

**NARRATIVES ON NATURAL DISASTER AND
RESILIENCE: PLANIFICATION VS. REALITY IN
POST-ERUPTION PENIPE, ECUADOR**

Narrativas sobre desastres naturales y resiliencia: planificación
vs. realidad en Penipe, Ecuador, en el contexto de erupción
volcánica

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ABSTRACT

Radioactive tephra fallout, landslides, and incandescent rocks have shaken the agricultural economy around the Tungurahua volcano in Ecuador since at least 1999. The events of 2006 involved a narrative offensive, based on the prevailing discourse of intervening international organizations, and a new credit policy, primarily aimed at productive diversification. Documents from that period were compared with two recent investigations: a geological-transdisciplinary study from 2022, and a more recent investigation, prompted by this research, in the town of Penipe. These investigations revealed that not only the designed policy was not successful, but that there were also no records of the strategic shifts chosen by farmers toward monoculture and indoor animal husbandry in response to the need to survive the pressures of the context and the uncertainty. The study concludes with a reflection on the gap between the formal intentions of the narratives of international organizations and governments (the formal narrative) and the situational reality on the ground, for the design of future policies.

Keywords: Tephra rain, risk management, agriculture, public policy evaluation, food security.

RESUMEN

La lluvia radiactiva de tefra, movimientos de tierra y piedras incandescentes han sacudido la economía agrícola alrededor del volcán Tungurahua, en Ecuador, al menos, desde 1999 hasta la fecha y sustancialmente, hasta el 2014. Los eventos del 2006 implicaron una estrategia narrativa, basada en el discurso predominante de los organismos internacionales interventores, y una nueva política de créditos, fundamentalmente dirigida a la diversificación productiva y la reacción inmediata. Los documentos de la época fueron contrastados con dos investigaciones recientes, una de tipo geológica-transdisciplinaria del año 2022, y una investigación impulsada por esta investigación en tiempos recientes, en la localidad de Penipe, revelando que, no solo la política diseñada no fue exitosamente implementada, sino que no hubo registros de las derivas estratégicas escogidas por los agricultores hacia el monocultivo y crías techadas de animales, frente a la necesidad de sobrevivir a la presión del contexto y la incertidumbre. Se concluye con una reflexión sobre la diferencia entre las intenciones formales de las narrativas de los organismos internacionales y la realidad en la escala situacional, para el diseño de políticas futuras.

Palabras claves: Lluvia de tefra, manejo de riesgos, agricultura, evaluación de políticas públicas, seguridad alimentaria.

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INTRODUCTION

We propose to explain that pollution (mostly *tephra fallout*) has reshaped the agriculture structure of Penipe from 1999 to 2007 because the Tungurahua volcanic activity. This process can be similarly recognized in all the direct radio around the volcanic activity, in the Province of Chimborazo, Bolívar and Tungurahua, Ecuador. This includes communities of Juive Grande, Cuspua, Bilbao, Yuibug, El Altar, Puela Choglontus, Cotaló, Pillate, San José de Chazo, Sabañag, Hualcanga, El Santuario y Santa Fé de Galán. But it was possible to observe protective differences, at least, in two main factors: crop altitude and wind direction.

Two main volcanic events shape the narrative on this process, because its impact on agriculture, displacement and migration: the 1999 fire eruption and the August 2006 *tephra fallout* cloud (Government of Ecuador, 2006). But the volcanic activity has been constant, producing uncertainty in more than 26 years. The August 2006 event was specifically addressed by International Organisms, State credit strategies, and a very solid narrative on how it had to be attended. In order to avoid future risks, most Official and International Organisms narratives explained local agriculture resilience through the idea of crop diversification: Farmers cannot “put all the eggs in the same basket”.

But previous scientific researches and our own interviews in Penipe match in 2025: farmer's perceptions showed that there was not diversification, but the opposite. Altitude and underground crops demonstrated to be more resilient, and because of it, shed leverages (as “cuyeros”) and white onions monocrops replaced traditional crops, and the planned intentions in 2006. Also the timing of flowering, the height of the trees, the natural barriers, the direction of wind,

the evolution of the local knowledge on the phenomenon, the logics of micro-credits, among other factors, were not considered or fully considered.

