

4.29 Aquifer surface ratio with excessive nitrate

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Aquifer Surface Ratio with Excessive Nitrate (ASRENI)	Water Management
<p>Description and justification</p>	<p>Provides an indication of groundwater quality referred to excessive nitrate concentration.</p> <p>The ASRENI addresses directly the good quality status mandate of the European Groundwater Directive.</p> <p>Tool: The ASRENI can be used to control the spatial (X, Y, and Z) evolution of groundwater pollution by nitrate, and it is especially useful to monitor the impact of remediation measures.</p> <p>It is also a powerful tool to report the general status of groundwater quality at River basin and Nationwide scales.</p>
<p>Definition</p>	<p>Ratio of aquifer/groundwater body surface with nitrate concentrations not complying with water quality standards (NO₃ above 50 mg/L) with respect to total aquifer/groundwater body surface.</p>
<p>Strengths and weaknesses</p>	<p>+ It is a simple and easy to understand indicator of groundwater pollution by agricultural activities.</p> <p>- Quite frequently, databases have poor quality with respect to two main aspects: depth representativity within the aquifer/groundwater body, and low spatial density data.</p>
<p>Measurement procedure and tool</p>	<p>Measurement: Water sampling in specifically designed/selected boreholes and wells at different depths and analysis of NO₃ content in accredited laboratories; quantification of groundwater body/aquifer surface with nitrate concentration above 50 mg/L at different depths and estimation of ASRENI with the support of GIS.</p>

	Tools: simple spreadsheets and GIS.
Scale of measurement	Groundwater body/aquifer scale.
Data source	
Required data	Nitrate concentration in groundwater samples taken and analysed after standard international methodologies and in adequately designed/selected observation points. Data can be retrieved from the official databases from water quality monitoring networks of water management authorities; trained groundwater users; public and private research institutions.
Data input type	Nitrate (NO ₃ in mg/L) data with indication of X,Y (georeferenced), depth of sampling and depth of screened stretch in the borehole/well, and date of sampling.
Data collection frequency	Usually biannual, based either on a seasonal or a crop-management scale.
Level of expertise required	To calculate the indicator: expert level on GIS. To understand the rationale behind and use the indicator it: low to medium expert level on hydrogeology.
Synergies with other indicators	With Correction Cost of Groundwater Quality.
Connection with SDGs	With SDG 6
Opportunities for participatory data collection	Groundwater sampling for nitrate analysis must be performed following specific methods of international standards, which advises to be collected only by adequately trained personnel.
Additional information	
References	NAIAD, Deliverable D6.2, From hazard to risk: models for the DEMOs. Part 1: Spain– Medina del Campo. SC5-09-2016 Operationalising insurance value of ecosystems. Grant Agreement n° 730497