Policy Paper
Monitoring Farming Practice at Regional Scale: Objective Evidence for Agricultural Policy

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RILab: RIL2a, Agri-environmental Monitoring for Policy Makers

Date: August 2026

1. Highlights

The Issue: European agricultural policy needs credible evidence that sustainability commitments are being met, without adding administrative burden. Today that evidence rests largely on farmer self-declarations and infrequent inspections, which are costly to audit and give no continuous, area-wide picture.

The Findings: The Agri-environmental Monitoring Lab demonstrated two complementary routes in Greece. The first aggregates farm records and satellite imagery into verified, region-level indicators of farming practice. The second detects pesticide spray events automatically with an in-field sensor, and this evidence is now integrated into the finalized dashboard.

The Recommendations: Policy should enable consent-based data sharing between cooperatives and public authorities, recognize transparency-labelled regional indicators as monitoring evidence, support interoperable exchange between farm management systems and common data models, and support the coverage and validation that operational use would require.

The Impact: Continuous, objective regional evidence can complement inspections and self-declarations, reducing administrative burden for farmers and authorities while strengthening the credibility of sustainability reporting.

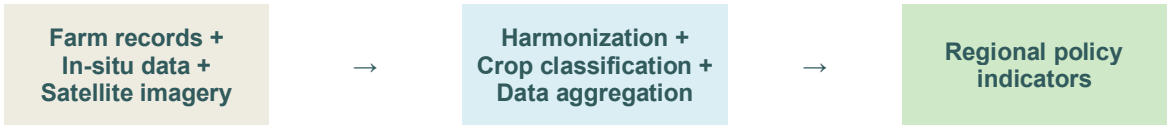

Figure 1) RIL2a logic: from farm records, in-situ sensors and satellite imagery to regional policy evidence.

2. Context of the Issue

Reducing administrative burden is a stated priority of the current agricultural policy debate, and simplification is its watchword. At the same time, Member States are asked to demonstrate the environmental performance of their agriculture. These two demands collide in practice. Public authorities depend largely on farmer self-declarations and infrequent field inspections, which are costly to audit, easy to misreport and blind between visits. There is currently no scalable mechanism to monitor actual farming practice continuously at regional level. Farm-level data does exist, but in fragmented silos (cooperative systems, advisory platforms, farm management software) with no governance framework connecting it to policy reporting, while pesticide use remains largely self-reported.

The Lab started from two questions. First, can fragmented farm records be turned into policy-

grade regional indicators? The regional monitoring service harmonizes digital farm books and field logs, combines them with free Copernicus satellite imagery (used to classify crops across a whole region and to fill gaps where ground data is sparse) and aggregates the result step by step from the individual parcel, to the group of parcels, to the administrative region. The indicators cover sprays, fertilizations, irrigations and harvests together with their per-hectare intensities, and can be queried by region, crop and time period through a public dashboard. Farm-level data is anonymized before any regional output is shared. Second, can chemical use be evidenced automatically so that it can be monitored regionally? A novel in-field sensor detects and classifies spray events, replacing error-prone manual logging with objective records.

A central lesson mirrors the wider project experience. Data access alone is not enough, because governance and representativeness are the real bottleneck. Eligible parcels are often scattered across administrative units, and coverage varies from year to year, so regional aggregates lean more heavily on satellite-derived signals, and every output is labelled to show whether it rests on direct farm records or on satellite-assisted estimates. User engagement pointed in the same direction. At the first demonstrator showcase, feedback came disproportionately from the scientific and industry communities, with limited direct participation from policy makers, which the Lab treated as a prompt to strengthen the policy-facing framing of the regional indicators. This brief is part of that response.

3. Policy Recommendations

1. Enable consent-based data sharing between cooperatives and public authorities

Regional indicators are only as representative as the farm records feeding them, and those records already exist. They sit in cooperative systems and farm management software, collected for agronomic purposes rather than for policy. What is missing is not the technology but a legal and organizational route for that data to reach public authorities in aggregated form, with the farmer’s consent and without exposing individual farm records.

We therefore recommend that national authorities, working with cooperatives and advisory organizations, put in place standard data sharing agreements and farmer consent frameworks that state clearly what is shared, at what level of aggregation, for what purpose and for how long. In the Greek demonstration the cooperative acted as the natural intermediary between individual farmers and the public authority, and this three-tier structure (farm, cooperative, region) maps onto administrative structures that already exist. Establishing the route once would allow the same data to serve several reporting obligations instead of being collected again for each one.

2. Recognize transparency-labelled regional indicators as monitoring evidence

Authorities are understandably cautious about acting on indicators whose reliability they cannot

judge. The Lab addressed this by labelling every output with its evidential basis, distinguishing indicators derived directly from farm records from those that rely on satellite-assisted estimates where ground data is sparse. The user therefore receives an explicit statement of confidence rather than a single undifferentiated number.

We recommend that authorities pilot such indicators inside existing monitoring workflows for a defined and limited set of sustainability indicators, running in parallel with current procedures rather than replacing them, so that agreement can be reached on the level of confidence required before an indicator is treated as evidence. We further suggest that the transparency-labelling approach itself be evaluated as a candidate quality standard for agri-environmental data, because the question of how to declare the evidential basis of an indicator arises for any monitoring service of this kind.

3. Support interoperable exchange between farm management systems and common data models

The burden reduction promised by this approach only materializes if data moves automatically. If a farmer or an advisor must re-enter the same information to satisfy a second system, administrative burden is displaced rather than removed. In the project, incoming farm logs were harmonized into a common agricultural information model through a semantic translation component, and that step proved to be the practical enabler of everything downstream.

