



D.3.2.3

Manual with policy recommendations plan



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1. Executive Summary

This document constitutes Deliverable D.3.2.3 of the STRENGTH project (STRategies for assessing climate change and natural hazards' impact on urban ecosystems, increasing resilience to ENvironmental hazards, and promoting territorial GrowTH), funded under the Interreg Italy-Croatia 2021-2027 programme. It is a strategic-methodological manual for flood and climate risk communication, intended primarily for the Municipality of Ravenna and local administrations in the province, but adaptable to other territorial contexts characterised by similar hydrogeological risks.

The manual translates empirical evidence gathered through the project's sociological research — a sample survey of 513 residents of the Province of Ravenna and 18 semi-structured interviews with stakeholders — into data-based principles and operational recommendations to improve the effectiveness of public risk communication. The approach moves beyond the traditional one-way communication model, which assumes that adequate information automatically produces behavioural change, embracing instead a cooperative, multi-directional and participatory model.

The research findings highlight four critical nodes. First, a significant gap between awareness of risk (74.3% feel adequately informed) and awareness of measures to address it (60.6%): existing communication describes the problems without providing practical response tools. Second, a strongly differentiated source credibility structure: scientists and emergency services are highly credible (86–87%), while national political authorities are much less so (46.6%). Third, the organisational separation between civil protection offices and communications offices as the main risk factor in crisis management. Fourth, preventive communication in peacetime is unanimously considered insufficient by all stakeholder interviewees.

The manual is structured in four parts: an analytical summary of empirical evidence; a framework of six guiding principles; operational guidelines for each phase of the risk cycle and for the main communication tools; and a priority action plan with assigned responsibilities and timelines. In-depth analyses of the data are available in Deliverables D.3.2.1 and D.3.2.2.



2. The STRENGTH project and the Sociological Research

2.1 The project

STRENGTH is a project funded under the European territorial cooperation programme Interreg Italy-Croatia 2021-2027 (Project ID: ITHR0200318). Its overall objective is to develop strategies for assessing the impact of climate change and natural hazards on urban ecosystems, increase resilience to environmental risks, and promote territorial growth. The project runs from 1 April 2024 to 30 September 2026 and involves Italian and Croatian partners.

The sociological research, conducted by the DOS Laboratory of the Department of Humanities at the University of Ferrara, constitutes the empirical component of the project relating to the social dimension of risk. Its specific objective is to understand how the local population and stakeholders perceive, interpret, and respond to flood and climate risk, with particular attention to risk communication as a lever for behavioural change and the strengthening of territorial resilience.

2.2 Theoretical Framework: Beyond the Information Deficit Model

The research starts from a critique of the dominant model in institutional risk communication: the so-called Information Deficit Model, according to which the adequate supply of information would automatically produce behavioural change in the desired direction. This model — which can be described as a linear transmission from expert sources to a passive public — has guided most risk communication campaigns, often with disappointing results.

More recent research on risk communication highlights instead how the relationship between information and behaviour is mediated by a plurality of factors: psychological (perception of self-efficacy, cognitive biases, psychological distance from risk), contextual (prior experiences, territorial rootedness, economic constraints), social (trust in institutions, relational networks, community belonging), and cultural (values, beliefs, interpretive frames). Effective communication is therefore not a transmission of information, but a bi-directional, multi-actor process that requires a deep understanding of audiences, their contexts, and the specific barriers to action.

This theoretical shift — from the deficit model to cooperative and multi-directional communication — constitutes the fundamental premise of this manual. Every operational recommendation is designed to support communication processes that actively involve



citizens and territorial networks, moving beyond top-down logic and building lasting relationships of trust between institutions and the population.

2.3 Research Design

The sociological component of the STRENGTH project adopted a mixed design combining quantitative and qualitative methods, with the aim of producing a multilevel understanding of the relationship between local society and flood risk. The two main instruments are methodologically integrated: the sample survey provides a statistical representation of population perceptions and behaviours, while the interviews delve into the practices, experiences, and assessments of those directly involved in risk management.

