

Article

Geographical Literacy and Preventive Culture in the Face of Natural Disasters: Analysis of the Master Plan for Analysis, Anticipation and Reaction of the Valencian Community, Spain

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Abstract

This study analyses the Master Plan for Analysis, Anticipation and Reaction to Natural Disasters of the Valencian Community (Spain) from the perspective of geographical risk literacy. The research adopts a qualitative methodology based on documentary analysis and conceptual assessment of public policy. The corpus includes Valencian institutional documents, Spanish civil protection and education regulations, international disaster risk reduction frameworks and the scientific literature on geography education, risk perception, social vulnerability and school preparedness. The findings show that the plan can strengthen institutional coordination, public communication and preventive culture through its preventive orientation, phased structure, official sources, attention to vulnerable groups, updated cartography and promotion of drills. However, its social effectiveness will depend on transforming protocols and guides into verifiable citizen capacities: identifying hazards, recognizing local exposure, interpreting warnings and maps, selecting safe routes, preparing households and rehearsing decisions in realistic contexts. The article proposes complementing the plan with a geographical literacy programme for territorial resilience based on local risk sheets, school atlases, evaluated drills, community mediation, accessible viewers and public monitoring indicators. The discussion places the Valencian case within international debates on disaster risk reduction, anticipatory governance, people-centred early warning systems and school safety. Because no empirical implementation data are yet available, the contribution is framed as an analytical and design-oriented framework requiring subsequent validation through pilots, surveys, interviews and evaluated drills.

Keywords: natural hazards; civil protection; prevention; Valencian Community; territorial resilience; geographical literacy



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1. Introduction

Natural hazard prevention and emergency management have become central fields of contemporary public policy. Extreme events do not become disasters by themselves:

they do so when they interact with exposure, vulnerability, social inequality, occupation of hazardous spaces, governance failures and limitations in citizen preparedness [1,2]. This premise is especially relevant under climate change, as the Intergovernmental Panel on Climate Change [3] has stressed that impacts, vulnerability and adaptation needs depend on specific territorial conditions and on institutional and social capacity to reduce risk.

The most influential international framework for this research is the Sendai Framework for Disaster Risk Reduction (2015–2030). Its priorities—understanding disaster risk, strengthening disaster risk governance, investing in disaster risk reduction and enhancing preparedness for effective response and better recovery—move attention from post-impact response to anticipatory understanding and vulnerability reduction [4]. The orientation of the Valencian Master Plan towards analysis, anticipation and reaction therefore belongs to an international trend demanding preventive, multi-actor and territorially informed policies.

At the European level, there is also a move towards more integrated models of resilience and preparedness. The Union Civil Protection Mechanism aims to improve prevention, preparedness and response to emergencies, while the European disaster resilience goals emphasize the need to anticipate, prepare, alert, respond and secure robust civil protection capacities [5,6]. At the continental scale, the European climate risk assessment warns that many risks may reach critical or catastrophic levels without urgent and coordinated action, particularly in relation to floods, extreme heat, wildfires, health, infrastructure and water resources [7].

In parallel, the Early Warnings for All initiative, promoted by the United Nations and the World Meteorological Organization, has reinforced the idea that early warnings must be complete, people-centred systems: risk knowledge, monitoring and forecasting, warning communication and a real capacity to respond [8]. This perspective is consistent with Basher [9], who argued that a warning system is not merely a technical device but a social chain that fails if people do not understand the message, do not trust the source or do not know which decision to make.

The Valencian Community case fits this global framework. This Mediterranean region is highly exposed to flash floods, wildfires, extreme heat, coastal storms, droughts and other hazards linked to the intense urbanization of vulnerable spaces. The cut-off low event of October 2024 (238 deaths) acted as a political and social trigger for reviewing anticipation, coordination and response procedures and for strengthening a preventive culture capable of avoiding similar impacts in the future [10]. In this context, the Master Plan for Analysis, Anticipation and Reaction to Natural Disasters appears as a strategic instrument for ordering institutional capacities and guiding citizen-oriented messages. In addition, recent Spanish flood-risk scholarship and work on land-use change in the Rambla de Poyo reinforce the territorial relevance of these processes [11,12].

The expression “natural disaster”, common in institutional and outreach documents, must be used cautiously. International disaster risk research insists that disaster is not purely natural but results from the interaction between physical hazards and human decisions: location of housing and infrastructure, urban planning, inequality, access to information, risk memory, support networks and response capacity [1,13]. Prevention therefore cannot be reduced to waiting for better meteorological or hydrological forecasts; it must reduce exposure and vulnerability while increasing society’s ability to interpret territory.

Geographical risk literacy may be defined as the set of knowledge, skills, attitudes and practices that enable people to understand how hazards and vulnerabilities are spatially distributed, interpret territorial information, connect scales and make prudent decisions under uncertainty [14]. It does not mean memorizing geographical names. It means reasoning with maps, river basins, elevations, distances, networks, slopes, coasts, infrastructure,

land uses and social inequalities. In an emergency, people do not act in an abstract territory but from homes, schools, workplaces, neighbourhoods and municipalities.

