



STATE AUDIT OFFICE OF GEORGIA

Audit Report on Anti-Hail Systems in Georgia



How effective are the anti-hail systems currently in place in the country?

- Audit Report on Anti-Hail Systems in Georgia
- EUROSAT WG on Disaster Funds | May 2025



The Growing Threat: Climate and Agriculture

- Hail is a growing hazard to Georgian agriculture.
- Extreme weather causes severe crop and infrastructure losses.
- Example: 13.3 million GEL in hail damage over just 4 days.



Budget Allocation Overview



Since 2015, 38.6 million GEL spent on anti-hail systems.



Funded and managed by LEPL Delta under MoD.

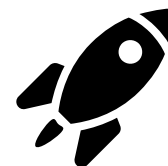


Coverage limited to Kakheti despite national risk.



✓ 1. Rocket-Based System (Georgia – Current)

- Ground-launched rockets disperse chemicals in clouds.
- Active only in **Kakheti region** since 2015.
- **Limitations:** One radar, limited launcher coverage, aviation restrictions, staff/rocket shortages.



✈ 2. Aviation-Based Hail Suppression

- Planes disperse silver iodide in storm clouds.
- Concept developed for **Shida Kartli (2021), not implemented.**
- Pros: Mobile, wide-area coverage.
- Cons: Expensive, requires skilled pilots, airspace coordination.



🌧 3. Hail Nets

- Physical barrier protecting crops.
- Offered via “**Plant the Future**” program.
- Low adoption due to **high cost and low state co-financing.**



🔊 4. Sound-Based Systems

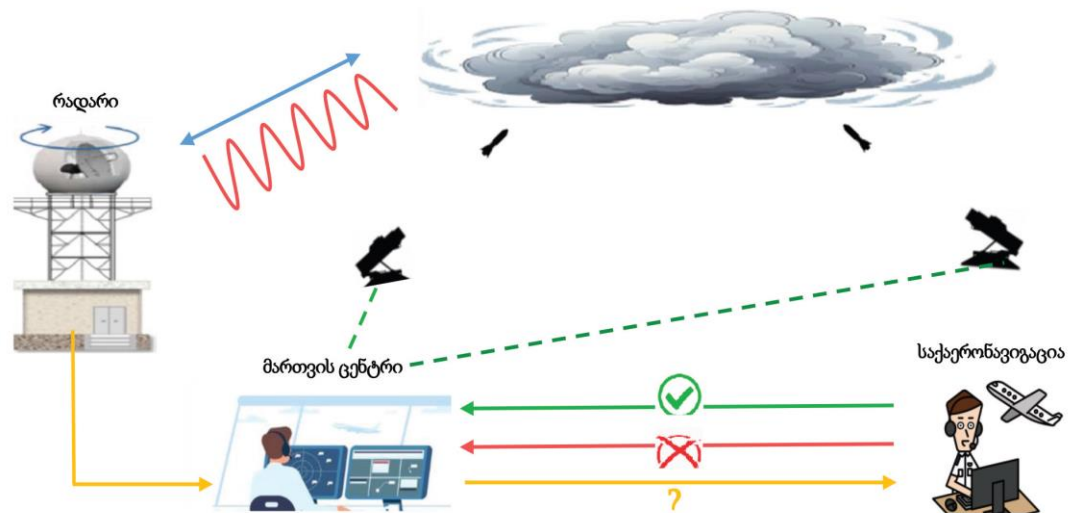
- Emit **shockwaves or explosions** to disrupt hail formation.
- Often used in **vineyards or small-scale farms.**
- Not implemented or assessed in Georgia per audit.
- Pros: Local protection; Cons: Effectiveness debated, limited range.



🔍 Audit Insight:

Georgia relies **only on rockets**, with **no implemented alternatives** elsewhere in the country.

