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Towards a sensory risk culture

Risk communication about contamination at Barão de Mauá (Brazil)

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Abstract Our research is based on an interdisciplinary collaboration between CETESB (Environmental Agency of the State of São Paulo), and two research teams, Territoire (UMR PACTE n°5194) and Cresson (UMR AAU n°1563), from France. It aims to test various qualitative methods to implement participative risk communication among the populations of at-risk areas in the São Paulo Metropolitan Region. We are particularly interested in the Barão de Mauá residential complex, located in the city of Mauá, 30 km from São Paulo, which is a life-size laboratory to study a risk situation involving soil and groundwater contamination. In this context, our contribution is to implement two very complementary approaches: an approach via the controversies, which brings the positions and thinking of the various actors involved in this risk situation up to date, and an approach that describes the ambience of the condominium in a way that reflects as closely as possible the inhabitants' lived experiences. The analysis of controversies can be used as a methodological tool to analyze the actors who are mobilized, the arguments that are made, the objects that circulate and are transformed and the agreements that emerge and dissolve in order to identify the salient aspects and analyze the bottlenecks. Regarding the approach within the ambience, there was an anthropological immersion of a French-Brazilian research team in the Barão de Mauá condominium over a period of five days. An original inquiry was implemented to develop a substantial sensory ethnography of this contaminated environment. The hypothesis that guided this work is that a risk atmosphere is embodied and manifested in sensory perceptions, physical and memorial traces, daily gestures, ordinary narration, emotional tones, specific landscapes and ways of being together. Both approaches proved very complementary to various points of view: in the implementation of various time scales involved in the situation of risk (long temporality

when it falls under the socio-political history of the area and short when it relates to the inhabitants' day-to-day experiences), in the articulation of the various levels of analysis involved (actors logical analysis and experiment inhabitants). The combination of these two approaches broadens the concept of risk communication by giving all due importance to the qualitative perception of risk and the complexity of vulnerable situations and leading to a proposal for participatory risk communication.

Keywords Participative risk communication, risk ambiances, analysis of controversies, public policies, contaminated areas

1. Towards a sensory risk culture

This research ¹ is based on an interdisciplinary collaboration between the CRESSON team (UMR AAU n°1563, France), which specializes in the themes of urban ambiances, affective atmospheres and sensory environments [1][2][3], the CETESB (Environmental Agency of the State of São Paulo, Brazil), which is in charge of managing at-risk territories and examines the social stakes of such inhabited spaces, and the Territorial team (UMR 5194 PACTE), which develops socio-political approaches to at-risk territories. The research recommends tackling an at-risk territory by combining a sensory approach of residing on it with an approach in terms of public policies. The goal is to give an account of the sensory experience of an at-risk territory (approach via ambiances) and to relate it to its social, environmental and political history (approach via its related controversies [4]).

The chosen field of study is the Condomínio Barão de Mauá in the city of Mauá, located 30 km from São Paulo, Brazil. Comprising a total of 54 buildings in which there are

¹ This work is part of a dual research framework: a CNRS PEPS Interdisciplinary FaiDoRA programme, "Low Doses, Risks, Alerts" (AAU-CRESSON, France), and a FAPESP

programme entitled "Da Comunicação de Riscos at Cultura de Risco" (CETESB, Brazil).

7,000 residents, it was built in 1996 on land owned by COFAP, a shock absorber company, which had buried solid industrial waste, mainly foundry residues, on the premises. As there was no land control by the owners, other toxic substances of unknown origin were also illegally deposited there. In other words, the buildings had been constructed on a ground contaminated by organic and inorganic compounds (some of which are volatile), including methane, benzene, chlorobenzene, trimethylbenzene and decane. People became aware of the contamination in April 2000 after an explosion that had likely been caused by methane. This explosion happened during the maintenance of a pump in one of the underground water tanks that had been installed in the condominium. It killed one worker, and another suffered serious burns. Since then, legal proceedings have dragged on and are still ongoing, while these condominiums' residents

continue to be exposed to a double risk: contamination by carcinogens and methane explosions.