Sample Survey (N=513)

The quantitative survey was conducted between 15 December 2025 and 21 January 2026 on a sample of 513 residents of the Province of Ravenna. Data were collected via CATI (n=294) and CAWI (n=219) modes. The questionnaire is structured around 43 items organised into five thematic areas: socio-demographic profile; attitudes towards science and technology; perception of climate change; environmental risks; floods and response to the May 2023 events.

The sample shows a gender distribution representative of the reference population (53% female, 47% male), with a concentration in adult and older age groups: 72.5% are over 45. Some 71.7% hold a qualification equivalent to or higher than a secondary school diploma. All respondents reside in the Province of Ravenna, with a concentration in the provincial capital (49.9%) and major towns (Faenza, Lugo).

Semi-structured Interviews with Stakeholders (N=18)

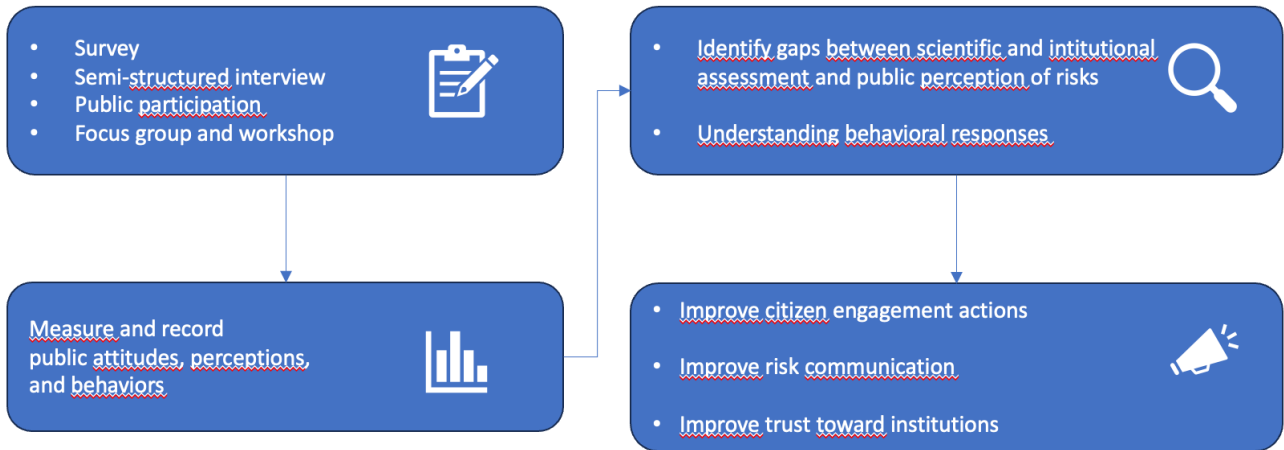
Semi-structured interviews were conducted between December 2025 and March 2026 with 18 stakeholders. Interviewees were selected to represent the different categories of actors involved, at various levels, in risk management and communication in the territory of the Province of Ravenna and the Emilia-Romagna Region. As planned in the project, the categories represented are: general public (2 persons), small and medium-sized enterprises (2), local authorities (3), regional authorities (3), sector agencies (3), infrastructure and public service providers (2), volunteers and other stakeholders (3). The interviews, averaging approximately one hour in length, were conducted in a semi-structured format organised around five analytical dimensions: perception of climate change, memory of the 2023 flood event, adaptation and prevention actions, risk communication, and recommendations.





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3. Summary of Key Empirical Evidence

Before setting out the guiding principles and operational guidelines, this section synthesises the most relevant empirical evidence for the design of risk communication. Every recommendation in the manual is grounded in this data.

