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# Development of a generalized methodology to apply a detailed agro-hydrological model to multiple and diverse agricultural catchments.

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The high nitrogen loads in coastal waters can cause “green tides”, i.e. an excessive development of Ulva sp. macroalgae and their accumulation on foreshore during the spring and summer seasons.
The nitrogen losses are mainly due to agricultural activities (livestock and cropping) and they have to be strongly reduced to limit green tides both in term of frequency and of quantity of produced algae. This study concerns fifteen catchments distributed around the Brittany coasts (France).
The objectives are: (i) to develop a generic methodology to supply and format the data required in a complex model application and (ii) to evaluate in a prospective approach the effects of different mitigation measure on nitrogen fluxes at the outlet of the catchment and nitrogen cycle.
The generic methodology developed firstly consists in defining a typology of the catchments based on a multi-criteria statistic analysis. The criteria used are: impacted bay, livestock systems and cropping systems (total nitrogen loads from 145 to 240 kgN ha-1 an-1, 20 to 60% of grassland, 0 to 40% of vegetable crops), hydrological effective rainfall (from 200 to 650 mm an-1), soil and sub-soil properties, nitrogen contamination (outlet fluxes from 22 to 95 kgN ha-1 an-1), area (from 2000 to 42000 ha). This typology is used to select representative and diversified catchments for the application of the distributed model TNT2 (Topography-based nitrogen transfer and transformation).
The data needed can be classified in three categories: (i) daily climatic data such as minimal and maximal temperatures, potential evapotranspiration, precipitation, global solar radiation, (ii) cartographic data for soil, sub soil, land-uses, agricultural plots and (iii) agricultural practices data including crop rotations, date of crop implantation, harvest and nitrogen applications.
TNT2 was initially designed for small catchments and can run with a fine spatial resolution and high degree of details in agricultural practices. This work tests the ability of TNT2 to simulate hydrology and hydrochemistry with a lower resolution data level in large catchments (i.e. no differentiation of agricultural practices between farms or types of farms, all practices are averaged at the catchment scale).
In a decision support approach, the analysis of the modeling results and the construction of specific scenarios will help answering to the following question: according to catchment characteristics, could nitrogen losses be drastically reduced by optimizing present agricultural practices and systems or will it necessary to reduce the amount of nitrogen entering the system and/or changing the production systems?