This situation not only opens a debate about scientific approaches to risk management in agriculture but, mainly addresses the problem of the divorce of social planning and reality. According to local farmers, normal narratives contradicted reality, which is a studied issue of Theory of Games and Rational Choice (Cornish & Clarke, 2010; Brantingham & Brantingham, 1993:261-264). These schools of political sciences remind that planning management can represent institution interests rather than communities. Communities also can understand how institutions think, and act persuasively, in order to get the credits, or simply, not to generate a conflictive situation.

The results of this process can teach several possibilities. From the interviews on the field, two of them must be highlighted:

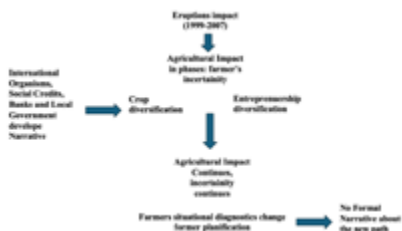
- Public policies design on food security and risk management, as most of International Organisms does, have consolidated narratives, based in a certain common knowledge and shared opinions, sold as specialized. The stability of these narratives, is linked to the stability of budgets, credits, posts, and leaderships in the international context. To recognize errors or the simple idea that logics of credits and formal narratives can change, stretched by logics of the situation, can be defiant. The need of rapid answers and the stability of presumptions generally play a role against the situational methodological approaches in qualitative social sciences, where time is necessary to understand the changes, and the quality or people representations.

- The timing of the social change among the actors of situation is normally different to the institutional timing. The existence of ancestral or traditional views of how agriculture, environment, decision making and communities works, is not often consistent to interviews, assemblies and the leadership of specialized advisors, as they usually act in fields. But to ethnographies, participatory observation and the shape of the decision-making process in the light of community complexity and continuous and long process involving nature.

This debate is not new: It can be found and developed by the often-forgotten Situational Planning, and Three Clocks theories, for instance.

In order to fix its argumentation, this paper general idea is newly explained in the following figure:

Fig. 1. Graphical Abstract



THE FORMAL NARRATIVE

The formal narrative on this problem is aware of certain diagnosis: Volcanic hazards frequently produce long-term socio-economic disruptions in small Andean cities. The 2006 eruption of Tungurahua significantly affected the all-around communities, steadily but differently. In general, they have been causing population displacement, agricultural losses, and structural transformations in local livelihoods.

The solutions to these problems, according to international organisms

and local governments, are related to a general plan, based on credits and accurate diagnosis of the problem

The Alcalde of Penipe, in 2009, presented before the Community of Andean Nations their experience on disaster management policies, in the frame of the contest "Local development practices and policies in the face of disaster risks: Identifying significant experiences in the Andean subregion". The name of the experience was "*Desarrollo territorial del cantón Penipe: Previniendo las consecuencias de la activación del volcán Tungurahua* (Territorial development of the Penipe canton: Preventing the consequences of the activation of the Tungurahua volcano)" (Comunidad Andina de Naciones, 2009).

The experience won the contest in Perú. In the report, it can be read the importance of the international assessment:

"In the seven-year period (1999–2006) between the first and second eruptions of the volcano, a series of social and political processes took place. These latter processes, linked to municipal management, allowed for the creation of strategic alliances with the central government and international cooperation agencies, channeling significant resources to projects, most notably the relocation of the affected population to safe locations (Comunidad Andina de Naciones, 2009, p.7).

The experience is presented as successful, three years after the 2006 event. It seems to have a specific success in the productive recovery:

"Furthermore, these institutional synergies succeeded in changing the local development approach in Penipe. The municipality ultimately assumed a managerial, planning, and facilitating role, thereby regaining its leadership position with respect to the population and civil society organizations.

Territorial planning, resource management for basic infrastructure, and the development of a productive recovery strategy following the volcanic eruption were the key factors in development and learning that emerged from this experience." (Comunidad Andina de Naciones, 2009, p.7).