The international literature confirms the relevance of risk education. Ronan and Johnston [15,16] showed that youth-oriented hazard education programmes can improve knowledge, risk perception and family preparedness. Recent reviews indicate that school-based natural hazard preparedness programmes may be effective, although they often suffer from scarce resources, isolated interventions, insufficient teacher training and weak links between content and real practice [17]. Within school geography, Gong et al. [18] argue that disaster risk reduction education must go beyond information transmission and include participation, action, response and curricular integration. Recent Ibero-American work on disaster risk management education also frames education as a preventive component of disaster risk reduction [19].

This school dimension is aligned with the Comprehensive School Safety Framework 2022–2030, which approaches school safety through children's rights, education-sector resilience, disaster risk reduction, inclusion and learning continuity [20]. In Spain, the Civil Protection Emergency Training Plan for non-university educational centres strengthens this opportunity by establishing compulsory training and adapting contents to the natural, social and economic characteristics of the environment [21]. The connection between civil protection, curriculum and territory opens a direct pathway for transforming information guides into situated learning.

From this perspective, preventive culture cannot be limited to campaigns. It requires continuity, didactic progression, repeated practice and evaluation. A citizen guide can be useful if it is integrated into reading real warnings, analyzing risk maps, identifying routes, conducting drills with debriefing, working with families and reviewing self-protection plans [22]. The challenge is to turn an information device into a territorial learning system.

The aim of this paper is to analyze the conceptual and operational structure of the Master Plan and its citizen guide, identify its strengths and limitations and propose an improvement approach based on citizens' geographical literacy. The starting hypothesis is that the plan has significant potential if it is implemented as a multi-scalar geographical literacy policy aimed at populations living, studying or working in risk areas. This literacy includes reading maps, recognizing exposure, understanding the difference between hazard and vulnerability, interpreting warnings, identifying safe routes, locating essential services, preparing territorially meaningful kits and practicing decisions in evaluated drills.

The scientific contribution is threefold. First, the article translates a recent regional policy into an analytical matrix of citizen capacities. Second, it specifies how geographical literacy can operate as a bridge between official risk information and situated decisions. Third, it identifies indicators and pilot actions through which the framework can be empirically tested in municipalities, schools and vulnerable communities.

2. Materials and Methods

This study uses a qualitative methodology based on documentary analysis and conceptual assessment of public policy. This design is appropriate because the Master Plan and the citizen guide are recently approved normative-operational documents; there is therefore not yet sufficient empirical evidence to assess social outcomes, behavioural change or ex post territorial impacts. The research question is not what effects the plan has already produced, but what capacities it seeks to generate, under which assumptions, with which strengths and with which implementation gaps.

Consequently, the article does not claim to demonstrate behavioural change, institutional effectiveness or reductions in vulnerability. Its scientific contribution is conceptual and operational: it systematizes the plan's assumptions, links them to the disaster

risk reduction literature and derives a testable implementation framework for future empirical evaluation.

The documentary corpus was organized into four blocks: Valencian institutional documentation; Spanish regulations on civil protection and education; international frameworks on disaster risk reduction and school safety; and the scientific literature on risk education, geography education, risk perception, social vulnerability and territorial resilience (Table 1).

Table 1. Sources and analytical function of the documentary corpus.

Source Block	Main Documents	Function in the Analysis
Valencian institutional sources	Master Plan, citizen guide, public hearing documents and supporting reports.	Delimit objectives, operational architecture, citizen messages and implementation assumptions.
Spanish regulations	Law 17/2015, Basic Civil Protection Standard and Emergency Training Plan for educational centres.	Situate the plan within the civil protection system and its connection with schools.
International frameworks	Sendai Framework, Early Warnings for All, Union Civil Protection Mechanism, European disaster resilience goals and Comprehensive School Safety Framework.	Contrast the plan with international priorities on risk reduction, early warning, governance, inclusion and school safety.
Scientific literature	Risk education, geography education, social vulnerability, risk perception and territorial resilience.	Substantiate the geographical literacy approach and improvement proposals.

Source: Own elaboration.

The Spanish regulatory block comprises the Law of the National Civil Protection System [23], the Basic Civil Protection Standard [24] and the Emergency Training Plan for non-university educational centres [21].

The analysis consisted of a coded reading of the documents according to six dimensions: governance and coordination; anticipation and risk knowledge; public communication and official sources; education, training and drills; inclusion of vulnerable groups; and evaluation, monitoring and continuous improvement. These dimensions combine the priorities of the Sendai Framework, international approaches to school safety, the educational literature and the contents of the Master Plan itself.

In a second phase, an assessment matrix was prepared to distinguish strengths, limitations and improvement proposals (see Section 3.2). The matrix does not assign closed scores. Its purpose is to organize the findings and make the analytical judgement explicit from the perspective of geographical risk literacy.

To reduce overlap between description, interpretation and recommendation, each coded extract was classified into three categories: documentary finding, analytical implication or prescriptive recommendation. Documentary findings are reported in Section 3; broader interpretation and links with the literature are addressed in Section 5; operational recommendations are concentrated in Section 4.

