

AmlAire

Citizen science for air quality



AmlAire

Recommendations for public administrations

Policy Briefs

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Universidad de Deusto · Fundación Ibercivis · Scicling



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amiaire.org

Presentation

Based on the data collected during the AmlAire project's campaigns, the teacher evaluation questionnaires (N=45), and the experiences documented at more than 140 participating schools across 15 autonomous communities, the following recommendations have been drawn up in the form of public policy briefs.

AmlAire is a citizen science project funded by the Spanish Foundation for Science and Technology (FECYT, ref. FCT-23-19719) — Ministry of Science, Innovation and Universities — which has involved primary and secondary school students in monitoring air quality using low-cost sensors. Students build their own sensors out of cardstock and petroleum jelly, capturing suspended particulate matter (PM10, PM2.5, PM1) and analysing the samples using a digital image-processing platform developed specifically for the project.

These recommendations are drawn directly from the evidence generated by the project and from the proposals put forward by the participating educational community. They are not intended to replace the work of the competent bodies, but rather to offer concrete, evidence-based courses of action that can inform decision-making on air quality, mobility, urban planning and education.

PB1: Expand the coverage of the air quality monitoring network by integrating citizen science data

Context

The official network of air quality monitoring stations has significant geographic gaps, especially in rural and peri-urban areas. Many of the schools participating in AmlAire are located in areas with no coverage from fixed stations.

AmlAire evidence

The project has generated 2,087 geolocated measurements across 15 autonomous communities, a third of which are in rural settings. The low-cost sensors used showed an acceptable correlation with reference commercial sensors (Atmotube Pro), validating their usefulness as a complementary screening tool. The data has been published openly on Zenodo (DOI: 10.5281/zenodo.15621491).

Recommendation

Establish protocols for environment departments to incorporate data from citizen science campaigns as a complementary layer of information within their air quality monitoring systems, particularly in areas with insufficient coverage from fixed stations. This does not mean replacing official monitoring, but rather supplementing it with an initial level of screening that helps prioritize areas for more detailed action.

Potential recipients

Regional environment departments; Ministry for Ecological Transition and the Demographic Challenge (MITERD); Bilbao and Zaragoza city councils.

PB2: Establish atmospheric protection zones around schools

Context

Many schools are located close to high-traffic roads. Prolonged exposure to particulate matter (PM10 and PM2.5) has documented effects on respiratory and cardiovascular health, particularly among children and young people.

AmlAire evidence

Several participating schools documented, during the campaigns, notably higher pollution levels in vehicle-access areas around the school compared with interior or sheltered areas. Proposals from teachers gathered in the evaluation questionnaires repeatedly point to the need to restrict vehicle access to town centres during school hours and to encourage sustainable modes of transport for school journeys.

Recommendation

Encourage municipal mobility and urban planning departments to create low-emission perimeters or zones restricting access to motor vehicles within a minimum radius around schools, at least during arrival and departure times. Complement these measures with active mobility infrastructure (bike lanes, secure bicycle parking).

Potential recipients

Municipal mobility and urban planning departments; regional traffic authorities.

PB3: Integrate citizen science on air quality into the school curriculum

Context

Citizen science projects in schools currently require significant adaptation effort from teachers, who must fit the activity into an already demanding curriculum with little time available.

AmlAire evidence

77.8% of participating teachers consider that the measurement campaigns added value to the school programme and curriculum. 47.6% identified meaningful learning among students (scientific method, hypothesis formulation, data analysis, critical thinking). Teachers point to scheduling as the main barrier: they propose starting campaigns earlier in the school year (November or January) and having two measurement periods to obtain more complete results. The methodology was successfully implemented from 3rd grade of primary school through to the first year of Bachillerato (upper secondary), demonstrating its cross-cutting nature.

Recommendation

Include participatory environmental monitoring as a recognized activity within STEM and environmental education competencies in regional curricula. Facilitate its integration through specific funding calls supporting schools that take part in accredited citizen science projects, with recognition of training hours for the teachers involved.

Potential recipients

Regional education departments; Ministry of Education, Vocational Training and Sport.

PB4: Create a mechanism for feeding results from citizen science projects back to participating communities

Context

One of the recurring risks in citizen science projects is so-called “data extractivism”: participants contribute information but receive no results and do not see how their data creates impact. This erodes trust and future participation.

AmlAire evidence

The teacher evaluation questionnaires reveal, as one of the most frequent requests, the need to receive an accessible summary with the project's overall data and conclusions, so that students can see the impact of their work. Teachers also request the possibility of direct interaction with the research teams (video calls, visits). The closing event held at the Universidad de Deusto (10/06/2025) and the visit to the Osotu Lanbarri school (09/06/2025) were the first steps in this direction, but they were one-off actions that were not systematized.

Recommendation

Make public funding for citizen science projects conditional on the inclusion of a plan for feeding results back to participating communities, with defined deliverables (school-level reports, comparative maps, feedback sessions). FECYT's funding calls and similar regional programmes should incorporate this requirement as an evaluable criterion.

Potential recipients

FECYT; regional science and innovation agencies; citizen science funding bodies.

PB5: Protect and expand urban green cover as a strategy for mitigating air pollution

Context

Urban vegetation acts as a natural barrier against the dispersal of particulate matter. However, various urban development projects involve the removal of trees without equivalent replanting.

AmlAire evidence

40% of participating schools included additional variables in their measurements, among them the presence or absence of nearby vegetation cover as a factor affecting recorded pollution levels. Teachers' proposals explicitly include “avoiding the removal of trees and renaturalizing public spaces” as a priority measure. Data collected at schools with and without nearby vegetation cover offers a qualitative contrast that supports this relationship.

Recommendation

Incorporate into municipal urban development plans an obligation to maintain or increase tree cover around schools and children's spaces, with particular attention to species with documented capacity to

capture particulate matter.

Potential recipients

Urban planning and environment departments; regional territorial planning departments.

More information: amiaire.org · analysis.amiaire.org · Open data: doi.org/10.5281/zenodo.15621491