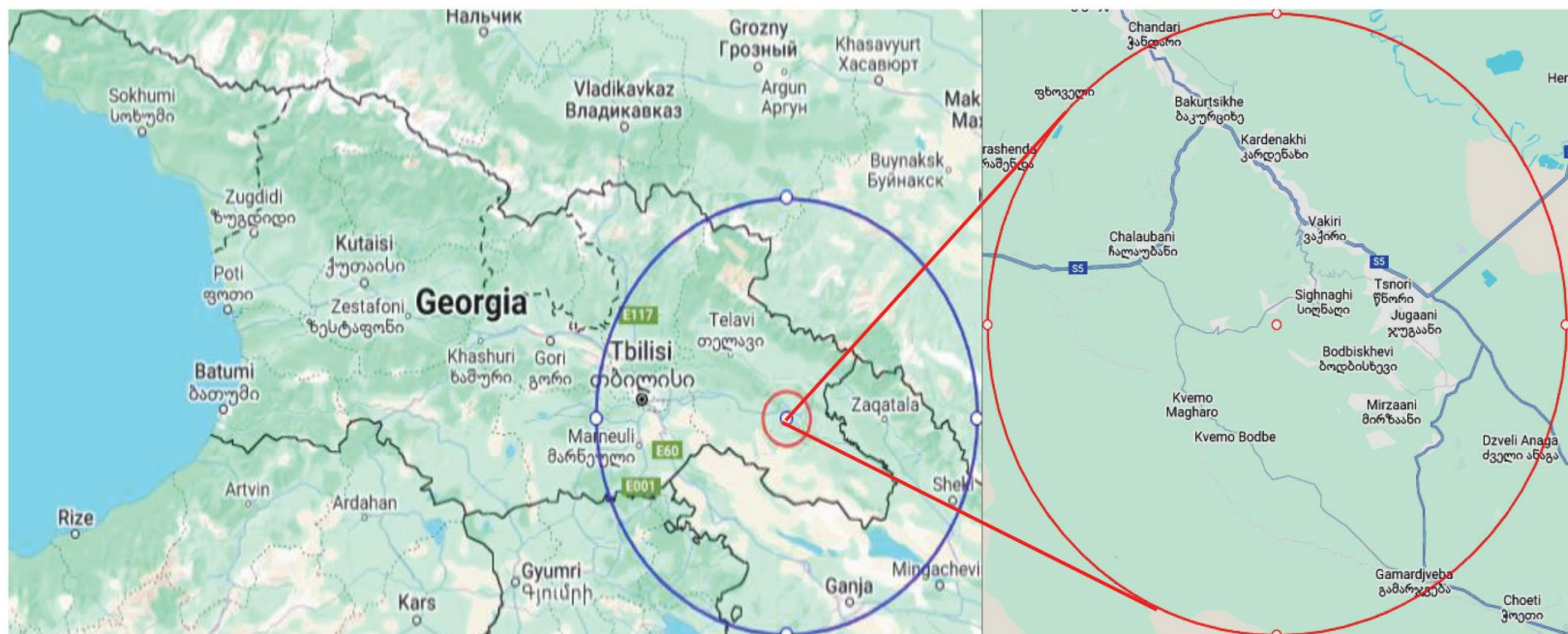
Georgia's Response: Rocket-Based System



- Operational only in Kakheti region.
- Uses 92 ground-based rocket launchers.
- Seasonal operation: April–November annually.

The Missing Radar: One Point of Failure

- Only one radar (Nukriani) used nationwide.
- Radar is outdated and covers only part of the region.
- Failure disables the entire system.