3. Results

This section is restricted to elements that can be directly derived from the Master Plan and the citizen guide: objectives, warning architecture, cartographic instruments, public guidance, training references and recovery messages. Interpretive judgements are limited to identifying the implementation gap that emerges from the documentary analysis; full recommendations are developed separately in Section 4.

3.1. Early Identification, Prevention and Training

The Master Plan is presented as a strategic instrument for improving emergency management, strengthening inter-institutional coordination, simplifying procedures and promoting a preventive culture (Figure 1). Available public documentation indicates that the plan focuses on anticipating and reducing risks through comprehensive management that includes early identification, prevention, training, response and economic and social recovery [25,26].

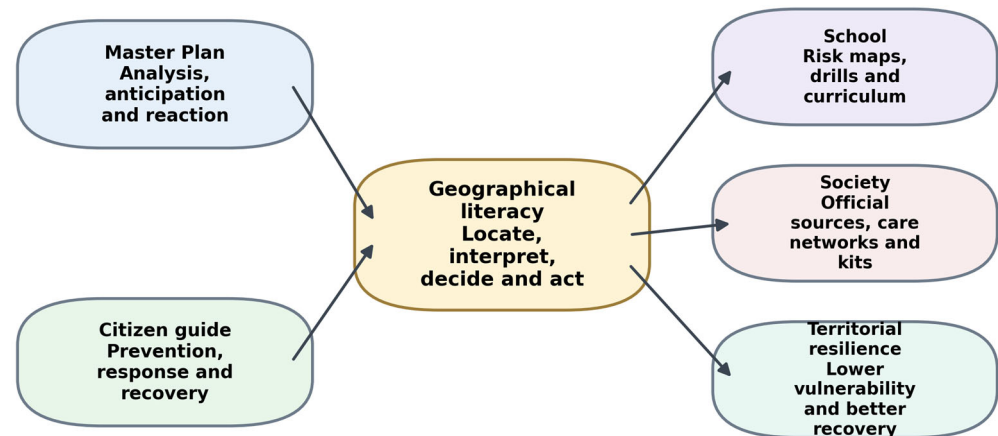


Figure 1. Geographical literacy as an axis of territorial resilience. Source: Own elaboration.

One of its central features is the intention to standardize warning systems through colour codes, including the incorporation of a black level for exceptional situations of extreme risk. This measure has both a technical and a communicative dimension. Technically, it may facilitate coordination between administrations and emergency services. Communicatively, it may improve public understanding if accompanied by clear messages on expected behaviours. However, a colour code is effective only if the population knows in advance what each level means, which actions to take and how meteorological information, preventive warning, operational alert and evacuation order differ.

The plan also proposes improving risk identification through data collection and analysis systems and an updated official cartographic viewer (Table 2). This measure is particularly relevant because the map acts as a bridge between expert knowledge and citizen decision-making. Nevertheless, the social utility of a viewer depends on accessibility, scale, language, updating and connection with teaching materials. A technically accurate map may be of little use if a family, a school or a company cannot answer basic questions: whether they are in a risk zone, which route to avoid, where the nearest safe point is or what happens if the usual road is blocked.

Table 2. Key elements of the Master Plan and its citizen guide.

Element	Synthesis	Educational and Social Implications
Purpose of the Master Plan	Strategic instrument for improving emergency management, inter-institutional coordination, proactive response, simplified procedures and prevention.	Strengthens preventive culture but requires geographical literacy to interpret risks and act in an informed way.
Colour-coded warning system	Standardization of colour codes and inclusion of a black level for extreme risk.	Requires people to know meanings, associated actions and differences between warning, alert and evacuation.

Table 2. *Cont.*

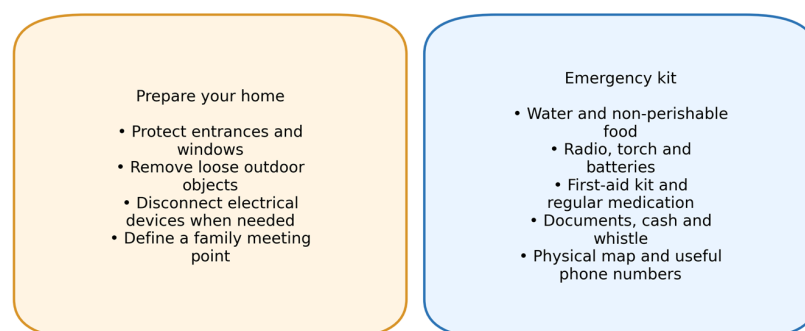
Element	Synthesis	Educational and Social Implications
Cartography and data	Updated official viewer to identify risks and support decisions.	Must be accessible, understandable, multi-scalar and connected with teaching materials.
Citizen guide	Outreach document that organizes prevention, response and recovery and differentiates hazard types.	Functions as the didactic interface of the plan, although it needs tools for self-assessment and practice.
Prevention	Regular information, consultation of warnings, activation of notifications, evacuation routes, safe points and essential services.	Introduces the everyday environment as a scale of learning.
Response	Official sources, rumour control, safe shelter and hazard-specific guidance.	Connects with situated decision-making.
Recovery	Caution in damaged areas, compliance with official instructions and attention to mental health.	Extends recovery towards psychosocial and community dimensions.