3.1 Trust and Source Credibility

The credibility of information sources is strongly differentiated and constitutes the most relevant variable for the design of institutional communication. Scientists (86.2% positive ratings) and emergency management services (87.0%) are the most credible sources. Regional and local authorities occupy an intermediate position (61.4%), with considerable room for improvement. National political authorities are the least credible, with 52.5% negative ratings.

86.2% of respondents consider scientists and researchers to be very or fairly credible

87.0% of respondents consider emergency services to be very or fairly credible

46.6% positive ratings for national political authorities (the least credible)

The use of information sources follows a hierarchy different from credibility: national media are the most widely used source (56.5%), followed by local media (48.5%) and social networks (35.5%). Scientists, though among the most credible sources, are among the least cited as a habitual information source (24.6%). This gap signals an underutilisation of the most authoritative sources in ordinary communication channels.

3.2 The Gap Between Risk Information and Information on Measures

A particularly significant finding for risk communication is the discrepancy between the perceived level of information on environmental risks and that on the measures to address them.

74.3% feel fairly or very well informed about environmental risks

60.6% feel fairly or very well informed about the measures to address them

13.7 percentage points gap: communication describes risks but does not provide practical tools

This gap indicates that existing public communication has so far been more effective at describing the problem than at providing operational guidance on how to reduce it or respond to it. Some 50.3% of the sample is unaware of any municipal initiative for



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environmental risk reduction, despite the majority attributing primary responsibility for local environmental problems to public bodies (87%).

3.3 Flood Risk Perception and Memory of the 2023 Event

Flood risk perception is high: 87.2% of the sample feels very or fairly exposed to the risk of floods or inundations, the highest figure among all environmental risks considered. Floods are identified by 52.6% as the priority water risk in their area of residence.

97.2% recall the May 2023 floods with a medium-high level of intensity

75.8% recall them as 'very strongly': exceptionally high cognitive and symbolic salience

54.5% state that the institutional response to the floods influenced their vote choice

A relevant finding concerns the causal attribution of the 2023 flood: 48.9% attribute it to insufficient river maintenance, while only 34.9% cite heavy rainfall. This predominantly managerial and maintenance-based interpretation — which does not necessarily correspond to the technical reading of experts — reveals a potential communicative gap around the causal complexity of flood events and their relationship with climate change.

3.4 Solidarity, Institutional Trust and Political Impact

The data show a sharp contrast between horizontal solidarity (among citizens) and vertical institutional solidarity. The national government is perceived as showing little or no solidarity by 65.3% of respondents, while solidarity from fellow citizens and other regions is rated positively by 89.1% and 83.7% respectively. Some 56.7% participated directly or indirectly in support activities for affected populations, signalling significant civic mobilisation.

3.5 Key Qualitative Nodes: What Stakeholders Say

Structurally insufficient preventive communication

"What we would need is someone whose actual job this is. Right now we are investing heavily because we got burned, but I am afraid that if things go well for a few years, it will all gradually fade away." (Communications officer, local authority)

Preventive communication in peacetime is not structurally funded, assigned to dedicated professional figures, or provided with ongoing resources. Investment increases during emergencies and in the weeks immediately following them, but tends to erode rapidly in the absence of new events.

Organisational separation between civil protection and communications



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"There is often no connection at all between whoever handles communications and whoever handles civil protection, and that is extremely risky. Even worse, it often happens that civil protection staff also handle communications during emergencies." (Communications officer, local authority)

The lack of organisational integration between those who manage the emergency and those who manage communication is the primary risk factor identified by institutional stakeholders. Communicative improvisation in emergencies — with unverified messages, inappropriate tone, and uncoordinated channels — erodes institutional credibility precisely when it is most needed.

Need for experiential formats

"You need to give groups of citizens the opportunity to engage with a real-life situation, one that triggers emotions. When emotions are triggered, you begin working with very fertile ground." (Regional civil protection officer)

All interviewees agree on the inadequacy of classic transmissive formats (lectures, leaflets, standardised information campaigns) and the need for experiential approaches that activate emotional responses and build embodied memory of risk.