Politically, interinstitutional cooperation and community participation seem to be the pillars that made the experience possible:

"Evidence of these actions includes the creation of a cantonal development committee, the formulation of the Institutional Development Plan to strengthen the municipality's management capacity, the Comprehensive Economic Development Plan, the Contingency Plan, and the ordinances, which constitute the institutional framework for local risk management. The participatory process implemented in the canton involved the Catholic Church's Center for Goiter Eradication and Training for the Disabled (CEBYCAM-CES), the Swiss Agency for Development and Cooperation (SDC), the Agricultural Technical Assistance Services Company (EMSETA), and community-based organizations." (Comunidad Andina de Naciones, 2009, p.7).

After the management of the security issues, Penipe started the economic recovery. International cooperation, local budgets and the National Government assignation rose up to 10 million dollars. In a local context, where 600.000 USD constituted the contribution of the municipality, 10 million of dollars is a very important sum:

"In this regard, the management capacity achieved by the municipality in the short term was also reflected in the signing of several institutional agreements, for which it allocated 20% of its annual budget (approximately \$280,000). This amount was derived from the 15% allocation law by the national government, and the Credit and Investment Fund for Emergencies was created in 2006. Consequently, it is estimated that up to 2006 the municipality invested, on its own income, around \$600,000. Furthermore, this same body undertook negotiations with various ministries and international cooperation agencies, which allowed it to channel over \$10 million, a significant sum that, when invested locally, helped to reactivate the local economy as a whole" (Comunidad Andina de Naciones, 2009, p.21)

This amount was located in the established idea by international organisms of promoting diversity. The approach is not examined in any si-

tuational context, because it comes with the budgets. The narrative of the FAO on these subjects is presented as if the ideas came from a famer, Serafin Medina, who always was "a researcher". On his experience, productive diversity slogan is once again confirmed, but no observed in time:

"Don Serafin's farm hasn't always been agro-diverse, however, he has always been a researcher and for this reason has been constantly preparing himself in various areas, both livestock (before the eruption it was the main source of income), as well as farm animals (currently the main commercial activity), short-cycle crops and fruit trees, which has allowed him to reduce the risk of losses through diversification, heeding the popular saying 'Don't put all your eggs in one basket', in addition to reducing the risk from the manifestations of the volcanic eruption process and having a multi-threat vision, such as: market price fluctuations, agricultural product import policies, increased prices of agricultural inputs, periods of drought and landslides caused by intense rains." (Valencia-FAO Ecuador, 2010, p.88)

This is the international organism's narrative on the subject. First, the very well established narrative on micro-credits, from the Mohammed Yunnus experience and the archetypes of entrepreneurship:

"To sustainably rehabilitate living conditions in the area affected by the volcanic activity, the Social Pastoral shifted its strategies from those previously based on emergency support to leveraging the knowledge generated by affected communities to recover from the severe impact. Previous development programs had demonstrated that small and medium-sized producers have the capacity to utilize credit and meet repayment deadlines, leading to a productive reactivation and a new cropping pattern resistant to ashfall, as well as changes in livestock. This initiative was developed through diagnosis and planning, with a participatory and collaborative approach; that is, it was the product of a process shared with the population of several communities. The proposal took advantage of the farmers' experience, who, based on observation processes, established new cultivation patterns and technology, both in the production of animals such as

beef cattle, and in the production of green and bulb onions, lupins, forage oats, and peas, which in previous years showed resistance to ashfall" (FAO, 2010).

The idea of production diversity was established through criteria of resilience to ashfall, and not the market:

"The credit is targeted at specific crops and livestock, identified through a participatory analysis of agricultural products that exhibit resistance and resilience to volcanic threats. For example, green onions are resistant to ashfall, while the Toa bean variety is highly resilient due to its flowering type and period. The selected crops include green onions, bulb onions, carrots, peas (black spot variety), broad beans, Toa beans, lupins, and alfalfa. In the livestock sector, the credit supports the purchase of cattle for fattening, guinea pigs, pigs, rabbits, dairy goats, sheep, and chickens." (FAO, 2010)

In this assumed idea of productive diversification, the Penipe government explains the implemented productive strategies:

"In this regard, the Comprehensive Economic Development Plan for the Penipe canton highlights the importance of having fresh resources in the area: 'Projects, whether mixed (with municipal participation) or entirely private, such as the meat processing plant, the cheese factory, the shoe factory, and the fruit pulp processing plant, have become important benchmarks for business and social enterprises' (CEPESIU, 2007).