Source: Generalitat Valenciana [25–27]. Own elaboration.

From an educational perspective, the citizen information guide functions as the didactic interface of the plan. It is not a legal document or a technical manual, but an outreach resource that translates the risk management cycle into understandable guidelines. It organizes preparedness into prevention, response and recovery; defines natural risk and natural disaster; and includes guidance for floods, wildfires, adverse weather phenomena, earthquakes, seaquakes or tsunamis and volcanic hazards [27].

The prevention section is the most closely connected with geographical literacy. It recommends regular information-seeking, consulting official forecasts and warnings, activating notifications, saving emergency phone numbers, checking whether the areas where people live, work or study are classified as risk areas, becoming familiar with emergency plans, evacuation routes and safe points, and locating essential services. These recommendations introduce the everyday environment as a scale of learning: not only knowing what to do, but knowing where one is and which resources exist nearby.

The training and awareness block includes participation in drills, talks or workshops, knowledge of alarm systems and protocols, insurance review, sharing information with children, older people or vulnerable persons, and asking whether one would know how to act in a real emergency. This self-assessment is relevant because a mature preventive culture is not based on subjective confidence but on the verification of capacities (Figure 2). Even so, the guide does not provide concrete tools for such verification, such as household checklists, school rubrics or municipal preparedness indicators.



A prepared household reduces exposure and improves family response.

Figure 2. Prepare your home and your emergency kit. Source: Generalitat Valenciana [27]. Own elaboration.

3.2. Documented Response and Economic-Social Recovery Contents

In the response phase, the guide insists on following only official sources, avoiding rumours, not overloading emergency services, sheltering in safe places, remaining calm, adapting to the type of hazard and helping only if it can be done safely (Table 3). Differentiation by hazard type is a strength because it avoids generic messages that may be inappropriate. During a flood, driving and sheltering in basements or garages are discouraged; during an earthquake, drop, cover and hold on is prioritized; in the event of a tsunami, evacuation towards higher and inland areas is recommended [27].

Table 3. Assessment matrix linking documentary findings and implementation gaps.

Dimension	Detected Strength	Main Limitation	Reading from Geographical Literacy
Governance	Single command, modular structure and coordination between operational bodies.	Need to translate institutional coordination into concrete social roles.	Citizens must know who communicates, which channel to use and which decision corresponds to each alert level.
Risk knowledge	Forecasting, risk reduction and updated official cartographic viewer.	Risk that cartography remains technical and difficult to understand.	Citizen maps, local sheets and didactic itineraries turn data into decisions.
Communication	Emphasis on official sources and combating rumours.	Potentially one-way communication.	Training must teach people to verify messages, interpret warnings and recognize misinformation.
Education and drills	References to training, campaigns and drills in schools and workplaces.	Lack of curricular sequencing and learning indicators.	Progression by age, drills with debriefing and capacity assessment.
Inclusion	Identification of vulnerable groups and safe-help recommendations.	Lack of specific protocols by vulnerability type and territory.	Vulnerability should be mapped with social, mobility, language, health and support network criteria.
Recovery	Includes social recovery and mental health.	Limited specification of memory and post-event learning.	Geography can transform experience into territorial understanding and collective improvement.

Source: Own elaboration.

Recovery also receives attention. The guide warns against entering damaged buildings or cordoned-off areas, using water or electricity without official confirmation, moving through areas with cables, glass or obstacles, spreading rumours or approaching affected zones out of curiosity. It also incorporates mental health: it recognizes that anxiety, sadness, fear or confusion after an emergency are normal and recommends talking about what happened, not minimizing emotions and seeking professional support if sleeping, concentrating or returning to routine becomes difficult. This mention extends recovery beyond physical reconstruction and introduces the psychosocial dimension of disaster.

Table 3 synthesizes the coded documentary findings and the implementation gaps inferred from them. It should be read as an analytical bridge between the results and the recommendation section, not as an independent empirical outcome.

4. Recommendations: Towards a Geographical Literacy Programme for Territorial Resilience

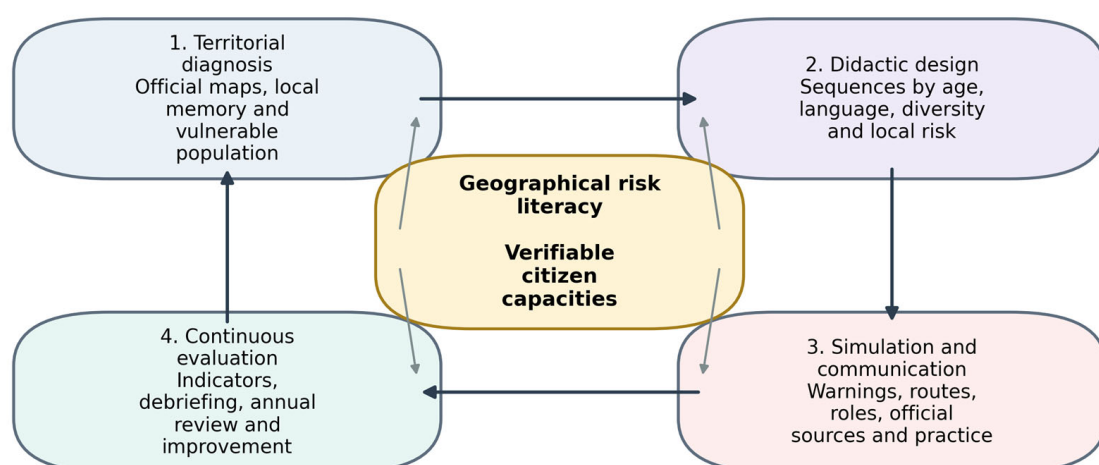
This section is explicitly prescriptive. It translates the previous documentary findings into a feasible implementation pathway but does not present these recommendations as already validated outcomes of the Master Plan.