To study the complexity of the situation and the problems such a territory creates, our hypothesis is that a risk environment is embodied in specific ambiances and lends itself to sensory manifestations that can be documented by methodologically appropriate means. Therefore, it was necessary to examine the modalities of the emergence of inhabitants' sensitivity to the risks, to question what might constitute a sensory risk culture and to update the stakes and socio-political consequences associated with the daily vulnerability of being in such a living environment. The approach adopted was based on the idea of a risk environment and on the commitment shown to the inhabitants with regard to this public problem.

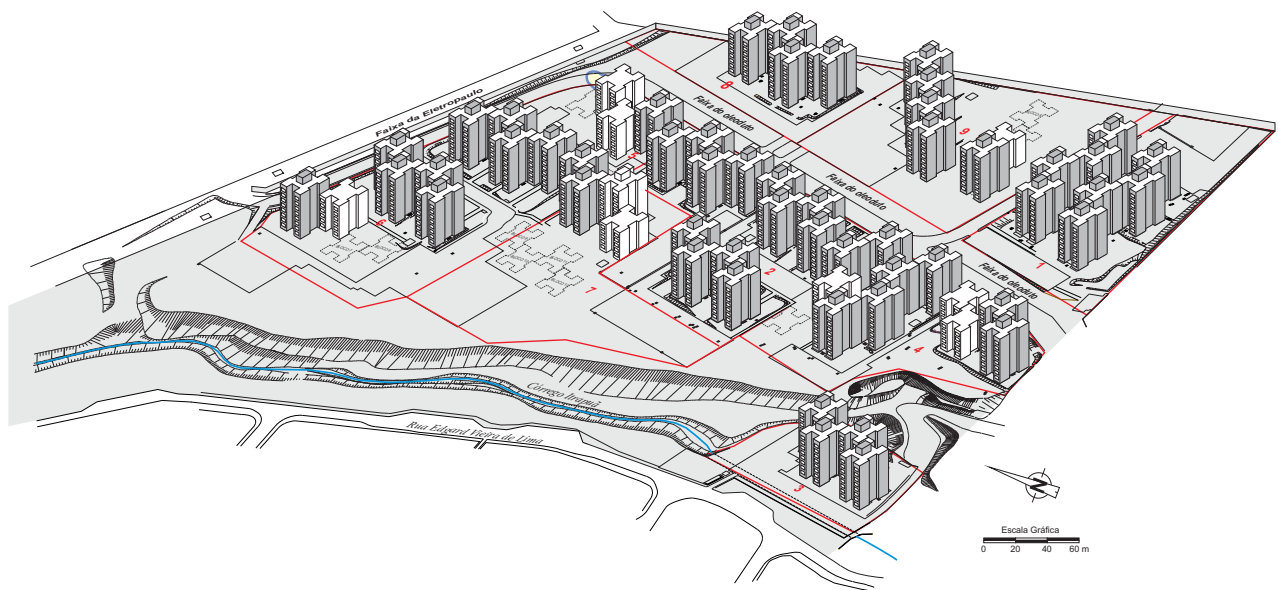


Figure 1. 3D perspective of the Condomínio Barão de Mauá

2. Controversies regarding the *in situ* investigation

An investigation carried out in Barão de Mauá in June 2015 took both a controversial and an environmental (or *ambience-based*) approach. These two approaches have proved to be quite complementary and intertwined. The first approach made it possible to understand the stakes of this contaminated territory, trace its history and its public life, update all the actors involved in the controversy and contextualize the *in situ* investigation [5]. The second approach gave access to residents' everyday sensory experiences, to the way in which a risky territory can be lived from within and can mobilize inhabitants and, lastly, to the way in which the atmosphere creates a particular feeling in such an at-risk territory.