We recommend continued support for automated interfaces between commercial farm management systems and common agricultural data models, including agreement on a small, shared set of definitions for the operations that matter most to policy, namely spraying, fertilization, irrigation and harvest. The project also met the opposite case. A planned connection between the Lab's harmonized records and the project's shared data infrastructure could not be activated initially, because the information model dialect used by the Lab and the current specification of the shared component had diverged. That is a concrete illustration of why alignment on versions and dialects deserves explicit attention, and not only agreement on standards in the abstract.

4. Support the coverage and validation that operational use requires

The results reported here come from a demonstration rather than from an operational service, and two conditions would have to be met before the outputs could carry regulatory weight. The first is parcel coverage. Regional indicators become statistically meaningful only once a critical mass of parcels within each administrative unit is monitored, and in the demonstration eligible parcels were often scattered across several units. The second is sensor coverage. The pesticide detection function has been demonstrated at pilot scale in one area, so offering it as a regional service would require a station network deployed across several regions.

We recommend that research and innovation funding continue to support precisely this step,

which is the least attractive to finance privately and the most necessary for policy use, namely the move from a working demonstration to validated coverage at regional scale, including independent assessment of accuracy across different crops, regions and seasons.

4. Evidence and Analysis

- The regional monitoring service was demonstrated on commercial farms in three Greek regions (Thessaly, Crete and Central Macedonia) and across five crops (wheat, peach, tomato, potato and cotton), with indicators aggregated from parcel level up to regional level and served through a live public dashboard and query service at scaleagdata.neuropublic.gr.

- The pesticide monitoring function, a novel in-field sensing array that distinguishes no-spray, water-spray and pesticide-spray events, was deployed at a pilot site in Farsala, Thessaly over two seasons. Controlled spray tests were carried out in 2024 and 2025, and the resulting data have been quality checked and integrated into the finalized dashboard.

- Transparency is built in. Outputs are labelled on an evidential basis, and farm-level information is anonymized and aggregated before any regional indicator is shared, which protects farmer privacy while keeping the outputs policy-relevant.

- The work remains at demonstration stage. The main limitations are parcel coverage below critical mass in some administrative units, pesticide detection demonstrated at a single pilot area rather than as a regional network, and an interoperability bridge to the project's shared data infrastructure was prepared.

Figure 2) RIL2a interactive monitoring dashboard providing a regional-level view of farm-management and sustainability metrics.

5. Strategic Alignment

The work sits under the European Green Deal as its umbrella. Continuous, area-wide monitoring of the environmental footprint of farming, covering input use, cropping diversity and land management, is the evidence base that footprint-reduction policies presuppose. Within that umbrella the Lab addresses one concrete and practical problem: authorities are asked to demonstrate sustainability performance, yet they lack the means to observe farming practice continuously.

All references to the post-2027 CAP below are indicative, since the regulation is not yet adopted and no articles can be cited. Demonstrated results are anchored in the current CAP, under which the project was funded and tested.

Policy area	Relevant link	Policy message	Who could use it and what they would need
Agricultural policies	Current CAP, covering the monitoring of sustainability indicators, the verification of commitments and the reduction of administrative burden. Post-2027 CAP (indicative). In our reading, in-situ evidence could also complement satellite-based area monitoring for what satellites cannot see.	Verified regional indicators and automated spray records can complement inspections and self-declarations, once governance, coverage and acceptance conditions are met.	Hellenic Ministry of Rural Development and Food, and the Greek paying agency authority (a role assumed by AADE in January 2026). DG AGRI for methodology and paying agencies in other Member States as replication targets. They would need indicators accepted as evidence within monitoring workflows, and data sharing frameworks in place.
Digital and data policies	EU agricultural data space, common agricultural information model, semantic harmonisation of farm records.	The governance and data harmonisation architecture is a reusable building block for defragmenting the agricultural data landscape.	Agricultural data space initiatives and farm software providers. They would need interoperable interfaces and clear consent rules.
Research and innovation	Horizon Europe Cluster 6 (food systems, environmental observation, agriculture and rural areas) and the Agriculture of Data partnership.	Further research is needed on coverage, independent validation and interoperability. The Agriculture of Data partnership is the natural scaling route for the regional monitoring approach.	DG AGRI research and innovation, and the Agriculture of Data partnership itself, which the consortium intends to engage. They would need validated, replicable building blocks.
Sustainability goals	Farm to Fork (input monitoring) and SDGs 2, 3, 6 and 12.	Objective chemical use and practice data supports input-reduction and sustainable-production reporting, presented as a measurement capability rather than a commitment to specific targets.	Environmental and regulatory agencies tracking the footprint of farming. They would need objective, comparable input-use data.

6. References

All ScaleAgData deliverables listed below are public.

D3.4 ScaleAgData generic architecture and data governance, sharing meta architecture and integration of the RI Labs, v2.

D3.5 Sensor and edge processing selection, development, spatial planning and data collection, v2.

D4.5 Sensor-integrated data products, v2.

D5.2 Deployment and Evaluation Report.

D5.4 Deployment and Evaluation Report, v2 (forthcoming), which contains the second-iteration demonstrator documentation for RIL2a.

D5.5 Replication Guidelines (forthcoming).

D6.5 IPR and Business Model Report (forthcoming).

D6.6 Policy brief (forthcoming).

Live dashboard at https://scaleagdata.neuropublic.gr

All tools and data have been made publicly available in the project GitHub at:
https://github.com/ScaleAGData/CROP-RILAB

7. Contact Details

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