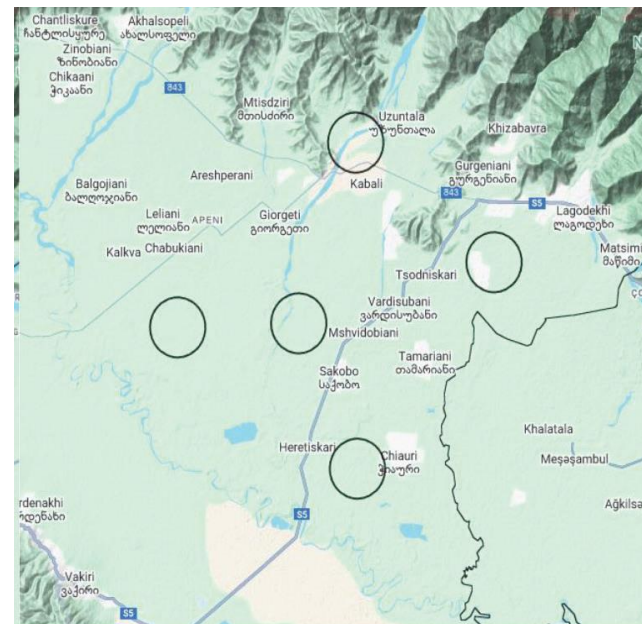
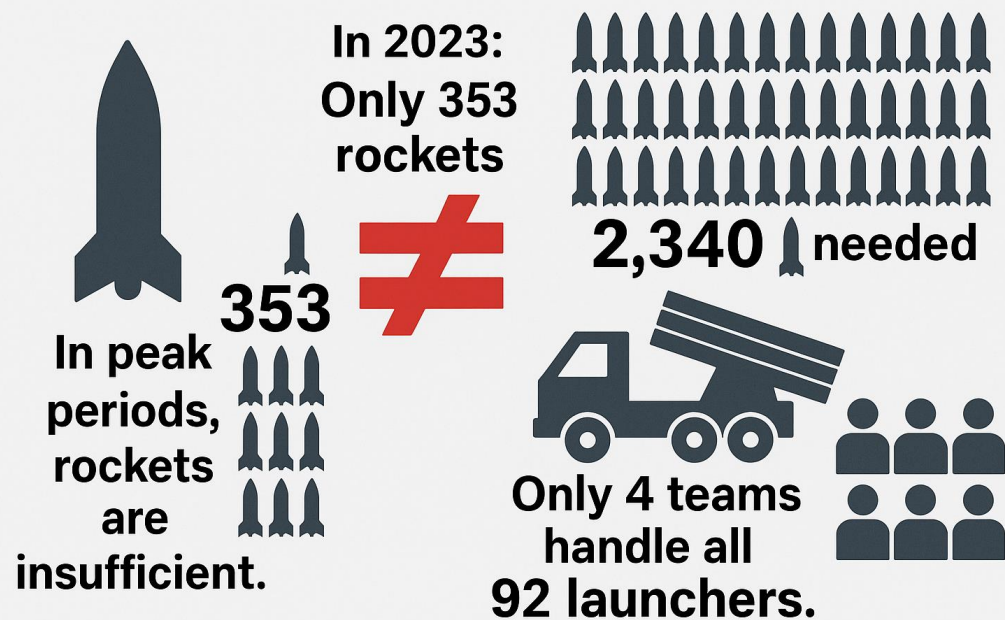
Communication Gaps and Coverage Limits



- Fiber-optic lines are vulnerable to weather.
- Dead zones and no 'buffer' launcher zones exist.
- Launch orders often fail to transmit.

Rocket Shortages and Staffing Problems

- In peak periods, rockets are insufficient.
- In 2023: Only 353 rockets for 2,340 needed.
- Only 4 teams handle all 92 launchers.



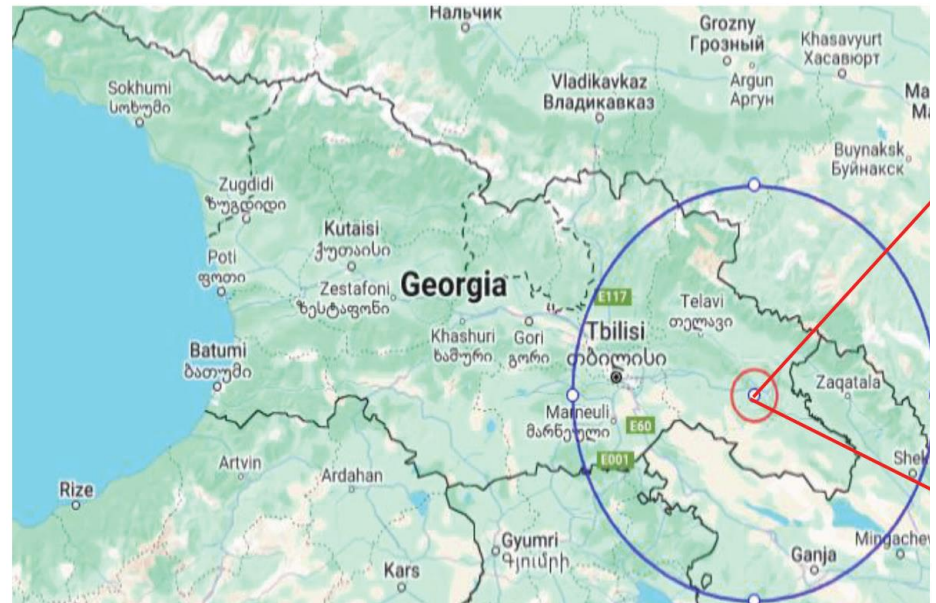
Aviation Restrictions Block Action



- Rocket launches require airspace clearance.
- Civil Aviation delays hinder timely response.
- Telavi Airport may worsen airspace restrictions.

