

THE PERCEPTION OF ADULT AND YOUNG ADULT STUDENTS ON THE RIVER RIO DOCE — CARTOGRAPHIES OF FEAR

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1 Introduction

This text is part of a scenario of concern about the consequences of the socio-technical disaster³ caused by the collapse of the Fundão dam owned by the mining company Samarco S.A., which occurred on November 5, 2015, in the municipality of Mariana (Minas Gerais). Scholars consider that this was the biggest global disaster of its kind since the 1960s as the volume of tailings released was about 60 million m³ and the mud traveled more than 600 km until it reached the mouth of the river Rio Doce and the coast of Espírito Santo (IBAMA, 2015; ANA, 2016).

As the studies report, the rupture of the Fundão dam caused nineteen immediate deaths, deterritorialization of people due to losing their homes, lands, plantations and livestock, destruction of flora and fauna, and impacts on the river Rio Doce, causing changes both in the lifestyles of communities that lived from fishing and the indigenous groups that depend on the water from that river and have a symbolic relationship with it as well. The mud that spread along the river Rio Doce caused water shortages in dozens of cities and keeps changing the lives of populations that depend exclusively on this river for water supply (FREITAS et al., 2016; MILANEZ; LOSEKANN, 2016; ZHOURI et al., 2018a).

Governador Valadares is the locus of this study and one of the most affected municipalities by the tailings and mud. The city is the most populated of the Rio Doce basin, with an estimated population of 280,901 people (IBGE, 2017) who live the consequences of this disaster.

This article aims to a specific group of people living in Governador Valadares, the EJA students (Adults and Young Adults Education in Brazil). The interest in this

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3. According to Zhouri et al., (2018a) the colapse of the dam caused a sócio-technicall disaster: “[...]a process that goes beyond a purely technical malfunction or error, thus referring us to the failures of environmental governance, which produce new patterns of vulnerability that in fact exposed the population to risk”. (p. 40)

group is justified by the educational commitments to environmental issues, and also the fact that EJA traditionally fights for the students' right to access to and permanence in school. Moreover, its members' lives are inextricably intertwined with work, family care, generational and gender differences, access to health and housing, and so forth. All of these factors are marked by social inequalities.

We chose this group based on the assumption that the specificities of these EJA students and their diverse experiences (DI PIERRO, 2005; PAIVA, 2006; HADDAD; SIQUEIRA, 2015; ARROYO, 2015) are marked by their sense of belonging to a place.

We also reaffirm the importance of the environmental debate in the field of education because "if we want a sustainable society, it is essential to insert environmental education in other policies" (LOUREIRO, 2007, p. 71) and this is a need posed to the field of EJA.

This article presents the results of a study⁴ that sought to understand the perceptions of the EJA high school students about the river Rio Doce in a public school located on its banks. The theoretical framework establishes a dialogue between EJA, Environmental Education (EA – Educação Ambiental), and Humanist Geography based on the contributions of Yi-Fu Tuan. The empirical material that comprises the analysis was produced through mental maps and interviews.

2 Theoretical choices for research on environmental perception in EJA

As part of the recognition of the right to education, a set of legal frameworks has been established in Brazil since the 1980s to guarantee this right (BRASIL, 1988; 1996) already reaffirmed for EJA subjects in the Curriculum Guidelines for Youth and Adult Education (BRASIL, 2000). Despite the legal apparatus, researches prove the existence of a significant number of young people and adults who could not access this right: "according to data from the 2010 Census, there were 65 million Brazilians aged 15 years or more without education or who did not complete primary education, and 22 million who did not complete secondary education, totaling 87 million people" (HADDAD; SIQUEIRA, 2015, p. 100).

Indeed, the field of EJA continues to experience the historical mismatch between the right guaranteed by law and its implementation. The issue of access to and permanence in school for a great number of people remains on the agenda of researchers in this field, who have over the years devoted special attention to the specificities of a significant group of young people whose school trajectories have been interrupted.

Overall, EJA students keep common stories based on the search for the rights to education and the establishment of relationships with school knowledge marked by their successive enrollment to and interrupted permanence in school. Besides, their stories often involve precarious social conditions, and life experiences linked with work, culture, and their daily struggle for survival that is presented along with social markers of race, class, gender and generation differences. These are the subjects who take to classes—mostly at

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night— their daily experiences, often ignored in the school context (DI PIERRO, 2005; PAIVA, 2006; HADDAD; SIQUEIRA, 2015).

