

AI-Based Risk Communication and Conscious Tourism Development in Volcanic Areas: The Case of Mr Plinio, the AI Assistant of Vesuvius National Park

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From an AI assistant for visitor information to a scalable platform for science communication and risk awareness in Natural Protected Areas and hazard-prone environments.

INTRODUCTION

Volcanic areas represent complex socio-ecological systems characterized by significant scientific, environmental and cultural value, while simultaneously exposing residents and visitors to multiple forms of risk. In these contexts, risk communication plays a strategic role in supporting safe behaviours, improving awareness and fostering informed interactions with the territory.

The challenge is particularly relevant in highly visited volcanic destinations, where visitors are often attracted by the scenic and symbolic value of the landscape but may possess limited knowledge of the hazards associated with active volcanic environments. Effective communication therefore requires tools capable of providing timely, understandable and accessible information to heterogeneous audiences. Recent advances in Artificial Intelligence (AI) offer new opportunities for transforming risk communication from a static and one-directional process into a more interactive and user-centred experience. Within this framework, the Vesuvius National Park developed Mr Plinio, the first AI-powered virtual assistant implemented by an Italian National Park.

CASE STUDY: VESUVIUS NATIONAL PARK

Vesuvius National Park is one of the most iconic volcanic landscapes worldwide and receives thousands of visitors every year. Tourism activities take place within an active volcanic environment characterized by different levels of hazard and exposure, including:

- Long-term volcanic risk
- Wildfire risk
- Extreme weather conditions
- Temporary trail closures
- Access restrictions related to environmental protection and visitor safety

These conditions require communication systems capable of providing updated information while supporting both visitor experience and risk awareness.

MR PLINIO: AN AI TOOL FOR RISK COMMUNICATION

From Visitor Assistance to Safety Communication

In 2024, the Vesuvius National Park launched Mr Plinio, an AI-based chatbot developed within the framework of the European Charter for Sustainable Tourism (ECST). Initially conceived as a visitor assistance tool, the system progressively evolved into a digital platform supporting environmental interpretation, visitor guidance and safety-oriented communication.

COMMUNICATION MODEL



DISCUSSION AND IMPLICATIONS

The experience of Mr Plinio suggests that AI-based virtual assistants can contribute to strengthening risk communication strategies in volcanic and multi-hazard environments. The system allows scientific and institutional information to be translated into accessible, user-friendly and context-specific messages. In doing so, it helps integrate safety awareness into the ordinary tourism experience rather than limiting communication to emergency situations. Particularly relevant is the possibility of addressing visitors who may have little prior knowledge of volcanic hazards, encouraging more informed and responsible interactions with the protected area. Rather than replacing scientific expertise or institutional responsibility, AI acts as a complementary communication layer that facilitates access to validated information and broadens its dissemination.

FUTURE PERSPECTIVES

The experience of Mr Plinio demonstrates the potential of AI-based virtual assistants to support science communication and risk awareness in volcanic environments. Future developments will focus on progressively expanding the chatbot's knowledge base through the integration of additional validated scientific data, environmental monitoring information and institutional content. A promising direction involves strengthening collaboration with volcanological research institutions, such as the Istituto Nazionale di Geofisica e Vulcanologia (INGV) and university research centres, enabling the continuous updating of information and the delivery of increasingly accurate, reliable and evidence-based responses. Such collaborations could also support the integration of real-time environmental data and the dissemination of the latest scientific knowledge. The proposed model is highly transferable and could be replicated in other protected areas and hazard-prone territories. AI-based assistants have the potential to become scalable tools for risk communication, science communication and public engagement, supporting institutions in making validated scientific knowledge more accessible while promoting safer, more informed and responsible interactions with natural environments.

MAIN FUNCTIONS



CONCLUSIONS

- ✓ AI can support risk communication in volcanic protected areas.
- ✓ Chatbots can transform risk communication from a static to a dialogic process.
- ✓ Multilingual accessibility improves communication with international visitors.
- ✓ Safety awareness can be integrated into everyday tourism experiences.
- ✓ AI-based tools can promote more conscious, responsible and sustainable forms of tourism.

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