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Monitoring nitrates water pollution by a citizen network in Spain, led by Greenpeace

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Original study by Greenpeace, Luis Ferreirim and Elia Gonzalez



In brief – In Spain, a citizen network was initiated by Greenpeace, with the aim of monitoring nitrate pollution in water. The network was created after suspicion of high nitrate amounts in waters due to intensive agriculture. It relies on the active engagement of local citizen collectives, associations and volunteers, who collect data with a measuring device. Nearly 800 measures were taken in 2021, and these results are publicly displayed online. Overall the initiative has been a success, and over time, Greenpeace hopes to make the network more independent, by preparing information and providing training.

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Introduction

The Spanish livestock industry is growing exponentially with more and more macro-farms which can have very serious repercussions, such as water contamination by nitrates. Greenpeace Spain estimated that the surveillance of nitrates amounts in waters by local authorities was insufficient, and saw an opportunity to design a citizen-based denunciation project to change this agroindustrial model. This innovative project which started in April 2021 is based on a citizen network, the Red Ciudadana de Vigilancia de la Contaminación del Agua por Nitratos (citizen network for surveillance of water contamination by nitrates) using a specific device (see picture 1) in order to monitor nitrate pollution. Around 800 measurements were collected in 2021 which can then be used as a tool to report excessive levels of nitrates in the bodies of water studied, such as groundwater, streams or rivers. In particular, in some places where a higher than legally permissible amount of nitrates has been detected, the reporting by Greenpeace led city councils to have to install a water purification machine and/or use another water source for the public network.

According to the [report](#) produced by Greenpeace (2022), the objectives of this project are three-fold:

- expand knowledge about water pollution by nitrates in Spain
- highlight the serious situation in which the water resources are and the importance of maintaining good quality water
- stimulate the defense of the right to clean water and the denunciation of the projects that threaten it, demanding, in particular, the end of factory farming.

The initiative is innovative in that it engages the citizens to actively take part in data collection about the quality of their waters, by using a “*highly reliable and easy to use*” technology (devices distributed by Greenpeace, picture 1). This allows data obtained from the measurements from May 2021 to January 2022 in various points of Spain to be displayed on a [map](#). The project is still ongoing, and now involves even more interested people.



Picture 1. The LAQUAtwinNO3-11 device used to measure nitrate concentration in water samples. © Foto: Greenpeace

Case study

- **Presentation**

The initiative of the citizen network arose from Greenpeace's project "Sin agua no hay pueblos. El agua limpia es un derecho" ("Without water there are no towns. Clean water is a right"). Due to a suspicion of high nitrate contents in water because of intensive livestock farms and insufficient verification of water quality by authorities, the citizen network formed by Greenpeace started in spring 2021 to collect data in all regions (comunidades autonomas) of Spain. The network consists of local citizen collectives, associations and volunteers. The objective of this project is to collect more data to complement official data and that people could use, for example as evidence to prove the need to slow down macro-farming, and to raise awareness about nitrate pollution generally and amongst local communities. In the year 2021, 4 measuring sessions took place, once every two months starting from May, collecting a total of almost 800 measurements.

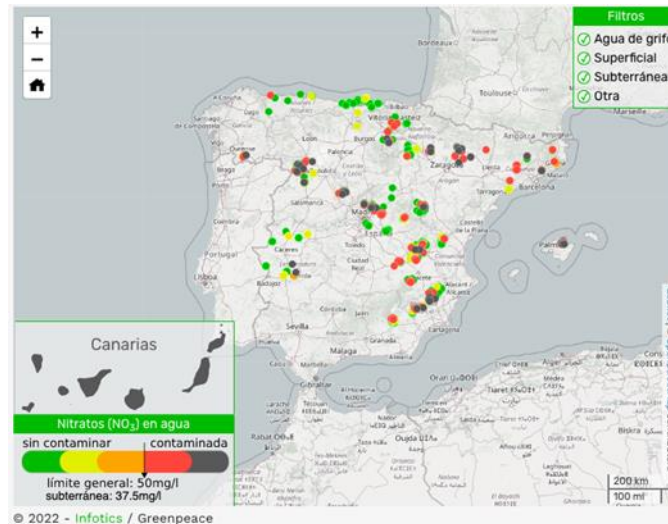
The data collected are sent by volunteers through a form which is then processed by Greenpeace and uploaded online on a map. Additionally, Greenpeace has produced a report available [here](#) which lays out the results of the campaign.

