ALPENKONVENTION
CONVENTION ALPINE
ALPSKA KONVENCIJA
CONVENZIONE DELLE ALPI

Topic 2: Agriculture 4.0 & Climate Smart Forestry

2nd Thematic Workshop of the Mountain Agriculture and Mountain Forestry Working Group (MAMF)
Alpine Convention - 4 May 2026

Workshop - Overview

Context: The workshop explored **how digital innovation can support resilient mountain forests and agricultural systems while identifying limits, governance needs, and implementation challenges.**

Objectives:

- Exchange experiences across Alpine and international regions
- Assess opportunities and limits of digital technologies
- Share operational case studies
- Identify policy and governance recommendations

Workshop - Structure

Part I: Mountain Forestry

1. Forest Monitoring & Innovation
2. Forest Adaptation to Climate Change

Part II: Mountain Agriculture

3. Digital Farming & Agricultural Technology
4. Collaborative Farming Systems

Session 1 – Forest Monitoring & Innovation

Key presentations: 3D sensing, LiDAR and AI for forest inventories

FORWARDS - European Forest Observatory

Forest EcoValue ecosystem service assessment and valuation

Main findings: Advanced monitoring technologies provide unprecedented information for forest management. Harmonization of data sources and operational deployment remain major challenges.

Session 1 – Forest Monitoring & Innovation

Strategic Recommendations

- Develop Alpine-wide monitoring standards
- Strengthen interoperability of datasets
- Translate ecosystem-service valuation into policy instruments
- Expand financing tools (water, carbon and nature credits)
- Ensure operational uptake of research outputs

Session 2 – Forest Adaptation to Climate Change

Key presentations:

Climate-smart forestry decision-support systems

WINALP21 climate adaptation planning

Tree-App.ch species selection under future climates

Main findings: Decision-support tools are becoming essential for adaptation planning. Uncertainty management and continuous updates are critical for long-term relevance.

Session 2 – Forest Adaptation to Climate Change

Strategic recommendations

- Co-design tools with practitioners
- Use scenario-based planning approaches
- Improve ecological and soil datasets
- Build modular and updateable platforms
- Integrate tools through common digital gateways

Session 3 – Digital Farming & Agricultural Technology

Key Presentations:

Precision agriculture technologies

Swiss mountain farming innovation

Agridata.ch agricultural data exchange platform

Main findings: Digital technologies improve efficiency and monitoring but adoption depends on affordability, trust, skills, and enabling regulatory frameworks.

Session 3 – Digital Farming & Agricultural Technology

Strategic recommendations

- Increase digital literacy and farmer training
- Promote shared technology services
- Develop decentralized data infrastructures
- Ensure interoperability standards
- Create legal frameworks for agricultural data governance

Session 4 – Collaborative Farming Systems

Key presentations:

Mountain Partnership initiatives (FAO)

IRRITRE smart irrigation network

Village Agriculture Cooperatives (Pakistan)

Pascolando cooperative farming model (Italy)

Main findings: Collaboration is a critical success factor for resilience, economic viability, youth engagement and rural revitalization.

Session 4 – Collaborative Farming Systems

Strategic recommendations:

- ❖ Support cooperative governance models
- ❖ Encourage youth participation and succession
- ❖ Integrate cooperation into education systems
- ❖ Balance efficiency with democratic participation
- ❖ Promote community-based value chains

Cross-Cutting Challenges & Conclusions

Data fragmentation; Climate uncertainty; Regulatory gaps; Cost and access barriers; Stakeholder engagement; Scaling successful initiatives

The workshop demonstrated that **technology can significantly enhance resilience in mountain forestry and agriculture**.

Long-term success requires governance, stakeholder engagement, capacity building and collaborative territorial approaches.

Policy Implications for the Alps

1. Support interoperable digital infrastructures.
2. Foster transnational knowledge-sharing.
3. Reward ecosystem services through innovative financing.
4. Promote inclusive and collaborative governance.
5. Strengthen innovation uptake in mountain areas.

Key words: Digitalization • Climate Adaptation • Ecosystem Services • Cooperative Models • Youth Engagement • Capacity Building

ALPENKONVENTION
CONVENTION ALPINE
ALPSKA KONVENCIJA
CONVENZIONE DELLE ALPI

THE ALPINE CONVENTION IS THE FIRST INTERNATIONAL TREATY FOR THE PROTECTION AND PROMOTION OF THE SUSTAINABLE DEVELOPMENT OF A CROSS-BORDER MOUNTAINOUS REGION

italian presidency 2025 - 2026
alpine convention
Together we can!

Thank you!