Based on the previous analysis, the Master Plan should be complemented with a geographical literacy programme for territorial resilience. This would not be a parallel plan but a pedagogical and community layer of implementation (Table 4). Its purpose would be to transform the contents of the Master Plan and the guide into verifiable citizen capacities, especially among school populations, families and vulnerable groups. The programme should be organized around four principles: territorialization, progression, practice and evaluation (Figure 3).

Table 4. Recommendations to strengthen geographical risk literacy.

Recommendations	Operational Action	Main Actors	Suggested Indicator
Local risk sheets	Citizen map with exposed areas, routes, safe points and essential services.	Municipalities, 112, schools, geographers and civil protection.	Percentage of municipalities and schools with a sheet updated each academic year.
School risk atlas	Stage-based material with maps, field activities and local scenario analysis.	Regional Ministry of Education, teacher training centres, teachers and universities.	Number of schools incorporating territorialized learning situations.
Evaluated drills	Hazard-specific exercises with prior preparation and subsequent debriefing.	Schools, companies, civil protection and municipal services.	Drills with improvement reports and corrected actions.
Community mediation	Network of people and entities that transmit official messages and detect barriers.	Social services, associations, parent associations, volunteers and health centres.	Coverage of vulnerable groups and safe-contact protocols.
Accessible viewer	Technical, citizen and educational versions of the risk viewer.	Regional government, cartographic institutes, civil protection and universities.	Viewer use, accessibility and updating of critical layers.
Annual evaluation	Public report on preparedness and geographical literacy.	Regional government, municipalities and education system.	Indicators of learning, coverage, inclusion and continuous improvement.

Source: Own elaboration.



Expected output: public indicators, territorialised curricular materials and cumulative learning after each campaign or emergency.

Figure 3. Proposed implementation and monitoring circuit. Source: Own elaboration.

Territorialization means adapting general recommendations to concrete local risks. Each school, neighbourhood or municipality should have a simple risk sheet with maps,

routes, safe points, essential services, areas to avoid and basic protocols. This sheet should be produced using official data, technical validation and citizen-oriented language. For students it could become a school atlas of local risk; for families, checklists adapted to housing, age, mobility, language and surroundings.

Progression means defining learning outcomes by age. In early childhood education and the first years of primary education, the focus may be on recognizing signals, identifying reference adults, knowing how to call 112 (emergencies), locating safe areas in the school and practicing calm behaviour. In the final years of primary education, simple map reading and identification of low points, watercourses, safe streets and emergency kit items may be introduced. In secondary education, students should work with real risk maps, satellite images, rainfall data, land uses, infrastructure exposure and news analysis. In upper secondary education and vocational training, the approach may include scenarios, uncertainty, decision-making, crisis communication and assessment of self-protection plans.

Practice requires drills with pedagogical meaning. A drill should not be limited to leaving the classroom or listening to a talk. It should include prior preparation, roles, plausible scenarios, adaptation to different hazards and subsequent evaluation. Debriefing is essential: what worked, what was not understood, which route was blocked, which students needed support, which message caused doubts or what the family would do if the school could not open. Without this subsequent conversation, the drill may produce routine but not learning.

Evaluation requires public and reviewable indicators. The Master Plan should incorporate a monitoring framework for geographical literacy and citizen preparedness, with annual data by municipality or county. The purpose is not to police schools or families but to know where resources need strengthening. Possible indicators include: number of schools with an updated local risk sheet; percentage of students who have participated in practical activities; availability of accessible and multilingual materials; drills carried out with improvement reports; coordination with social services for vulnerable persons; updating of the cartographic viewer; campaigns before risk seasons; and citizen knowledge measured through periodic surveys.

Operationalization of the proposed indicators should combine administrative monitoring, learning assessment and drill-based evidence. Each indicator needs a unit of analysis, a data source, an update frequency and a responsible institution. A minimal monitoring system could distinguish output indicators (materials produced), outcome indicators (capacities acquired) and equity indicators (coverage of vulnerable groups). Table 5 proposes a practical measurement scheme.

Table 5. Operationalization and monitoring of preparedness indicators.