In addition to the issues listed above, we consider the belonging to a territory as one of the social markers of this group while dealing with the environmental perceptions of EJA subjects. They are subjects of the place to which they have different relations. It is in place

that social movements happen, thus providing the constitution of our cultural identities, resistances, counterpoints, dreams, renewals, daydreams, freedom. Place is inseparable from our experience (MARANDOLA Jr, 2013, p. 10).

In the contemporary world, place assumes relevance, besides being the stage for territorial, economic, political and environmental disputes, it shows the work involving mining companies in Brazil as well (ZHOURI, 2018b).

To recognize the relationship between the place of EJA subjects, demarcated by the consequences of the collapse of the Fundão dam, an approach to EA is necessary (environmental education). In EJA, EA leads us to recognize the importance of environmental perception as

a condition for human achievement because it is not enough just to be informed, instead one should have knowledge that can be contextualized in the world so that there is critical awareness of the set of relationships that condition certain cultural practices and, by doing so, one may be able to overcome his or her conditions initially established (LOUREIRO, 2007, p. 69).

Ireland (2007), discussing EA in the field of EJA, recognizes the intrinsic relationship between education and life, and AE as “an integral part of life, with enough strength to transform it. It is the contents of education that come and go back to life. Therefore we have the centrality of environmental education as a fundamental axis of EJA” (IRELAND, 2007, p. 231).

The author resumes the debates about the need for a critical perspective in the training of EJA students by arguing about the importance of environmental education and the dialogues that should be established between knowledge and experiences of subjects in pedagogical practices, and also the need for considering the socioeconomic, cultural and environmental reality in which the subjects are inserted. In this sense, the subjects of EJA have the right and the duty to understand, preserve and protect the environment, to exercise “citizenship as protagonists in decision-making processes on environmental policies, generating knowledge that allows an informed and active participation in reality” (IRELAND, 2007, p. 234).

Given the importance of the understanding of the diverse experiences brought by the environmental debate in EJA and its dialogue between subjects and the different fields of knowledge, as well as the relationship between their experiences in the different

segments of society where they live, we recognize the weave pattern of environmental perception in EJA.

According to Marandola Jr. (2012), the studies on environmental perception began in 1970, in the United States, with the consolidation of the humanist geography as Yi-Fu Tuan launched his work “Topophilia a study on perception, attitudes, and values of the environment” which appeared in Brazil in the 1980s. In the preface of this work, the author highlights its importance for researchers who are interested in the environmental debate and its interdisciplinary nature, because “topophilia still reveals basic spatial meanings of the relationship of man with the environment in completely different contexts, times and spaces” (MARANDOLA JR, 2012, p. 9).

Tuan (2012) argues that studies on perception, attitude and environmental values reveal that our senses are characterized as common traits regarding perception. Thus, there are several ways that human beings perceive and evaluate the environment because our environmental attitudes and values are intertwined with the culture that influences our way of seeing and being in the world. When approaching culture, experience, and environmental attitudes, the author highlights that if we want to

understand a person’s environmental preference, we need to examine their biological heritage, upbringing, education, work, and physical surroundings. At the level of group attitudes and preferences, it is necessary to know a group’s cultural history and experience in the context of its physical setting (TUAN, 2012, p. 91).

Tuan in his book “Space and Place” (2013) highlights that the distinction between one and the other is made through experience. For the author, through experience our sensations, perceptions, conceptions, emotions, and thoughts take place. There are different ways of experiencing (TUAN, 2013). Thus, the author highlights the importance of recognizing the experience that bears the mark of subjectivity in the relationship of the subject with the environment. Since

experience implies the ability to learn from one’s own experience. To experience is to learn, it means to act on a piece of data and to create from it. The data cannot be known in their essence. What can be known is a construct of experience, a creation of feeling and thought (TUAN, 2013, p. 18).

Therefore, it is important to consider the environmental perception and what people feel in relation to the environment in which they live in order to understand the relationship between subject and environment, as well as the different ways of experiencing and interpreting space and place, taking as reference the images contained in complex and even ambivalent feelings, characterized by Tuan as topophilia (2012) and topophobia. (2005).

Topophilia (2012) is defined as being the specific manifestations of human love for the place or physical environment and it means “the link that unites the person to the lived,

concrete, experienced place, the word *topophilia* is a neologism, used in a broad sense, including all the affective ties of humans with the environment” (TUAN, 2012, p. 135).

In contrast to the experience of affection for the place, the subject can develop a *topophobic* feeling, characterized by fear, anguish, and insecurity. Thus, the feeling becomes one of fear, and even aversion to a place, as described in Tuan’s book “*Landscapes of Fear*” (TUAN, 2005).