The controversy is a problematic situation where there is a

combination of scientific uncertainty, divergent strategies of actors and strong social mobilization. It is characterized by the absence of a consensus on the definition of reality. Controversy analysis can be used as a methodological tool to understand how new public issues are formed, and contaminated areas are a good example in this regard. It is not a question of taking sides in the controversy in question but of describing the full panorama (actors, positions, arguments, strategies, instruments, evolution), identifying the salient aspects and analyzing the points of blockage.

In addition, the *ambience* approach took the form of a five-day survey involving a group of 13 investigators. The aim was to document as accurately as possible the scattered contamination risks in Barão de Mauá. An ethnography of the senses was developed to be as close as possible to the situations faced by the inhabitants. The investigation [6] was simultaneously *immersed*, *plural*, *collective* and *interactive*: *immersed*, because it was an *in situ* investigation within the

Barão de Mauá residential complex; *plural*, because it is based on a variety of light approaches (ethnographic observations, explorations in progress, sensory reactivations, group meetings, inhabitants' stories, floating listening and sound recordings, photographs, shared logbook, reporting on the survey with the residents); *collective*, because of the role played by the group of investigators' internal dynamics as well as that of the inhabitants; *interactive*, because of the round trips between the data collected, the analyses in progress and the presentations made to the inhabitants and other city actors.

3. Sharing first impressions

The power of the site's ambiance was both rich and complex. Upon arrival at the condominium, not all the researchers shared the same experience regarding Brazil, São Paulo or the Portuguese language. However, it is striking that the tone of the researchers' initial notes, and even of the final syntheses, was so similar. The floating attention that emerged thanks to the predominant use of the descriptive form, as well as the pedestrian drift and the priority given to a first sensory-type knowledge, has certainly contributed to a strong coherence between the theoretical affect resulting from the immersion in the condominium. The strong contact with the site seems to have made a mark on all the investigators. According to the logic of the condominium, the threshold effect is both practical (barrier and control of individuals) and symbolic. For example, the tension that can be felt by a European in a Latin American metropolis decreases immediately, as it gradually becomes possible to have more relaxed interaction with the inhabitants, even if they remain unfamiliar. At the same time, there is an extreme ambivalence regarding the site, as well as the compartmentalization where this ambivalence originated.

The spatial experience seems to have been based from the outset on the perception of both visual and auditory discontinuity on the disparity of the grounds distributed between ground rather welcoming to being tread on and the many technical stigmas related to the primordial accident. It is also noteworthy that the sound space reveals repetitions via dry echo much more easily than through an enveloping reverberation. In the same way, the fortress or castle aspect orients the representations on the side of a strong personality of the building or a certain resistance of the place with respect to its surroundings, while the sensory experience attests to the site's strong dependence on the perceptible horizons (visual, auditory and olfactory), which evoke intermediate spaces that are highly undifferentiated and ultimately not very elastic.

The site is wrapped up inside the sound ring of peripheral sounds, to such an extent that the residents have long perceived auditory threats that can express a new disaster in relation to underground gas. This border around the condominium is noted by everyone and quite logically colors the visual barrier of industrial chimneys, whose chemical

smoke smells can easily be transposed into site-specific miasmas. In the same way, all the researchers notice the "weight of the sky" that the birds cannot make lighter. Perceptible thanks to their singing, the oral investigation reveals, however, that the birds feed on fruits that have almost certainly been contaminated. The sky has many aircraft passing through at low altitude, which contributes to the shared sense of an atmosphere of heaviness. Finally, beyond the details that provide consensus for a final report, we must note a fine sharing of all the rhythms of discovery and crystallization of theoretical affect.



Figure 2. Barão de Mauá residential condominium. Halted constructions next to the inhabited buildings.

4. Controversies in Barão de Mauá

The controversial analysis allowed us to reconstruct the complex history of the Condomínio Barão de Mauá, its public life with a few highlights of what has transformed the inhabitants' perception and increased the controversy.

In 1995, the sale of COFAP's contaminated land was approved by the City Council. However, according to one resident, "everyone knew there was waste – the hospital, COFAP, the other companies... everyone was dumping waste here". This event would later provoke the indignation of the inhabitants concerning the lack of respect shown to them by institutions, especially the Town Hall.