Indicator Domain	Operational Measure	Data Source and Frequency	Responsible Actor
Local risk sheets	Percentage of municipalities and schools with validated sheets; date of last update.	Municipal and school registry; annual update before risk season or academic year.	Regional civil protection, municipalities and schools.
School learning	Pre/post map-reading and warning-interpretation task; minimum competency threshold by stage.	Short rubric and aggregated school report; annual.	Schools, teacher training centres and education authority.
Evaluated drills	Drills with scenario, roles, debriefing and improvement report; percentage of corrective actions closed.	Drill reports after each exercise and annual aggregation.	Schools, companies, municipal services and civil protection.

Table 5. Cont.

Indicator Domain	Operational Measure	Data Source and Frequency	Responsible Actor
Vulnerable groups	Accessible materials, safe-contact protocols and coverage of mobility, language, health and digital barriers.	Social services and community-mediator checklist; annual and before risk seasons.	Social services, health centres, associations and civil protection volunteers.
Cartographic viewer	Successful completion of citizen tasks: Locating risk areas, safe points and alternative routes; accessibility score.	Web analytics, usability tests and accessibility audit; semiannual.	Regional government and cartographic services.
Public accountability	Annual dashboard with indicators by municipality or county.	Public monitoring report; annual.	Generalitat Valenciana and municipalities.

Source: Own elaboration.

A specific proposal is to create geographical risk-reading itineraries in vulnerable municipalities (Figure 4). These itineraries, designed by geographers, teachers, civil protection and municipal technicians, would allow participants to walk through significant spaces: ravines, ephemeral streams, underpasses, slopes, forested areas, beaches exposed to storms, industrial areas with technological risk or urban heat zones. The aim would not be to generate fear but situated understanding. Fieldwork, social mapping and historical photograph analysis can help risk cease to be an abstraction and become actionable knowledge.

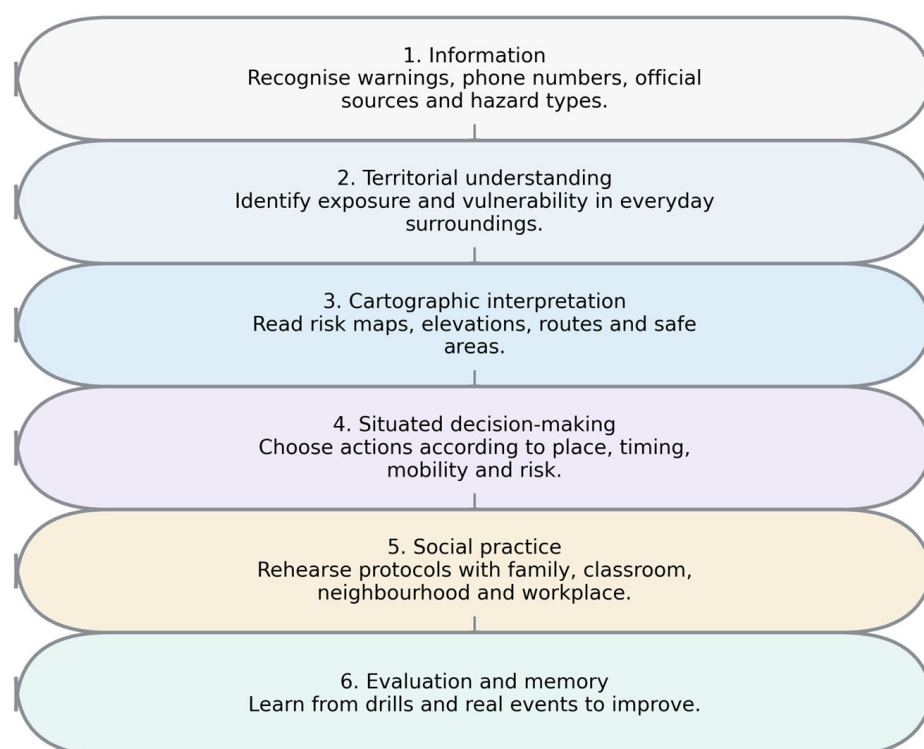


Figure 4. Ladder of geographical risk literacy. Source: Own elaboration.

Practical case illustration: A municipal risk sheet for a school in a flood-prone Mediterranean ravine could be built from four layers: (i) hazard: floodable areas, underpasses, ephemeral streams and low-lying streets; (ii) exposure: school, nearby homes, bus stops, health centre, dependent persons and electricity nodes; (iii) safe routes: streets with greater elevation, assembly points and barriers to avoid; and (iv) communication and support: official warning channels, responsible adults, community mediators and fallback contacts.

The exercise would ask students and families to answer five verifiable questions: Is my daily route exposed? Which street must I avoid? Where is the nearest safe point? Who needs assistance? What action corresponds to each warning level?

An equivalent wildfire or heat-risk sheet could use the same logic by replacing hydrogeomorphic layers with wildland–urban interfaces, fuel continuity, evacuation roads, shaded or cool spaces and vulnerable-population layers. This example is illustrative, not a substitute for official hydrological, fire-risk or public-health assessment; its function is to show how the plan's recommendations can become spatial tasks, maps and drills.

Teacher training should also be strengthened. Emergency services provide essential operational knowledge, but teachers need didactic preparation to integrate these contents into the curriculum. Classroom guides by level, banks of local maps, learning situations and competency rubrics should be produced. Training should cover basic risk concepts, map reading, communication of uncertainty, emotional management of students, inclusion of students with disabilities and coordination with school self-protection plans.