Risk of alert fatigue ("boy who cried wolf" effect)

"If we start issuing 100 weather alerts a year, it becomes like the boy who cried wolf. We need to be selective, otherwise people will not believe us when it really matters." (Ravenna beach cooperative, SME)

An overabundance of alerts generates habituation and lowers the threshold of public attention. This risk is flagged by multiple stakeholders as one of the main challenges in managing pre-alert communication.

Erosion of institutional trust and asymmetric relationship with citizens

"Of course, when a person has been flooded three, four times in two years, they will find it hard to trust the system." (Technical civil protection officer, local authority)

Trust in institutions erodes progressively with each new flood event. Many citizens attribute responsibility exclusively to public bodies, without perceiving their own individual responsibility in prevention. This asymmetry in expectations is one of the hardest knots to untangle through communication alone.

4. Guidelines for Risk Communication



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The evidence synthesised in the previous section enables the articulation of six principles to guide flood and climate risk communication activities in the Province of Ravenna. These principles are not specific operational recommendations but design criteria to which every communication intervention can refer.

Principle 1 — Priority to the Ordinary Phase

Most communicative efforts concentrate in the emergency phases or in the immediate post-event period, when awareness of risk is at its highest but the capacity to learn and change behaviour is impaired by stress. Yet preventive communication in peacetime is structurally essential: it builds habits, trust, and proximity networks that hold during crises. It must be adequately funded, assigned to dedicated staff, and embedded in the ordinary planning of public bodies, rather than treated as a residual or extraordinary activity.

Principle 2 — Grounding in Scientific and Technical Sources

Given the high credibility of scientists (86.2%) and emergency services (87.0%), these actors can be placed at the centre of preventive and post-event communication. Meteorologists, ARPA experts, Land Reclamation Consortium technicians, and civil protection operators are the most authoritative spokespersons for technical risk messages. The exposure of national political figures — the least credible (46.6%) — should be limited in risk messages.

Principle 3 — From Risk Information to Actionable Steps

Since 74.3% of respondents feel informed about risks but only 60.6% about how to address them, communication should help close this gap. Describing the problem is not enough: every risk message should include concrete guidance on what the recipient can do, in their specific context and with the resources available to them. The principle is that of the 'actionable call to action': not 'flood risk is high', but 'here is what you can do right now to protect yourself'.

Principle 4 — Differentiation by Phase, Channel, and Target

Information needs, accessible channels, and the propensity to engage vary profoundly between peacetime, pre-alert, emergency, and post-emergency phases. They also vary across population segments: older people, working adults, young people, vulnerable individuals, entrepreneurs. There is no single message that is effective for all contexts and all audiences. Every communication intervention must begin with a mapping of the target and a deliberate choice of the most appropriate channel and format. The data collected in the questionnaire can help define these objectives.



Principle 5 — Experiential and Emotionally Engaging Formats

The risk perception literature and the experience accumulated by stakeholders concur: lectures, leaflets, and standardised information campaigns produce limited learning and do not motivate action. Simulated experiences (drills, educational escape rooms, role-play), direct testimonies from flood survivors, and guided site visits with technicians generate deeper awareness because they activate emotional responses that anchor knowledge in memory. Every preventive communication plan should include at least one experiential format.

Principle 6 — Cooperation, Consistency, and Organisational Integration

Risk communication is not only a matter of content and channels: it is also a matter of organisational design. Several conditions emerge as territorial needs: (a) better integration between civil protection offices and institutional communications offices, with shared protocols and procedures practised before emergencies; (b) networks of trained local referents (volunteers, teachers, pharmacists, shopkeepers) who amplify institutional communication at the local level; (c) consistency across all actors — institutions, businesses, volunteers — because discordant messages simultaneously erode the credibility of all sources.



5. Communication by Phase of the Risk Cycle

The four phases of the risk management cycle have profoundly different communication requirements. For each, the priorities and critical issues emerging from the project data are set out below.