20 April 2000: There is an explosion in the condominium. It kills one worker. This dramatic event leads to the condominium put on hold (see below). It causes panic among the inhabitants. This is a traumatic event, especially for those who were on the scene. The complex's inhabitants have been living in fear ever since of another explosion happening.

August 2001: The Secretary of the Environment of the state of São Paulo invites the press, as well as nine síndicos from the condominium, to the CETESB to share the results of the first study into the causes of the explosion. The meeting with the press is held at 10 a.m., the one with the síndicos at 11 a.m. This first public meeting provokes a feeling of injustice among the inhabitants. "We were informed after the journalists, while we were the main ones concerned." Before the meeting, the inhabitants are informed by the press in a sensationalist way: "52 carcinogenic

substances: the Chernobyl of Brazil". This event reinforces the anxiety of the inhabitants who are already frightened of another explosion.

On 26 September 2006, the judge of the 3rd civil court of Mauá ruled on the inhabitants' compensation and the demolition of the condominium's 72 buildings. In September 2007, Mauá's "Environmental Prosecutor" decides to suspend legal action and sign a Conduct Adjustment Compromise with COFAP to present an environmental recovery plan. This evolution of the judiciary's positions and a procedure that drags on cause disappointment and anger among the inhabitants.

The controversial analysis also focused on describing the position of each of the social actors (administrations, companies, politicians, mobilized communities, etc.). Each group offers its own solution in accordance with its vision of the problem without engaging in dialogue with the others. For example, for the mobilized inhabitants, the solution is compensation in order to repair the lack of respect that they faced. For our interlocutors in the Public Ministry, only a final decision of the justice will be able to put an end to the conflict that feeds off the population's anger. For the CETESB Contaminated Area Service, the solution is a good risk communication plan that will help re-establish a

connection with the residents. For our interlocutors in the Health Administration, the use of the ATSDR epidemiological methodology from the United States can contribute to solving the problem of the population's exposure to benzene. If each institution defends a different position, it is undoubtedly because each of them defines its activities and priorities in its own field of action and because they define their priorities based on the imperfections of their own actions.

This erratic risk management can be understood as a non-directed collective learning process [7] because no one really knew how to deal with this unprecedented situation; no one had a real strategy. This learning on the part of the institutions had a positive result, namely the realization that it was necessary to radically change practices – in particular, risk communication design – and that the institutions would not be able to improve the situation by settling for the remediation plan that the Geoklock company has been implementing since 2014 to decontaminate the site. From the point of view of the people who have been at risk for 20 years, the process is much too protracted, considering that this situation had been known to those in charge for 15 years by the time we started our field investigation work.