A network of community risk mediators is also recommended. The guide asks citizens to share information with their environment, especially with vulnerable people. This recommendation can be institutionalized through neighbourhood associations, parent associations, health personnel, social workers, civil protection volunteers, libraries and senior centres. Mediators would not replace official services; they would help translate messages, detect barriers, identify isolated people and reinforce everyday preparedness. In multilingual neighbourhoods or areas affected by the digital divide, this mediation can be decisive.

If developed, the natural risk viewer should offer three levels of reading: a technical version for professionals, a citizen version for rapid consultation and an educational version for schools. The educational version could include downloadable activities, blank maps, guided questions, safe itineraries and examples of case analysis. It should also be accessible to people with visual or cognitive disabilities, use plain language and be available in Spanish, Valencian and other locally relevant languages when necessary.

Finally, the plan should build public memory of events. Each emergency leaves lessons, but these are lost if they are not documented. The creation of local risk memory repositories—with testimonies, impact maps, decisions taken, errors detected and improvements made—can help society learn without depending solely on traumatic memory. In educational terms, this memory can be approached sensitively, avoiding catastrophism and promoting territorial responsibility.

5. Discussion

The first contribution of the Master Plan is that it places disaster management within a logic compatible with the international disaster risk reduction approach. The Sendai Framework insists that understanding risk is the first priority of any effective policy, and governance cannot be reduced to operational command during the crisis [4]. From this perspective, the Valencian case is relevant beyond its regional scale because it shows how a sub-state administration seeks to translate global priorities—anticipation, coordination, communication and preparedness—into procedures, guides and citizen-oriented messages.

The plan's preventive orientation is consistent with the shift observed in the international governance of critical risks. The OECD [28] recommends integrating prevention, preparedness, response and recovery into coherent governance systems, while the European Commission has formulated disaster resilience goals based on anticipating, preparing, alerting, responding and securing civil protection capacities [6]. The Master Plan fits this logic, but its impact will depend on whether institutional coordination is translated

into concrete social roles for schools, families, associations, companies, social services and municipalities.

The warning system is a clear example of this tension between technology and social interpretation. Basher [9] argued that early warning systems must be systematic and people-centred; the Early Warnings for All initiative resumes this idea by insisting that warnings work only when there is risk knowledge, understandable communication and a real capacity to respond [8]. Standardizing colour codes may therefore be positive, but it does not automatically guarantee safe behaviour. People must previously have practiced what each level means in their specific space: flood-prone housing, wildland–urban interface development, school, industrial estate or nursing home.

Official cartography is another strength with international relevance. Disaster risk reduction policies have increasingly incorporated maps, viewers and geographic information systems. However, the literature on social vulnerability warns that risk cannot be understood only as a physical hazard layer; it must integrate mobility, age, health, income, support networks, language, digital access and local memory [29–31]. Consequently, the cartographic viewer envisaged by the plan should combine technical accuracy with citizen and educational readability. A useful map not only shows where a hazard exists; it enables different people to make decisions in real contexts.

Gaillard and Mercer [13] argue that disaster risk reduction requires bridging scientific, institutional and community knowledge. Residents know where water accumulates, which streets are blocked, which mobility barriers exist, which people are isolated and which rumours recur. Integrating this memory through workshops, participatory mapping and geographical risk-reading itineraries would not weaken technical authority; it would complement it. In the Valencian case, this integration would allow the plan to be perceived not only as a hierarchical device but as a policy of shared territorial learning.

Schools emerge as strategic spaces for reasons that are also international. The Comprehensive School Safety Framework approaches school safety through safe learning facilities, school disaster management and risk reduction and resilience education [20]. Ronan and Johnston [15,16] and the review by Seddighi et al. [17] show that school programmes can improve child and family preparedness, although effectiveness decreases when they are occasional, weakly contextualized or disconnected from practice. Spain's compulsory emergency training therefore creates an opportunity for the Valencian Master Plan to operate as a laboratory for applied geography education.

From the perspective of geography education, the added value lies in teaching spatial reasoning. Gong et al. [18] argue that disaster risk reduction education should include action, participation and curricular integration. In Spain, Morote and Olcina [32–34] have shown that learning about risks improves when students interpret hazards in their own environment rather than as abstract content. This evidence supports the proposal for local sheets, school atlases, risk maps, evaluated drills and fieldwork. Geographical literacy is not a decorative complement: it is the didactic translation of risk understanding.

The plan's attention to vulnerable groups is a strength, but it requires greater operational detail. Vulnerability is not a fixed attribute of social groups; it is a relational condition depending on exposure, resources, support networks and response capacity. Morrow [30] and Cutter et al. [29] have shown that mapping vulnerability requires social and territorial variables. In preventive policy, identifying older people, children, persons with disabilities or groups facing language barriers is only the first step. The next step is to have verifiable protocols for nursing homes, day centres, isolated dwellings, migrant populations, carless families, dependent persons and neighbourhoods affected by the digital divide.