Through institutional agreements, financing is expedited for the construction of the physical infrastructure that houses the following productive projects: a meat processing plant; the Taita Pacho mixed-economy marketing company; facilities for collecting dairy products, serving as the base for the network of small-scale cheese producers in the canton; a fruit processing plant in Bayushig; and the first phase of the Tambo Capil thermal spa complex in agreement with the provincial council and the Federation of Municipalities of Extremadura (Spain).

Furthermore, independently, the creation of the agricultural tractor production unit was facilitated, along with projects for the production of stone for construction: quarrying, processing, and sales, and for the manufacture of paving stones.

Regarding institutional initiatives, the fruit sector was revitalized and linked to the fruit processing plant.

In addition, four irrigation systems were activated, a sewage system was constructed in the communities, and the water systems of three communities were rebuilt (...) Production of hydroponic fodder for animal feed in greenhouses; Production of food for affected families through hydroponic cultivation. Construction of sheds for milk production with housed cattle" (Comunidad Andina de Naciones, 2009, p.21).

Finally, the government of Penipe in 2009 sees the eruption as the necessary experience to move productivity forward:

"On the other hand, significant steps have been taken to ensure that the local authority fulfills a more structured role in promoting local economic development. In this regard, several initiatives supporting productive economic reactivation are being managed with local funds. This same approach has guided negotiations with international cooperation agencies for the channeling of extra-budgetary resources.

Penipe is moving towards sustainable development, learning from the lessons of Tungurahua, as well as the knowledge and traditional wisdom of its population..." (Comunidad Andina de Naciones, 2009, p. 30)

But finally, as we will see, despite the progressive stabilization of volcanic activity, economic recovery and territorial development remain uneven. Monocrops defined the productive horizon of communities, and local development (nor social or economic) did not arrive.

REAL IMPACT OF ERUPTIONS IN ECONOMY. THE TIME TALKS

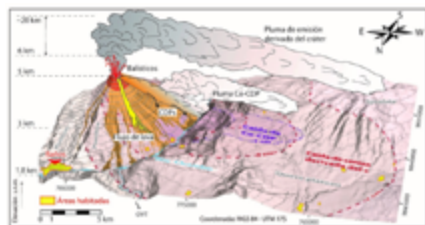
In 2022, several researchers published in *Volcanica*, a journal from the University Press of Strasbourg, that most of the crops still were the yellow tender corn, but that eruptions made farmers to move to white onion (Ligot et al., 2022). This information lists another group of crops, and gives

consensus around the idea of timing of the crops (not just species). The transcript information is from 2014, but it is not related at all with the Pastoral/FAO statement that justified the credits in 2006, as we read before:

"Potato, frijole, fava bean, tamarillo, black seed squash, peach, apple, and/or blackberry were reported to be the most sensitive crops to tephra. While Tungurahua's farmers could not rank their crops in terms of vulnerability, they conceded that white onion was most resistant. The flowering stage was unanimously perceived as a period of extremely high vulnerability for any crop. Frijole, fava bean, and black seed squash were also considered to be particularly at risk if tephra fall occurred during fruit growth or fruit ripening, whereas corn was notably sensitive to tephra when grain started forming. When fruit trees reached fruit set, significant damage from tephra could occur, but the fruits became less fragile as they grew (Figure S1; Supplementary Material). Interviewees reported that tree fruits became more resistant to tephra once they had reached approximately half of their final size" (...) Although the two crops belong to the tuber crop category, tephra deposition was reported to impact potato significantly but has a minor effect on white onion. Similarly, tree fruits exhibit different vulnerabilities to tephra depending on skin traits; for example, peach and apple are highly sensitive, whereas greengage and tangerine are much less vulnerable (Ligot et al., 2022, p.172).