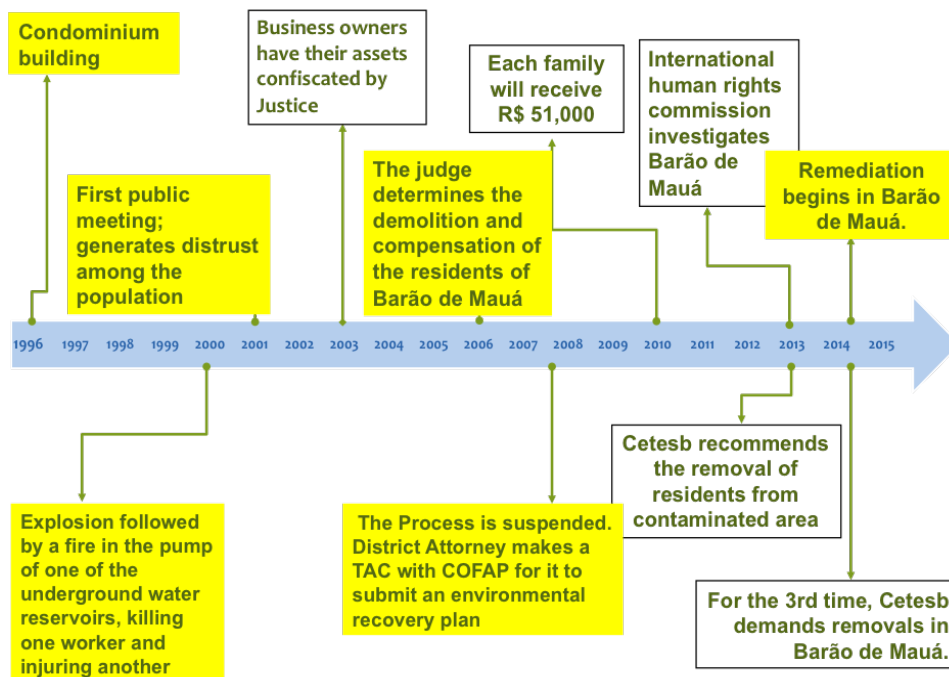


Figure 3. Controversy Time-Line

5. Pervasiveness of the senses: vision, smell, silence

Following the investigation of the controversies, the *in situ* investigation focused on the ambiances of Barão de Mauá and the pervasiveness of the senses. In this respect, three main aspects emerged: in visual, olfactory and auditory terms.

On the visual level, scattered throughout various parts of

the condominium, there are unfinished buildings, ghost buildings without doors or windows, showing rough, grey, tagged and neglected pieces of rubble. This vivid and disturbing image, which calls to mind a territory at war or a post-disaster zone, sets the tone for the entire condominium, harnesses the imagination and constantly brings to mind the perception of risk with which the residents are living.

On the olfactory level, there is a smell, more prominent in

some places than others, even if it is difficult to identify and delimit the specific areas. According to the inhabitants, the pervasiveness of this smell varies significantly according to the weather. The smell is stronger when it rains; when it is hot, only smoke rises from the ground, and the smells spread more evenly. While the ghost buildings provide an immediate shock, this indistinct, omnipresent and indefinite smell spreads slowly, gradually. It keeps the residents in a more or less worried state of hypervigilance: Is it the smell of methane, the gas that caused the explosion in 2000? Or is it the smell of benzene, an index of contamination? Or both? Or a combination of all of this and the odors of the nearby petrochemical complex?

On the auditory level, many people remember the explosion of 2000, so when they hear a sudden noise, an impact sound, they cannot help but think of the possibility of another explosion. A state of auditory vigilance persists as if the inhabitants remain on the lookout for an accident to come. Moreover, there is an enigmatic silence all over the neighborhood. In particular, the sound of cars being parked – and sometimes, of Geoklock's work – is very noticeable. Following the investigation and attentive listening, it is necessary to note the little sound presence of the residents, the noise of (human) life. Everything happens as if the sound space of the condominium was inconsistent, punctuated from the outside (there is a very lively district just opposite) by the diffuse sounds of the city in the distance (noise of the main road and the petrochemical complex) and the very low sound ceiling, as if the sounds from the inside could not really be heard or could not create their own atmosphere.



Figure 4. Barão de Mauá at dusk.

6. A neighborhood on hold

The methane explosion that revealed – or at least made public – the problem of soil pollution was a cataclysmic event shared by the whole neighborhood, the starting point for putting its entire development on hold. If the past is shared among the inhabitants (completely new neighborhood, dates of moves of people over the same period of ten years), the present and the future are also just as much. A shared present: Few people left, the neighborhood is no longer developing, and the problem is always there. But also a

shared future or, more precisely, the absence of a possible future: between personal situations that are stuck and the need to wait for potential compensation and/or strong remedial action.

A place that is on hold. The condominium is located on a hillock, cut off from other areas by fairly steep slopes, bordered by small streams (*córrego*) and set off by an abandoned green buffer and an oil pipeline. Although it is true that the primary function of the condominium is housing, there are activities such as traffic and commercial life, school, sports, craft, industrial on the outside. The visual horizon, as well as the luminous horizon in the evening and the sound horizon, bears witness to a more intense life all around. The forming of methane, which continually has to be extracted from buried waste, puts people and buildings on ground that is not firm and homogeneous but literally degassing. There is something below that might be dangerous. One is reminded of this by children's games that jut out more than 1.5 meters above the ground thanks to artificial mounds and inside free space, and one grasps that the land is not used (no vegetable garden or outdoor sports activity).