The guide rightly insists on official sources and rumour control, but risk communication cannot be exclusively one-way. Paton [35] stressed that disaster preparedness

depends on cognitive and social factors such as trust, perceived efficacy and community ties. Communication must therefore be redundant, multi-channel, accessible, multilingual and practiced before the crisis. Fighting misinformation is not solved only through institutional messages; it needs media literacy, community mediators and exercises for verifying warnings in real contexts.

Recent empirical and review evidence strengthens, but also qualifies, the educational argument. Kamil et al. [36] reported improved disaster knowledge among high-school students through geographic literacy-based learning, while Song et al. [37] found that web-GIS disaster risk reduction materials and local cases improved students' post-test results, especially in on-site settings. Sun et al. [38] show that geography textbooks can contribute to disaster resilience but often emphasize risk understanding more than governance or investment. These studies support the spatial literacy premise of this article, but they also justify the limitation stated above: the Valencian proposal remains a framework until local pilots measure learning, preparedness and response capacities.

The recent risk-communication literature also reinforces the need to move from information dissemination to trust-based and participatory communication. Bonfanti et al. [39] identify trust as a cross-cutting variable across prevention, preparedness, response and recovery, and Grabmaier et al. [40] propose inclusive community participation as a practical condition for involving vulnerable groups in disaster risk management. This evidence supports the proposal for community mediators, multilingual materials and locally embedded verification channels.

Comparable European and Mediterranean practices show that the Valencian framework is not isolated. Italy's *Io non rischio* campaign combines national civil protection messages with citizen preparedness [41]. France's *Géorisques* portal allows citizens to identify risks near a given address and connects information with preparation and protection resources [42]. Catalonia's Civil Protection Map links hazard-specific plans such as PROCICAT, INUNCAT, INFOCAT and SISMICAT with municipal emergency-planning obligations and recommendations [43]. Portugal's National Platform for Disaster Risk Reduction and its local-platform guidelines emphasize multi-sector coordination and the mobilization of civil society [44]. The Valencian contribution is therefore potentially transferable as a regional model that integrates official cartography, citizen guidance, school training and measurable geographical literacy; its uniqueness lies less in any single instrument than in the proposed connection between these instruments.

The plan's limitations are concentrated in implementation. The first is potential territorial generality: guidelines such as "move to higher ground" or "avoid flood-prone areas" are correct, but must be translated into concrete maps, routes and safe points. The second is the absence of public indicators of citizen capacities. Distributing guides or conducting campaigns does not indicate whether people can interpret a warning, prepare a kit, recognize a safe route or act during an emergency. The third is inequality of local resources: small municipalities, rural areas, schools with fewer staff or vulnerable neighbourhoods may need differentiated technical and financial support.

The international interest of the Valencian case lies precisely in this tension between regional planning and local capacities. Many European and Mediterranean regions face combined risks from floods, extreme heat, wildfires, storms, urban pressure and population ageing [3,7]. A regional plan may become a reference if it shows how to articulate civil protection, education, public cartography, social inclusion and evaluation. In this sense, the Valencian Community can offer a transferable case for other territories exposed to rapid and spatially unequal hazards.

6. Conclusions

The main conclusion of this analysis is that the Master Plan for Analysis, Anticipation and Reaction to Natural Disasters provides a relevant institutional basis for strengthening preventive culture in the Valencian Community. However, its social effectiveness will depend on its ability to transform protocols, guides and maps into practiced geographical literacy. Informing is not the same as preparing. Preparing means understanding one's own risk territory, practicing decisions and participating in community learning processes.

Key strengths include the integrated prevention–response–recovery cycle, attention to official sources, differentiation by hazard type, consideration of vulnerable groups, incorporation of mental health, the intention to update maps and the promotion of drills. These strengths connect with international priorities on disaster risk reduction, people-centred early warning systems and school safety.

The main limitations concern implementation: absence of public indicators of citizen capacities, risk of excessive generality in recommendations, unequal local resources, the need to adapt messages to diverse social realities, insufficient specification of assessment tools and possible disconnection between guide, curriculum and municipal plans. These limitations do not invalidate the plan; they identify the conditions required for it not to remain merely declarative.

A further limitation is the absence of empirical validation. The framework should therefore be tested through pilot municipalities, school-based interventions, stakeholder interviews, citizen surveys and longitudinal assessment of drill performance. Such validation would allow future research to distinguish between the plan's documentary quality, its implementation fidelity and its real effect on preparedness capacities.

Future challenges are fourfold. The first is to territorialize prevention through citizen maps, local risk sheets and school materials linked to the environment. The second is to institutionalize evaluated drills rather than merely ritual drills. The third is to build preparedness indicators enabling annual monitoring and continuous improvement. The fourth is to integrate disaster memory into a critical geography education that helps understand the relationship between natural phenomena, land-use decisions, social vulnerability and climate change.

A society does not become resilient only because it has better warnings, but because it understands better the territory in which it lives. Geography provides this situated intelligence: it helps read places, relations, scales and inequalities. In a Mediterranean context exposed to floods, wildfires, extreme heat, storms and other hazards, geographical literacy should be regarded as a basic dimension of citizen safety.

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