No National Strategy or Alternative Systems

- No coverage outside Kakheti.
- Concepts for other regions exist but aren't implemented.
- Low use of hail nets due to high cost, low co-funding.



Ineffective Subsidy Uptake: Hail Nets

- 'Plant the Future' program has low participation.
- Farmers lack financial incentive and awareness.
- State co-financing not attractive enough.



Inadequate Damage Tracking and Compensation



No centralized data on hail frequency or losses.



Compensation lacks transparency and monitoring.



Risk of inefficient public fund use.



Audit Highlights Key Systemic Risks



Single-point radar
failure risk.

Poor communication
infrastructure.

Funding allocated
but results limited.



Total Recommendations Issued: 3

Audit Recommendations



Recipients:

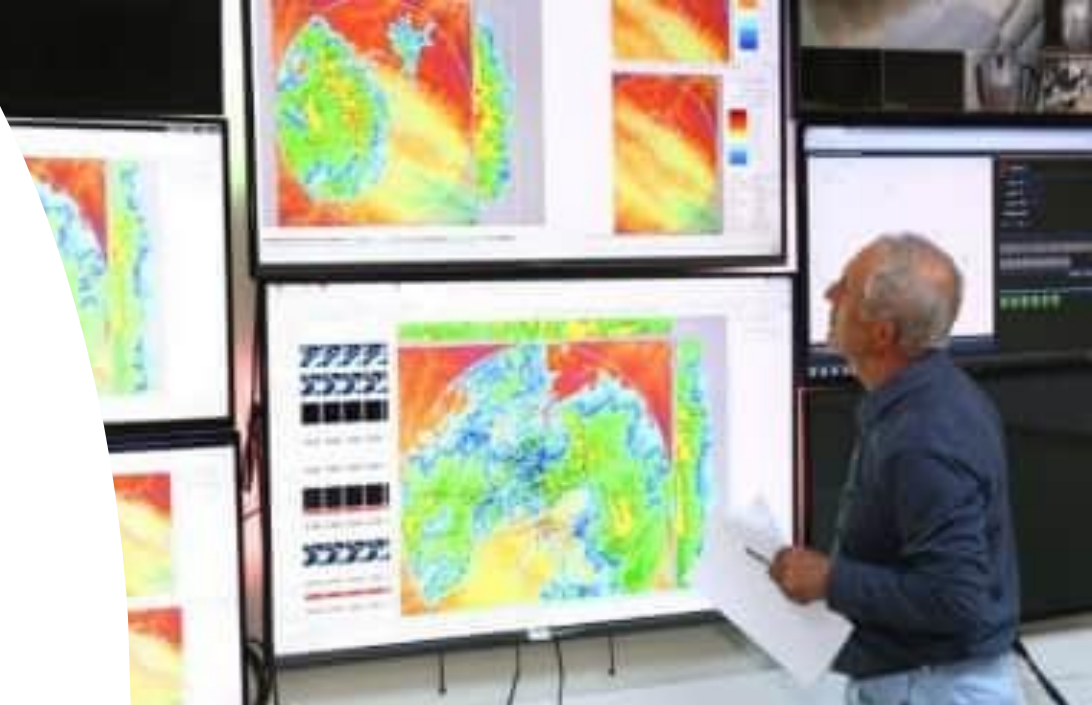
LEPL National Environmental Agency
(Recipient of Recommendation #1)

LEPL Delta (Under Ministry of Defense)
*(Recipient of Recommendation #2 and
co-recipient of #3)*

**Ministry of Environmental Protection
and Agriculture of Georgia**
(Co-recipient of Recommendation #3)

Audit Recommendations (Technical)

- Acquire additional radar, eliminate dead zones.
- Improve launcher placement and communication.
- Ensure rocket availability and trained personnel.



Audit Recommendations (Strategic)



Expand system coverage to other regions.



Develop aviation and mixed-method solutions.

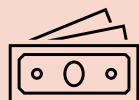


Improve data collection and fund oversight.

A Safer Future: Coordinated, Scalable Protection



National strategy needed for hail mitigation.



Better fund use ensures stronger disaster resilience.



Effective protection is possible — with action.

THANK YOU!

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