The uptake has been successful, with almost all groups approached agreeing to participate, meaning there are now around 30 devices distributed around Spain (excluding the « traveling device »). Information on the network, project, and ways to proceed for data collection is communicated to volunteers through documents produced by Greenpeace, such as a methodological guide. A training will also be organised, focussing on 4 themes: legal regulations, political incidence, territorial communication strategy, and how to organise better in groups and make mobilization strategies. There is also a more technical part about what are nitrates and what is the associated problem. Ultimately, Greenpeace would like to propose volunteers to take part in a final project as part of the course in which they could develop a campaign of their territory and put it into practice. All of this with the aim of making the network more independent and able to denounce the effect of macro farms on water nitrate pollution.

Hence this project provides capacity building for volunteers about various issues, then this knowledge can be transferred to people within their communities to raise awareness. Moreover, the results of the measures are public and there could be potential, upon agreement by volunteers, for them to be used in conjunction with official data to get a more general set of data that informs about the water quality on a larger area of the territory than currently available.

- **Technical characteristics**

The project is putting an emphasis on deploying means so that volunteers can be as independent as possible in the future. The information prepared by Greenpeace allows collectives to self-organise, enabling the option to pass the device from one regional group to another in order to cover more zones. However, Greenpeace is always present to resolve doubts and process the data, although one objective would be the automatisisation of data which would allow a direct upload from the form filled in by participants, to the map (picture 2).



Picture 2. Map of Spain showing the measurement taken. © Map: Greenpeace

The device used to take measurements has been chosen for its simplicity of use, its robustness and the fact it generates almost no waste. Another advantage is it is precise, and gives the reading instantly, without needing to take a water sample and add any chemical to it. The measurement is taken in situ, in the body of water. After processing of the data, results show that in Spain 53,6% of groundwaters indicate nitrate contamination with concentrations equal to or greater than 37.5 mg/l. Of the nearly 800 measurements taken, around 388 were made in groundwater, 293 in surface water and 89 in drinking water.

From July 2022 and to reply to demand from individual people interested in participating in the project, Greenpeace has put in place a new innovative method, whereby measurements are made by what they called the “medidor viajero” (traveling device). Forty people share the same device, which they can keep for 15 days and use to make as many measurements as they wish, before sending it to the next person. Although Greenpeace has coordinated and created some dynamics for this new way of proceeding, the volunteers are self organising in terms of managing the delivery of the device, and the upload of the data to the form.

Challenges and opportunities

- Challenges

During this first year, Greenpeace did not impose volunteers to make a specific amount of measurements, which has meant that there has been a lot of imbalance in the amount of measurements received from different areas and groups. This is because the participation in the project by citizens is voluntary, and all volunteers might not have as much time to dedicate to it. Hence this year, in order to get a more balanced and accurate set of data, volunteers have been asked to collect at least 10 measurements 4 times a year for their region. However, Greenpeace remains flexible and understands that volunteers have other commitments, hence it considers this project more a denunciation one than purely a citizen science one.

In terms of the difficulties encountered, there are various elements that are preventing the project from scaling up, including the price of the device, which is around 400€. There have

also been technical difficulties with the upload of data to the form on the volunteer's side. One reason for this is there is no real citizen science platform behind it. There have only been a few occasions on which opposition has been faced, since volunteers have been told to never go through private properties, and that Greenpeace was not looking for confrontation.

- **Opportunities**

This initiative is important since in Spain not all towns are required to control the amounts of nitrates in water. It is based on the number of inhabitants, and/or they can happen infrequently. In fact, volunteers have found towns where people were consuming contaminated water without knowing it. This was denounced and the city council took action.

Additionally, the government of Spain decided last year to repeal the royal decree 261/1996 that transposes the nitrates directive. The new version, 47/2022, contains many improvements, including article 9 stating that the entities such as the basin organizations, will be able to encourage citizen participation to diagnose the problem of water contamination by nitrates, supplying interested people with simple diagnosis systems to be able to measure nitrates. This is a step forward towards a wider measurement of such issues.

In spite of the few difficulties, some scalability options are explored. For example, there is interest from other Greenpeace offices to launch this same dynamic in their countries, such as in Italy. They have been given a device for testing, and they are building a budget to create their own network. However, this is a lengthy process and there would be a need to build up internal resources to support scaling up.

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