The apparent contradiction is related probably to the fact that the 2014 researchers thought on crops differently, worked with a well selected and representative group of farmers in 15 villages spread on the affected areas (and not with Mr. Serafin Medina, as the FAO did). Also, to the fact that wind and altitude are important factors to differentiate the effects of eruptions, the kind of tephra (they published 6 kinds and the "white fine" was registered as the worst) and the geological barriers of the tephra displacement, as can be seen in this figure from the National Geographic Institute of Ecuador:

Figure 2. A schematic idea of the tephra displacement in 2006, in the geological context (IGSB, 2016)



The most important contribution also can be due to farmers who have a more accurate comprehension of general phenomenon, without the pressure of receiving credits and budgets, and adding more information to the 1999 and 2006 uncertainty. In fact, the Volcanica journal offered a detailed and important comprehension of the relation between crops timing and vulnerability, we did not have in 2006, as it will be seen in the next figure.

Figure 3. Crop calendar and vulnerability to tephra (Ligot et al. 2022, p. 168)

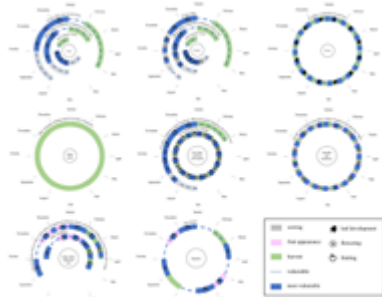


Figure 3. Illustration of the crop calendars for the main crops cultivated in the 15 villages surveyed in 2016. Each crop-specific calendar shows the period of sowing (purple points), fruit appearance (fruit trees), and harvest. The period corresponding to the plant development stage(s) (i.e. leaf production, flowering, and fruit/vegetable formation) most vulnerable to tephra fall is indicated in blue.

PENIPE: AN IN-DEPTH FIELD RESEARCH

From November 2024 to April 2025, we analyzed the socio-urban

and productive dynamics of Penipe in order to identify strategic planning mechanisms capable of reactivating local economies while strengthening territorial resilience in a volcanic risk context.

We designed a mixed-method combining socio-economic analysis, territorial diagnostics, and qualitative assessments of urban infrastructure, productive systems, and citizen perceptions. The data also included housing conditions, employment structures, productive sectors, infrastructure availability, and governance dynamics, indicators related to socio-economic stratification, productive activity, and urban services scopes. The main research questions were, Did Penipe improved local development from August 2006, and, according to local perceptions, Why?

Why Penipe?

Natural hazards increasingly shape urbanization patterns in vulnerable territories across the Global South. In volcanic regions, disasters often generate long-term socio-economic transformations that extend beyond the immediate destruction of infrastructure and livelihoods. The interaction between hazard exposure, migration dynamics, and economic restructuring frequently produces new territorial configurations requiring innovative planning strategies.

Penipe, located in the province of Chimborazo in the central Andes of Ecuador, represents a paradigmatic case of this phenomenon. The canton is geographically positioned near the Tungurahua volcano and historically has maintained strong agricultural traditions linked to its favorable climatic conditions and fertile soils. However, the volcanic eruptions that intensified during the early twenty-first century, particularly in 2006, generated widespread environmental, social, and economic impacts. Large quantities of ash and volcanic material affected agricultural systems, while repeated

evacuation processes forced thousands of residents to temporarily abandon their homes and productive activities.

The eruption caused severe losses in the agricultural sector, including the destruction of crops and livestock mortality, fundamentally altering local economic dynamics. Approximately 19,000 people were affected in high-risk areas, and agricultural systems experienced severe disruption due to ash deposition and pyroclastic material that interrupted crop germination processes (Comunidad Andina de Naciones, 2009).

Data sources

The analysis is based on a comprehensive socio-urban diagnostic conducted in the urban and peri-urban areas of Penipe. The study area includes the nine communities that form part of the cantonal urban structure, including Nabuzo Alto, Nabuzo Bajo, Gaviñay, Shamanga, Puchiquies, Penicucho Bajo, Penicucho Alto, Uñañag, and El Guzo.