A becoming that is on hold. The future seems to be on hold. On hold first because of an explosion that may well be unlikely but is still possible. Mostly, however, it is on hold because of the results of surveys and expertise, the revelation of a level of toxicity that makes it necessary for the residents to leave or the possible result of epidemiological analyses showing infection through diffuse contamination. The inhabitants' own future is tied up with the future of this place, which makes it difficult to make normal decisions in all areas of life (to leave, to rent, to sell, to buy, to renovate) – almost all of these decisions depend on the results of studies that are underway, of legal decisions, possible compensation and more satisfactory risk treatments. In the meantime, there is no possibility for the neighborhood to develop: Although sought, no common room was built, and there is no opportunity to install rooftops in the outdoor parking area because any new foundation would be risky. It is just as difficult to start renovating the buildings and even to demolish or transform what has been stopped and long abandoned.

A temporality that is on hold. There are buildings with faded facades, the one next to the other, others made of concrete and exposed blocks, their construction stopped, and others, more infrequent, have been repainted, giving a semblance of something new. In the same space, there are inhabited buildings and the ruins of these same buildings. Here the difference is not in the typology of the buildings (they are almost identical, apart from the color and the orientation) but in the state of the building where all the temporalities come together to produce a strange effect of a temporal mirror.

Since the construction was halted, the district has not seen any renewal, neither in its buildings nor in its inhabitants. Few things have evolved, except one, which is very much alive: children, the only ones who really make use of time

every day to enjoy the outdoor spaces and the only ones to show how long the time has passed: They are born, they grow up and leave...

At the bottom of the condominium buildings, green spaces have been planted and can be seen but not really used, with very pruned, season-less plants, some potted next to plastic animals and decorative white wrought-iron benches. Activity in the area is static, a point reflected by these immobile elements. Traces of Home Sweet Home, the lawn is well maintained and the seasons are represented in the halls of buildings that often have artificial potted flowers, painted flowers and colorful paintings. The whole contrasts sharply with the offbeat nature on display around the condominium.

Although the past, the present and the future are now shared among the inhabitants of the neighborhood, life is nonetheless still there. A solidarity, a mixture of attachment to a collective home, public actions and expertise, has developed between the inhabitants. Although the condominium has no public space, no collective space, there are places to meet and talk.



Figure 5. An equipment that we learn to decipher...

“Here is our playground, where the children play. At the beginning, it was at the ground level. However, due to the contamination, it was raised about 2 meters. So that the children wouldn't have direct contact with the soil. This is where the kids play. That is the only space we have for them.”

7. Collective expression of affects

On the whole, the investigation took place within an emotionally charged context. The inhabitants' attachment to their initial housing project, the explosion in 2000 that revealed the extent of the contamination, the protracted legal battle and the sense of profound injustice all contribute to the pervasiveness of a formidable, emotion-filled climate. The photographic reactivation workshop of Thursday, 4 June 2015 bears witness to this. It presented a collection of photographs taken at the site (26 photographs chosen by the research team) to the inhabitants to serve as a basis for and stimulate discussion. The meeting turned into a public meeting, and it was very challenging to discuss the photos

with the inhabitants. This meeting was a highlight of the survey, as the anger and distress of the people facing this painful and blocked situation were expressed forcefully. It looked like the remediation work had a powerful impact on their memory: *"Now that they have started digging, our memories are starting to surface ... When we see people making holes in the ground, when they come here, then everything rushes back to our memory, and in particular a reminder of the fear that we had."*

Complaints include, first and foremost, the public expression of vulnerability when the participants mention their suffering: the trauma of "those who saw the burned, naked, headless guy"; *"the dream (of living here) that turns into a nightmare"*, the terror of living here *"with these monsters that look like they are ready to explode at any moment"*; the stigma they face *"But we are becoming victims today; former dreamers, we have become victims... now we have become something even worse, and then when (they) see us, 'Look, look there: There's a ghost'."* Then they also remember the diseases related to contamination, the children who may have cancer, the sick neighbors who leave, the epidemiological tests and this diffuse nature of contamination.