Thus, after considering all these elements, we understand that our fears are “subjective, diverse, and vary according to each individual and society, space, place and time. Countless and infinite are the landscapes of fear, which make human beings feel threatened” (TUAN, 2005, p. 9).

Therefore, when we reflect on time, space and place, we understand that the landscapes of fear can change due to the complexities of society. Thus, some people fear epidemics, others are afraid of natural phenomena caused by the devastations from a storm, destructive floods, and so forth (TUAN, 2005). Based on these factors, we sought to understand some of the EJA students’ perceptions of the river Rio Doce.

3 Methodological choices for a riverbank survey

To research the banks of a river means to consider that the subjectivities of the researched subjects are imbricated in their experiences with the river. Such experiences can be of closeness for the subjects who live on the river banks, as they have the river as a source of subsistence, leisure, or the part of religious traditions; or yet, for others it may be even marked by distancing behaviors regarding the river, but even so it is part of the place where one lives and has to deal with the issues of either scarcity of water or floods. Some issues are dealt with in this study more specifically such as the socio-technical disaster that somehow reached the population of the entire city.

Therefore, a state school that offers EJA at an Evening Secondary School, located on the banks of the Rio Doce, was selected as a research field as we considered the subjective relations between the students and the river. The subjects are twenty-two second-year students (15 women and 7 men) who live near the river.

These subjects are workers who go to school after a day’s work in which they perform various functions such as saleswomen, mechanic’s assistant, kitchen assistants, general services assistants, bricklayer’s assistant, electrician’s assistant, office messengers, and housewives.

This group’s classes were followed for two months so that contact could be established with the subjects and the references that they made about the water and the river Rio Doce could be learned. After this initial approach, we chose two research techniques to generate data: mental maps and interviews.

On the methodological use of the map, Kozel (2013a) argues that “an image to be constructed or decoded goes through different filters and languages, inherent to each individual, which establishes its symbolic codes according to his or her worldview” (p. 59). For the author, the map constitutes a graphic representation that facilitates the spatial understanding of objects, concepts, conditions, processes, and facts of the human world.

Such considerations emphasize the lived space where the perceptions, meanings, and complexities inherent to the sociocultural aspects of societies exist.

The maps were individually produced by the students who were present (13 women and 06 men) on a day they had previously chosen and scheduled. The direction for the elaboration of the map was given orally:

Tell me what you know about the water, about the river Rio Doce. I want you to represent in your map everything you can and know about the river and the place where you live, (street, neighborhood), the distance or proximity between your house and the river, the elements that we can find in the river Rio Doce and its banks. Show me through your drawing the experiences you have had with the river Rio Doce. Try to represent the details.

For the preparation of the maps, an A4 sheet of paper, a felt pen, and colored pencils were made available. They elaborated the maps for approximately 60 minutes, and researchers recorded their presentation of the map during an informal chatting⁵ as each student reported what they had drawn.

The subjects were invited to participate in an interview and ten of them were willing to participate (6 women and 4 men).

The interview was a conversation that had as a core the subjects' experiences related to the river Rio Doce. The students were invited to narrate their first contact with the Rio Doce, with the water, their experiences with its landscapes and other known life forms that belonged to nature and how these forms were related to the river. They were asked to establish a parallel between their relationship with the Rio Doce in the past and after the Samarco tragedy and its impact on their homes, work and school. They were also asked to report how the map was drawn and its representations⁶.

According to Kozel (2013b), the maps as "representations can be analyzed both as products and processes" (p. 14b). The products are built by researchers through procedures and interviews as the basis for understanding the processes that portray analysis, social and spatial transformations (KOZEL, 2013b).

For the reading and understanding of the senses related to the maps, we used the methodology of Kozel (2007) that proposes a way of interpreting and analyzing maps by observing questions that regard the form of representation of icons, letters, "natural elements of the landscape, representation of the elements of the built landscape, representation of the mobile elements, representation of human elements; (...) Presentation of other aspects or specificities" (KOZEL, 2007, p. 133).

Based on these aspects, we elaborated criteria for the analysis of maps and interpretation of the ways in which the Rio Doce was represented: the color used to draw the water; distance or proximity of the river in relation to the interviewees' houses; absence or presence of different elements in the river and the riverside, such as fish, disposable materials,

5. The chat was recorded on an MP4 device.

6. Available at: <https://www.facebook.com/324319641034891/photos/a.794088814057969.1073741895.324319641034891/794088817391302/?type=3&theater>. Access: Jan. 2018.

boats, fishing material, trees, stones, sandbanks, mud; whether there were people developing activities related to the river; as well as the distance or proximity of the subject to the river.