Data were collected through:

- Household surveys
- Field observations
- Spatial analysis of urban infrastructure
- Evaluation of productive systems
- Analysis of institutional frameworks

Analytical Dimensions

The research analysed several key variables structured into thematic categories:

Social Dimension

Indicators evaluated included:

- demographic composition
- education levels
- employment status

- socio-economic stratification
- housing conditions

Productive Dimension

The productive structure of the canton was analyzed according to the classification of economic sectors:

- Primary sector (agriculture, livestock, fruit cultivation)
- Secondary sector (small manufacturing)
- Tertiary sector (commerce, tourism, services)

Urban Infrastructure

Urban infrastructure was evaluated through indicators related to:

- Water supply systems
- Electricity networks
- Road infrastructure
- Waste management systems
- Telecommunications access

Governance and Institutional Capacity

Institutional analysis examined:

- Municipal management capacity
- Citizen participation mechanisms
- Interinstitutional coordination

Analytical Approach

The research applied descriptive statistical analysis and comparative evaluation of socio-economic indicators. Relationships between variables were analyzed in order to identify structural contradictions affecting territorial development.

Results and Discussion

The analysis reveals a socio-economic structure characterized by strong dependence on primary productive activities. Agriculture, fruit cultivation, and livestock production represent the dominant sources of in-

come for many households.

Despite this productive potential, employment opportunities remain limited and frequently characterized by informality and low productivity levels. These conditions contribute to labor and income instability, particularly among rural households.

Socio-economic stratification analysis indicates that significant portions of the population face economic constraints affecting access to housing, services, and educational opportunities.

The productive system of Penipe is structured around several key sectors.

Primary Sector

The agricultural sector includes activities such as:

- Crop cultivation
- Fruit production
- Livestock farming
- Poultry production

These activities represent the backbone of the local economy but face several structural challenges, including:

- Soil degradation
- Vulnerability to climatic variability
- Limited technological innovation

Secondary Sector

The secondary sector consists primarily of small-scale artisanal and manufacturing enterprises. These businesses play an important role in local employment but remain limited in scale and productivity.

Tertiary Sector

The tertiary sector includes commerce, transportation services, and tourism activities. Tourism presents a particularly opportunity due to the

canton's proximity to attracting natural landscapes and volcanic environments.

Infrastructure analysis reveals uneven access to basic services.

Although water supply and electricity systems are generally available in urban areas, rural and peri-urban zones experience more limited-service coverage.

Transport infrastructure also presents significant challenges. Road networks connecting rural production zones to urban markets require improvement in order to facilitate economic exchange.

Transversal problems

The diagnostic identifies several key contradictions affecting territorial development:

1. Precarious employment opportunities
2. Degradation of agricultural soils
3. Insufficient productive infrastructure

These contradictions illustrate not only Penipe's, but the complexity of post-disaster recovery processes in small cities exposed to the 2006 natural hazards, and after, around Tungurahua

Conclusions on Penipe conditions

While emergency response and reconstruction programs were implemented from 2006, long-term economic recovery has remained uneven. Many rural households continue to rely heavily on traditional primary activities such as agriculture, fruit cultivation, livestock production, and small-scale artisanal activities. These sectors are characterized by limited productivity, insufficient market integration, and still vulnerability to environmental disturbances.

The findings reveal that Penipe's economy remains strongly dependent on primary activities such as agriculture, livestock, and fruit production, yet these sectors face structural vulnerabilities including soil degradation, market access limitations, and infrastructure deficits. The socio-urban analysis identifies significant challenges including limited labor offer, limited diversification of economic activities, underutilized infrastructure, and uneven access to services. At the same time, the canton presents significant opportunities related to agro-productive potential, tourism resources linked to volcanic landscapes, and strong community networks.

The socio-urban diagnostic of Penipe reveals that economic activity remains concentrated in the primary sector, with agriculture, fruit cultivation, livestock production, and small-scale artisanal activities representing the dominant sources of income. Diversification is mainly visible in the subsistence crops, and some domestic crops serving to the Penipe town. But all the canton is a sort of inclined valley, from the 2600 meters of altitude at the Penipe town, to the 5260 of the Cañónigo peak, in the middle of several big peaks in other cantons and provinces, as the Chimborazo peak (the highest in the world, according to its proximity to outer space). This position makes the Penipe region a too much vulnerable valley to winds and tephra. Because of the altitude, the inclination and the strong winds, white onions, an underground crop, used to dominate the region production from 2006. But now, because of the soil degradation, and the inherent ability of tephra to fertilize soils, farmers returned to tender yellow corn and livestock grass crops. This would imply a new cycle of agricultural and food security crisis, if Tungurahua, or any other volcano of the region, flood the air with new tephra clouds.