Other emotions have a more political tone. The expression of emotions in public is sometimes linked to a moral evaluation [5], and emotions can then be the cement for mobilization. This is the case when the inhabitants mention the lack of respect (*desrespeito*) from the institutions: *"the public authorities have only one solution: to give five cents to everyone, so that they go to the pharmacy to buy five cents' worth of drugs, shame in the face. But the residents here are not rubbish, I am a human being, and here the others treat you like s***."* When they express the indignation, it provokes at home. "But my indignation is about the lack of respect for people, you know? ... Everyone knew that there was a garbage dump; the city let it happen. The city authorized the houses to be built, and the city gave them the right to do it. You know what? Everyone is implicated, and they got City Hall loose from the situation." During the workshop's two sessions, emotions backed up the very strong criticism of the institutions, particularly the CETESB, which has not lived up to residents' expectations. We ourselves were challenged and criticized, sometimes vehemently, because some of the team members are from the CETESB.

Thus, the photographic reactivation workshop became a means for people to complain and to ask questions, a kind of obligatory passage so that the inhabitants, once placated, could participate in the two sound workshops that took place in the neighboring rooms. The sound investigation and the proposals for collective listening revealed the ambivalence of the inhabitants between anger and a deep-seated desire for re-enchantment. Thus, the proposal of a collective outcry presented as a mode of salvation shared between investigators and users was initially received with a curiosity made stronger by the fear of making noise – as if the risks of

a noisy and magical contamination, acting as a reminder of the original catastrophic noise, became possible – a fear that very quickly gave way to the prospect of a liberating and productive gesture. Even though there were not many participants, the production of a sound space through a scream and weakly projected onto the walls because of the distance represented, for a brief moment, the intense desire for a possible form of becoming.



Figure 6. We have seen the above condo that feels like a fort-castle built on a hill. It appears as a fortress, banished by a vast area of impassable vegetation... and block the horizon. The condo is isolated from the other inhabited neighborhood, like a quarantine.

8. Becoming of a contaminated space

The two approaches – controversy and ambiances – proved to be very complementary from different points of view: in the implementation of various temporalities involved in the risky situation (long temporality when it falls under the socio-political history of the neighborhood and short when it relates to the inhabitants' day-to-day experiences) and in the articulation of the various levels of analysis involved (analysis of actors' logics and residents' experiences). This complementarity is reflected in the results of the analysis: The two approaches reveal the existence of two incommensurable realities: the world of public policies that is relatively closed in on itself, where the sectoral actions of institutions collide with each another without any real exchanges or willingness to collaborate, and the lived world of the inhabitants who are torn between the restrictive nature of considering all the risks and the aspiration for their lives to return to normal, between the affliction caused by a painful and blocked situation and the hope for better living conditions.

This telescoping effect of the two very different realities makes it possible for us to better understand the difficulties of life inside the condominium. For example, why the inhabitants do not spontaneously adhere to the remediation project that seemed to be the solution for some of the

institutions. To begin to improve the situation, we propose connecting the two worlds to implement a participative and partnership risk management in Barão de Mauá. The two sessions to present the results that we organized separately with the *inhabitants* and with the institutions made it possible to legitimize the perception of the risk by the *inhabitants* and to reinforce awareness of institutional compartmentalization without making the actors feel guilty. This first awareness based on the results of our research has served as a lever to build a new participation system composed of two complementary forums that are called on to work together: one composed of the condominium's *inhabitants* and the other of the various institutions concerned.

Thus, the combination of these two approaches has made it possible to broaden the notion of risk communication by giving full scope to the qualitative perception of risk, the complexity of vulnerability situations and leading to a proposal for participatory risk communication, which "*includes the public as a collaborating agent*", as Covello and Sandman [8] so beautifully describe it.

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