This way of reading was complemented by the socialization of the map during group chats and through interviews. We chose the analytical method by weaving mind maps and interviews to analyze the perceptions as this proved to be the best way to understand the subjectivities represented in the instruments used in the research for data generation.

When tracing the maps, explaining and narrating their experiences related to the river during the interviews, the subjects remembered their life stories and the problems that also made them drop out of school (work, failure in regular education, women care of the house and children), which is a common situation in the trajectory of EJA students.

The river was the source of memories of women and men who used to play on its banks during childhood, place of appreciation, fishing and bathing place for men. They remembered the floods of the Rio Doce, the volume of water in the past, and the past of a river with clear waters. In this set of memories, references to the socio-technical disaster stand out in all maps. We can read the landscapes of fear in these references, in which we identify the visible marks of topophobia.

4 Rio Doce - the marks of topophobia

Tuan (2013) states that it is “the drawing of maps, incontestable evidence of the power to conceptualize spatial relations” (p. 100). The author summons us to learn the experiences of subjects with the place, seeking how the representations of place are presented. In this perspective, the author emphasizes the impossibility of “discussing the experiential space without introducing objects and places that define the space” (TUAN, 2013, p. 167).

Therefore, a map travels between the visible and the invisible, between what is written and what is told about the writing. Thus, the marks of topophobia weave the cartographies of fear drawn by the subjects and compose their accounts. The topophobic feeling appeared in the memory of the subjects, marked by the memory of some floods of the Rio Doce and by the disaster that struck the river in 2015.

The analysis of this cartography points out three intersecting lines in which we identify topophobic marks: environmental degradation showed in the landscape contrast of the Rio Doce before and after the collapse of the Fundão dam; health concerns due to the contamination of the water by the tailings dumped into the river after the disaster and the impacts on work and family budget due to the effects of the disaster.

4.1 *Environmental degradation*

The presence of environmental degradation was denounced in all the maps and the reports brought feelings of sadness, disappointment, concern, and anguish concerning the river's water. Feelings that became visible when we analyzed the drawings, as shown in the maps below:

Figure 01 - Sara's Mental Map - the river Rio Doce before and after the disaster.



Source: Research Data, 2017.

In her interview and presentation of the map, Sara addresses her feelings related to the environmental degradation in the river Rio Doce due to the lack of sanitation, as domestic sewage is discharged directly into the river, and the presence of siltation before the dam collapse:

Since it's a 'famous' river, we hear a lot of stories, you know? So I did a very light drawing here before the tragedy, with lots of fish, blue, lots of green and today unfortunately what I know most about the river Rio Doce is 'this one' today. The river is so 'anemic', the river today needs a life. So, unfortunately, it's very sad that we see something like this. Here we have a little restroom, a toilet, you know? Putting it in an old fashioned way, people throwing waste into the river. Besides being very 'weak', as it still faces all the waste that keeps falling, 'killing' it even more. And also the silting up, people are 'hurting' it even more. And we are part of this group that is 'finishing up' the river (Sara, 52 years old).

Luiza and Paulo confirm Sara's perception:

I'm a bit of an environmentalist. I'd even posted on my facebook before: people, we are water running out of water. Way before this happened when I saw the river waters going down, I used to say: "Wow, the river waters are going down. We're not having any water." I used to walk on the island, I thought the landscape was wonderful and so on, I always admired it. But we knew that it was dying somehow (Luiza, 38 years old).

My feelings are of disappointment because the river didn't use to be like this. At the time I was born... I was born and grew up here, you see? I saw the river clean. Nowadays, people throw things in the river like... a chair, it's a lot of things... and it doesn't matter (Paulo, 19 years old).

The perceptions regarding the environmental degradation addressed by the subjects were highlighted in the report of the National Water Agency (ANA, 2016). The document denounces the anthropic use of the Rio Doce basin for the pastures, with the corresponding 59% of it being severely degraded, causing a surface susceptible to soil erosion, forming significant volumes of sediments that are carried to watercourses (ANA, 2016).