The economic structure also includes secondary activities such as

small manufacturing enterprises and tertiary services related to commerce, transportation, and tourism.

At the same time, the territory faces multiple structural challenges. These include precarious labor opportunities, degradation of agricultural soils (which is also compensated by the same accumulated tephra), limited productive infrastructure, and deficiencies in public services and urban management. Such conditions reflect broader contradictions in the territorial development model, where significant natural and cultural resources coexist with socio-economic vulnerabilities.

Urban planning thus becomes a crucial instrument for fostering economic reactivation while simultaneously addressing risk exposure and spatial inequalities. Strategic planning must identify mechanisms capable of linking productive systems with urban infrastructure, improving connectivity with regional markets, and promoting sustainable crops and livelihoods in time, in order to prove its relevance.

Strategic urban planning integrating risk management, productive diversification, and territorial governance can foster a transition towards productive resilience in Penipe. But it did not happen from the 2006 interventions. White onion was then contradictory to the crop diversification strategies boosted by regional credits and international organisms, and nowadays yellow tender corn and livestock grass are new forms of monocrops, which are naturally risky to a new cycle of eruptions.

It is clear from the Penipe farmers point of view, that government budgets and international organisms planning was not related to reality, nor to solutions. The whole approach to local development is determined by the opportunities of the market and not sustainability.

Strengthening agro-value chains, promoting tourism-based local eco-

nomies, and improving infrastructure connectivity still are critical pathways for achieving sustainable livelihoods in the post-disaster Penipe canton.

GENERAL CONCLUSIONS: THE IMPORTANCE OF SITUATION AND TIMING

With the passage of time following the terrible events experienced by communities within the radius of the Tungurahua volcano eruptions, from 1999 to 2014, it is possible to observe how discourses that sound "good"—that is, that seem coherent at a given moment—may not be reliable or reasonable bases for the design of public policies. The two aspects that stand out from this discrepancy, in light of the information provided, are that social processes are inherently complex and must be understood not through attractive discourses standardized by the political logic of official authorities or international organizations, but rather through scientific evidence that considers context, temporality, situational triangulation, and the appropriate use of scientific methodology.

Specific considerations are revealed in the two recent investigations of the area, including that of the emblematic Penipe region, which should have been fundamental to the 2006 policy (and to the 1999 policy, had one been sufficiently articulated): a) dogmatic use of the idea of diversity, b) lack of understanding of each species' reaction to tephra, c) dogmatic use of the microcredit strategy, d) lack of adequate sampling measurement strategies, e) lack of participant observation, or other ethnographic strategies, to recover the temporality of the culture and, with it, the real notion of social change (not desired, but possible), f) confusing the scientific design of a policy with governmental action, or the creation of offices, g) absence of the components of altitude, wind direction, geological protection, and tephra type in the analysis, h) lack of understanding of the rela-

tionship between soil types, tephra fertilization, and real market pressures, among others.

Such considerations not only reveal miscalculations but also the unscholarly use of public policy theory and its actual formulation by specialized sources (which are far from being the so-called specialized sources in international organizations, which tend to reproduce standardized and dangerously axiological narratives).

In this sense, it is suggested that the contributions of theories such as Rational Choice (Cornish and Clarke, 2010) or the Three Clocks theory (Castro Aniyar, 2022) be revisited. The latter, in particular, recovers the notion of situation in diagnostic and predictive analysis, while also integrating it with the slower and more stable timescale of social conjunctures, and in turn, with the even slower and more stable timescale of social structures. This theory focuses on the need to understand the timescale of things and their symbolizations in order to avoid falling into the characteristic traps of metadiscursive illusion, which substitutes poetic formulations for an understanding of reality as it is.

It is the opinion of the authors of this text that the experience analyzed shows, in a fundamental way, the development problems produced by the poetic and attractive discourses that populate the formulation of policies in developing countries.

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