



# **PRESERVATION OF WOODEN ARCHITECTURE HERITAGE IN THE ROMANIAN CARPATHIANS: CHALLENGES AND PERSPECTIVES**

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# Introduction & Objectives

01 Object of Study: Unique wooden architecture of the Romanian Carpathians (Maramureş and Transylvania). Modern methods of preservation.

02 **Objective:** To analyze the complex approach to preservation, combining new scientific technologies with social initiatives.

# Why is this Important?

- Cultural Value: A blend of craftsmanship, spirituality, and symbolism.
- UNESCO Recognition: Many wooden churches are included in the World Heritage list.
- Historical Identity: High spires and complex roofs reflect how communities adapted to local conditions and history.





# Traditional Protection Methods

- Material Selection: Timber (Oak or Spruce) cut only in winter to reduce sap and pests.
- Roof Maintenance: Regular replacement of wooden shingles (dranița).
- Surface Treatment:
  - Charring.
  - Natural sealants like linseed oil to protect against moisture.

# Limitations of Traditional Restoration

- Replacement vs. Preservation: Traditional repair often meant replacing damaged parts with new ones.
- Loss of Originality: While the structure “lives longer,” the original material is lost.
- Modern Goal: To preserve the original structure and historical substance using advanced conservation methods.



# Modern Physical-Chemical Methods

Technology: Using gamma rays to “sterilize” wooden artifacts (Method used by IRASM center / IFIN-HH). Deep penetration kills insects and fungi inside the wood structure.

Advantages:

- No chemical usage.
- No change in color or structure.
- Non-invasive stabilization using hidden carbon fiber/fiberglass rods. \*\*



# Digital Twins



- Concept: Creating exact 3D digital copies of monuments.
- Technologies: Terrestrial laser scanning (LiDAR) and Photogrammetry.
- Purpose:
  - Preserving memory in case of fire or destruction.
  - Monitoring structural deformations over time.