5.1 Ordinary Phase (Peacetime)

The research data highlight that this is the most neglected phase and, at the same time, the most strategically important. Some 50.3% of the sample is unaware of any municipal initiative for environmental risk reduction: a signal of insufficient peacetime communication.

Stakeholder interviews confirm this structural shortcoming. Communicative investment increases after each emergency, but systematically tends to erode during calm periods, when political and institutional motivation is lowest. An important challenge for improving peacetime communication is therefore organisational: how to ensure continuity in preventive communication independent of the flood event cycle.

Two cross-cutting recommendations emerge strongly from the qualitative data in this phase. The first concerns target audiences: the most difficult segment to reach is the working adult population, inaccessible both through schools and through evening public meetings. The second concerns formats: all stakeholders interviewed converge on the ineffectiveness of lectures and on the need for experiential approaches capable of activating emotional responses.

5.2 Pre-Alert Phase

Questionnaire data show that the institutional alert system is generally perceived as adequate by the population during emergencies. Qualitative interview data corroborate this. After the first days of the 2023 flood, citizens learned to turn to official sources: this indicates that institutional credibility holds and needs to be actively maintained.

The most critical risk in this phase, flagged by multiple stakeholders, is over-alerting. Too many alerts generate habituation and reduce the capacity to respond when an alert is real. Selectivity in communication — communicating only what is genuinely relevant to the specific context — is identified as an essential condition for maintaining the effectiveness of the system. Interviews also reveal that several stakeholders choose to ignore alerts because they interpret them as a way for institutions to 'cover themselves' in case of damage from an emergency. To increase trust in the alert system and citizens' adherence to recommended



practices, it would be advisable to communicate transparently to the public how the alarm system works, dispelling doubts about when and why it is activated.

5.3 Emergency Phase

Against a generally positive picture regarding emergency-phase risk communication, interviews with institutional stakeholders highlight, as a possible critical issue, the organisational separation between those who manage the emergency and those who manage communications: where this integration is absent, emergency communication becomes improvised and potentially damaging.

5.4 Post-Emergency Phase

This emerges as a particularly critical phase in institutional communication, according to the majority of stakeholders interviewed.

The data collected highlight two opposing dynamics in the post-event period. On the one hand, strong solidaristic mobilisation: 56.7% of the sample participated in support activities, and solidarity among fellow citizens is perceived as very high by 89.1%. On the other hand, interview data highlight the problem of disaster politicisation, with scapegoating that obscures the technical analysis of causes. Managing this tension — valorising solidarity without fuelling polarisation — is one of the most delicate communicative challenges for institutions.

Another emerging theme is that of psychological suffering in the most exposed areas: post-event communication must be able to recognise and respond to the emotional and psychological dimension of collective trauma, not just the informational one. Finally, transparency about the limits of the system — openly communicating what was not possible to do and why — is identified by stakeholders as a key factor in the rebuilding of institutional trust.



6. Credible Actors and Sources: Who Communicates What

The questionnaire data provide a clear credibility hierarchy that can guide the choice of spokespersons for risk communication.

6.1 Actor Credibility

Emergency management services (87.0%)

Civil protection operators, firefighters, emergency medical services. Credibility slightly higher even than scientists. Particularly effective for operational messages on what to do during the various phases.

Scientists and technicians (86.2%)

ARPA meteorologists, Land Reclamation Consortium technicians, university researchers. Considered the most credible spokespersons for risk communication, yet also the most underutilised in ordinary communication (only 24.6% cite them as a habitual source). Closing this gap — by bringing scientific voices into ordinary communication formats, public meetings, and local media — is one of the levers with the greatest potential effectiveness.

Regional and local authorities (61.4%)

Mayors, councillors, municipal officers. Intermediate credibility with significant room for improvement. Interviews suggest that transparency in communication positively influences public perception. Greater transparency can potentially increase levels of trust in regional and local authorities.