Rute's map shows the presence of many stones, words and phrases that call for a critical look at the river - "Rio Doce: dead"; "less green"; "more stones" - Rute also evokes the river with much more water and how this scenario has changed in 33 years:

Figure 02 - Rute's mental map



When I moved here to Valadares in 1984, there was a very big river. And the river had water, a lot of water. Now, what is left of the river Rio Doce? Sil-tation, more rocks, mud. It's sad to see, but I've seen the river Rio Doce with lots of water! When I moved here, my boys were all small. And now there's this river. Not river, stream. You can't say river rio Doce (Rute, 56 years old).

Source: Research data, 2017.

She denounces the "Little drinking water" on the map and draws a thin thread of blue water. Her view on the matter is justified because the urban area of the municipality of Governador Valadares has only the river Rio Doce as the source of water for the population. The water resources of the Rio Doce basin are of fundamental importance for the economic performance of eastern Minas Gerais and the northwest of Espírito Santo as the water supplied by the river Rio Doce is essential for domestic, agricultural and industrial uses and also for the generation of electric power, among others (ANA, 2016). In addition to these activities, we emphasize that "economic growth centered on the exploitation of commodities puts pressure on the natural resources of the Rio Doce valley where there are important mineral reserves" (ANA, 2016, p. 10).

Along the way, it was clearly seen: displacement of populations, devastation of localities and the consequent rupture of community social bonds, destruction of public and private structures (buildings, bridges, streets, etc.), destruction of agricultural areas and pastures with loss of economic revenues, interruption of electric power generation as it affected hydroelectric plants, destruction of areas of permanent preservation and native vegetation of the Atlantic Forest, death of

aquatic biodiversity and terrestrial fauna, silting up of watercourses, interruption of water supply, interruption of fishing for an indefinite period, interruption of tourism, loss and fragmentation of habitats, restriction or weakening of environmental services for the ecosystem, alteration of drinking, brackish and saltwater quality standards, inhabitants' feelings of danger and helplessness (IBAMA, 2015, p. 4-5).

The effects of this disaster are not only restricted to the physical environment but also affect the different subjects and their cultural manifestations, the framework of life and work, the relationship with the place where the appropriate conditions for the reproduction of the ties for community existence are guaranteed.

Therefore, the rupture of the dam and the deposit of sediments in the river have affected the environment, modifying it, and causing feelings of topophobia related to health concerns due to the consumption of drinking water.

4.2 Health concerns

The maps show the scene of the environmental desolation after the disaster: the yellowish and brown color remind us of the presence of the tailings sludge in 16 maps; the river is presented alone, without the presence of people on its banks (10 maps), and the marks of human presence are easily perceptible (boats, houses, streets, bridges) on 10 maps. The death of the fish is recorded on the maps.

During the chats, the group denounces the environmental degradation as health concerns are presented, revealing fears about the consumption of water and the local fish. In this way, the subjects narrate the topophobias and the “smell of death” (Luiza).

Figures 03 and 04 - Vera's mental map (left); Photograph showing dead fish in the Rio Doce after the disaster (right)



Source: Source: Research data, 2017, and *Fotos antigas e atuais de Governador Valadares MG*⁷

7. The Interviews were conducted individually, in a room available at the school, and recorded on a MP4 device, lasting about one hour. All the interviews transcribed and the excerpts inserted in this article respect orality. The names of the subjects were replaced by fictitious names.

The map and photo clearly show the death in the river reported during the interviews:

When I saw the dead fish passing by me along with the thick muddy water filled with waste, I was very sad. It's the image I have in my mind. It was the smell of death everywhere. I could smell death, sadness. Until then I didn't even know that the river gave us so much fish. My feeling was of loss as you lose a relative, we lost the river, you know? (Luiza, 38 years old).

My deepest feeling when I saw that mud in the river was of sadness, so much fish dying. The image that stayed with me the most was those fish floating on top of the mud, you understand? The river became horrible, very sad (Ana, 40 years old).

So when this environmental disaster happened, it was very tense. It was very hard to see the reality of the city. Yeah, just like here, because, dead fish, causing a bad smell, the whole neighborhood got this bad smell (Sara, 52 years old).

The fish that I drew, some are alive, some not, not suitable for consumption, today I believe there's some alive, but not good for eating, so, ... it is lifeless fish, dead fish! It is half-dead fish! (Sonia, 26 years old).