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Root4Dig

ПАРТНЕРСТВО  
БЕЗ КОРДОНІВ

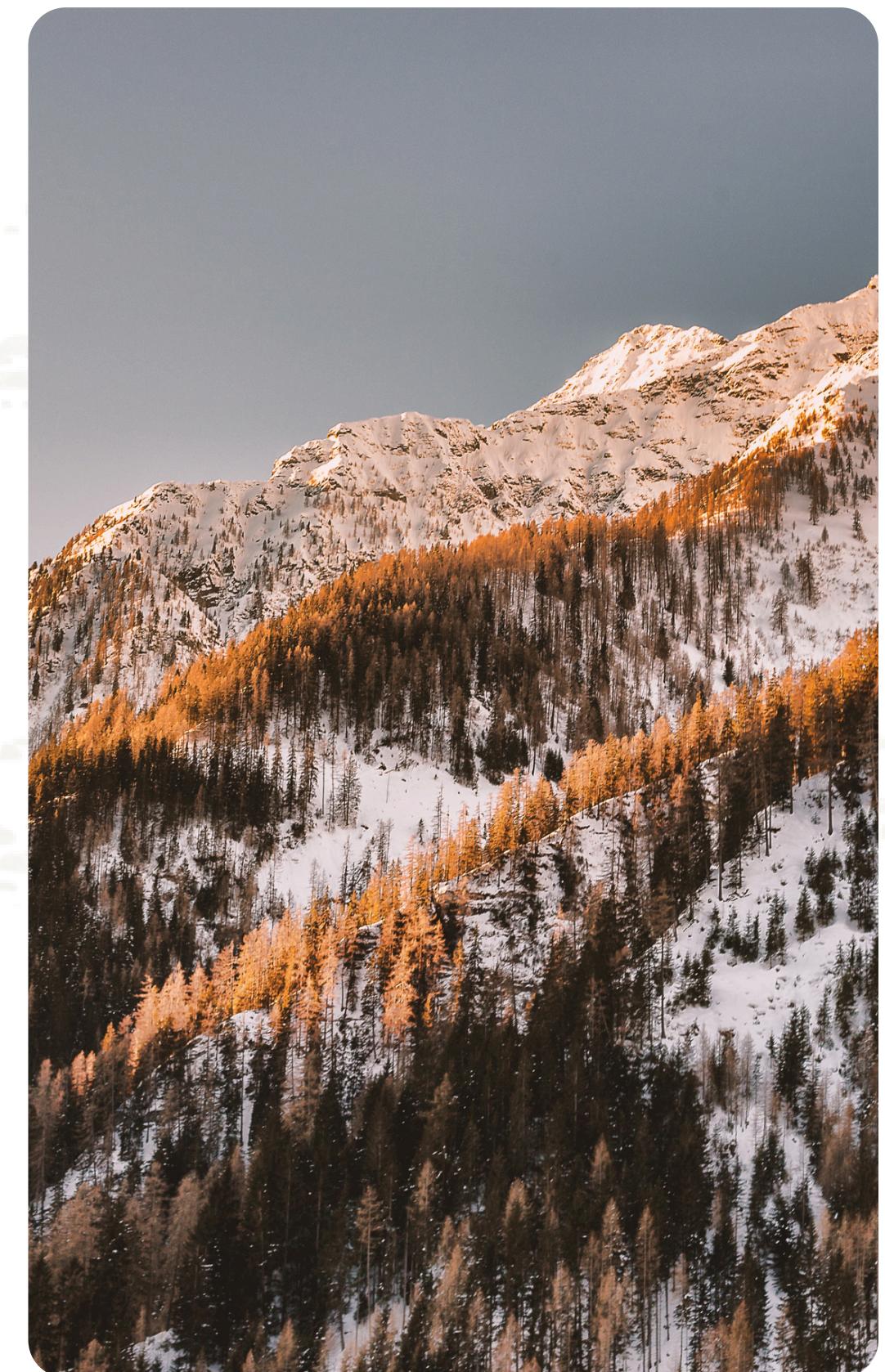
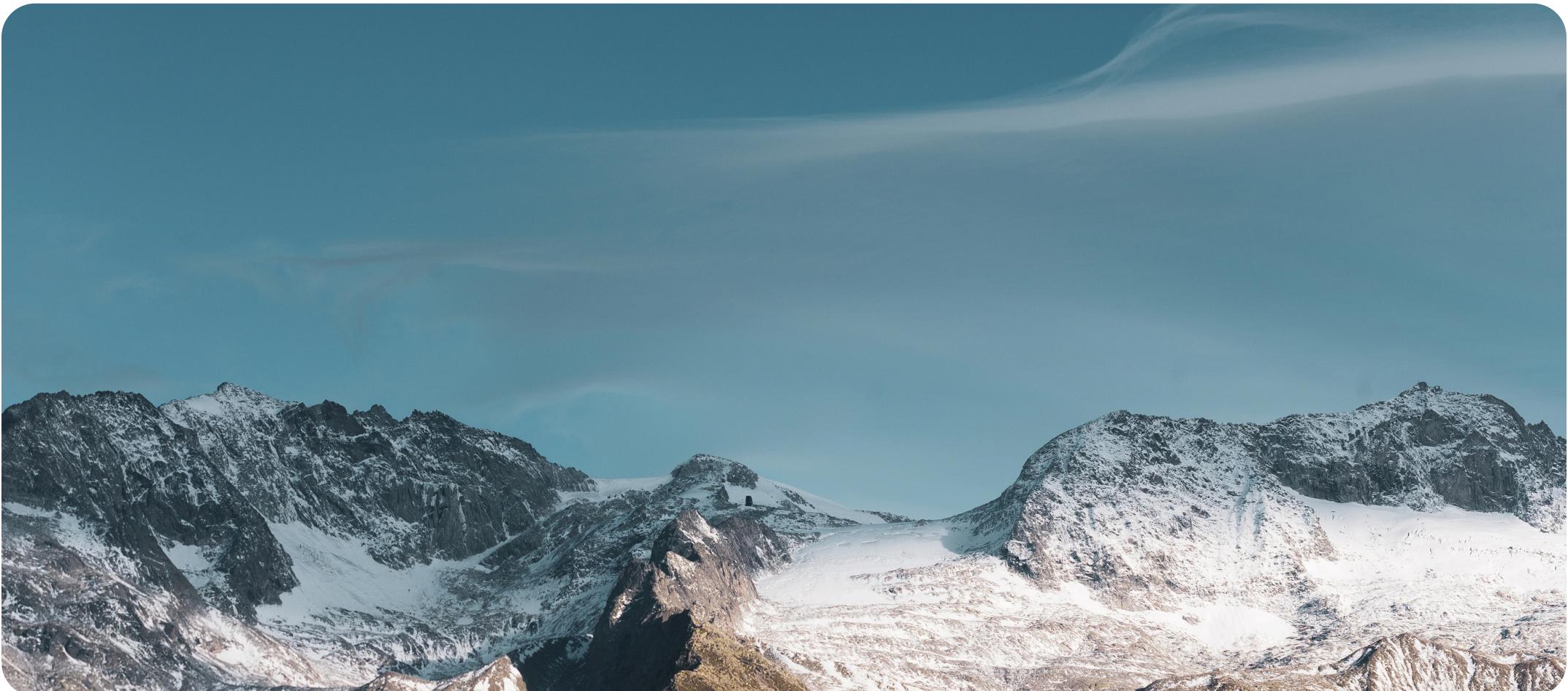


# Projects

- Sălaj and Cluj Counties: Digitization of wooden churches (e.g., Voivodeni and Săliștea) to record exterior and interior conditions.
- “Root4Dig“ Project: Creating virtual models for “Virtual Museums.“ VR Tours: Allows remote visits, reducing physical human impact on fragile microclimates and old floors.

# Social Challenges

- The Problem: A critical lack of masters capable of traditional maintenance.
- The Risk: Restoration by unskilled workers can damage UNESCO monuments.
- The Need: Educational programs to transfer ancient skills to the new generation.





# "Ambulance for Monuments"

Concept: An emergency service for monuments under immediate threat.

Collaboration: Unites volunteers, architecture students, and experienced craftsmen.

Dual Benefit:

1. Saves the physical structure (e.g., urgent roof repairs).
2. Revives craft professions among young people.



# Conclusion

The preservation of wooden architecture in the Romanian Carpathians is a complex challenge that requires bridging the gap between ancient craftsmanship and modern innovation. Romania successfully integrates traditional knowledge with advanced scientific solutions, such as gamma-ray sterilization and digital digitization, to protect this unique heritage. Ultimately, the long-term survival of these monuments depends on the continuous collaboration between scientists, restorers, and social initiatives to maintain both historical integrity and structural stability.