National political authorities (46.6%)

The prominence of national political figures in risk communication is a possible risk factor for local and regional authorities. The data show that the level of distrust in national politicians as sources of information on environmental risks is such that their prominence can be counterproductive. This finding also emerges from the qualitative interviews, where multiple stakeholders flag the politicisation of natural risk communication as a negative element.

6.2 The Role of Local Networks and Volunteering



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The interviews highlight the fundamental role of local proximity networks as capillary amplifiers of institutional communication, particularly effective in reaching population segments that are hard to intercept through official channels (older people, vulnerable individuals, foreign nationals). The provincial coordination of civil protection volunteers is identified as one of the most valuable actors in this function, thanks to its territorial reach and the trust built over time with local communities.

A critical element emerging from the interviews, however, concerns the need to clarify roles in public communication: volunteers are sometimes perceived by the public as autonomous sources of information on the progress of an emergency, with the risk of amplifying unverified information. Training local referents in communicative protocols is therefore a precondition for valorising their role without introducing new criticalities.



7. Channels and Formats

7.1 Channels: Usage and Credibility Compared

The most significant finding is the gap between the most widely used channels and the most credible sources. National media are the most widely used source for environmental risk information (56.5%), followed by regional and local media (48.5%) and social networks (35.5%). However, national media are not among the most credible sources: journalist credibility stands at 54.6%, lower than that of scientists and emergency services.

Social networks show significant penetration in the sample, with Facebook as the dominant platform (67.3% of users), followed by YouTube (62.8%) and Instagram (56.3%). TikTok is used by 28.3% and X (formerly Twitter) by only 15.6%. This usage profile reflects the predominantly adult demographic composition of the sample.

Emergency management services as an information source are cited by 32.7% of the sample: a significant figure suggesting the existence of an audience already oriented towards technical institutional sources, on which investment should be made to consolidate habitual use.

7.2 Formats: Preferences Emerging from Interviews

Interviews with stakeholders — both from the supply side (institutional operators, trainers, technicians) and the demand side (general public) — converge on a very clear indication: classic transmissive formats produce limited learning and do not motivate action. Awareness is built through emotion, not through the transmission of information.

"You convey environmental awareness if it passes through emotions. Anything a person wants to do is because it awakens some kind of emotional response within them." (Environmental educator, general public)

Experiential formats — drills open to citizens, educational escape rooms on flood risk, guided visits to hydraulic infrastructure, school workshops with simulations — are identified as the most effective for building lasting awareness. These formats have already been successfully piloted in the area and their use should be systematised and expanded.

An element emerging from interviews with institutional stakeholders concerns technical alert bulletins: these documents are designed for public bodies and not for the general public, and require translation into operational, accessible language. This 'translation'



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function is not currently structured in most local administrations and represents a worthwhile investment for improving the effectiveness of pre-alert communication.

7.3 Preferred Information Sources

The data show that scientists are perceived as the most credible source for environmental risk information, yet are among the least habitually used. This asymmetry between perceived credibility and actual use suggests that the problem is not a lack of trust in the scientific message, but the absence of channels and formats that make that expertise accessible. Investing in communicative partnerships with ARPA, the Land Reclamation Consortium and Universities to produce quality outreach content is one of the avenues worth exploring in order to leverage the public's trust in experts.



8. Methodological Note

The questionnaire was administered between 15 December 2025 and 21 January 2026 to 513 residents of the Province of Ravenna (219 CAWI, 294 CATI). Semi-structured interviews were conducted between December 2025 and March 2026 with 18 stakeholders in 16 sessions. Quotations are faithful to the original transcripts, including imperfections of spoken language. In compliance with applicable privacy regulations, questionnaires were anonymised. The research was conducted by the DOS Laboratory of the Department of Humanities at the University of Ferrara as part of the Interreg Italy-Croatia 2021-2027 project (ID: ITHR0200318).