The socio-technical disaster affected the lives of “thousands of people, especially the riverside communities and local fishermen, who depended directly on the river’s resources, such as fishing and water supply” (DIAS et al., 2016, p. 171), and brought with it health concerns (contamination of fish and drinking water). The relationship between water consumption and illness extends to the family, as reported by some mothers:

It was a fear of drinking the water, the kids' snack made with the water, and they started taking their water to school. And we were monitoring any stomachache, any skin changes, so we thought it was because of the water, for sure the water. It was like this for a year, a lot of surveillance, you know? Is the thing I'm feeling because of the water? My hair is falling out, is it the water? Mom, I have a tummy ache, is it the water? Now we're more relaxed, aren't we? I think we have accepted somehow. But the worry about drinking the water is still around (Luiza, 38 years old).

The worries about drinking water also reach the schools:

It was bad at school, wasn't it? Because they sent us a note so we wouldn't send the child without having a water bottle. Even today I went to the meeting, the same situation, asking the children to bring water. So we are not the only ones who are not trusting the water. It's everyone else. The school itself is directing the parents to send the children with water bottles. I even sent a small bottle, but they asked me to take two, because of the

heat, the children end up drinking more water – the water from the river (Ana, 40 years old).

It was bad, you know? Because the arrival of the mud hurt many people, you know what I mean? Not only my family, but it was general. Then, we had difficulty getting water even for drinking, for showers. Because I think we didn't have no water for about four or five days because of the mud. Then they decided to treat the water because of a lot of iron, right? Ore. So, for drinking, we still get it from the mines, from the artesian wells. We don't use it for cooking either. I only wash clothes, I clean the house (Ana, 40 years old).

Dias et al. (2016) point out water as “a fundamental part of the origin and maintenance of the life of all beings. Because it is such an important and vital element, impaired water for human use is also a source of several health problems” (DIAS et al., 2016, p.176).

The authors highlight the importance of access to treated water and basic sanitation as a health indicator and emphasize that even before the collapse of the Fundão dam there were impacts related to access to quality water due to the installation of the dam. In their studies, they denounce that the rupture of the dam that dumped millions of tons of mining waste onto the Rio Doce, according to a report by the Autonomous Water and Sewage Service (SAAE) exposed the population to “alarming rates of increase in the tolerable levels of various metals analyzed, such as arsenic, barium, lead, copper, mercury, nickel and others, which in excess are harmful to human health” (DIAS et al., 2016, p.176).

The authors, based on different studies, argue that the consumption of heavy metals, via water, causes damage to health such as intoxication, gastrointestinal symptoms, cardiovascular diseases, neurological problems, and so on. In addition to these problems, they also highlight psychological impacts generated by the processes of experiencing the traumatic situation, such as the loss of dwellings.

As the authors explain the social determinants, they argue about the need to consider the living conditions regarding their social, economic and environmental aspects, as constituents of social inequality (DIAS et al., 2016).

Thus, the disaster directly impacted the disadvantaged in what concerns the promotion of health and well-being, and it affected the assurance of the supply of goods and services vital to health, such as the safety of quality water. When considering the magnitude of the disaster and its consequences for health, it must be said that “psychosocial impacts are multiple and reverberate over time, as it draws from the dynamics of each affected community” (DIAS et al., 2016, p. 167).

Based on the arguments of Dias et. al (2016), who analyze reports on water quality and other documents on the disaster and its consequences, it is found that the distrust of the subjects of this study concerning the water from the river Rio Doce and the treatment given by the SAAE is well founded. Besides, the disaster affected the work context due to the temporary suspension of the water supply at the time, and in the current days, it represents an additional expense in the budget due to their need to purchase mineral water for consumption.

4.3 Work and family budget

The disaster affected the lives of EJA subjects who have been struggling daily for their survival as their living and working conditions are marked by precariousness. They narrate the effects of the disaster on their work and family budget. They report a number of issues such as their difficulties and sufferings because they are not able to work, the economic damage caused by the lack of water, as well as having to face the lines after work or during lunch breaks to collect the mineral water distributed by Samarco or even getting any other donations received from different parts of the country. The following photos record these lines:

Figure 05 - Water distribution to the population by Samarco mining, dec. 2015.



Source: private collection.

During the “water race,” as Marcos, one of the interviewees called it, there were a desperate sensation and fear of running out of the water along with turmoils, accidents, reports from people who stored a lot of water along with humiliations:

When the disaster occurred, we picked up water from the lines at lunchtime after we left work. I would leave work, face a line so that I could get water for my mother, water for us. There was a day when the bus driver treated me badly because I was carrying water. So I mean after having to wait in lines, I still have to face humiliation because I lived far away and had to take the bus. And we didn't need nothing of this trouble because we had the river (Eva, 56 years old).

Ah, the worst was the lack of water. Because it was bad to do everything there at work. Here is the thing, we work with engines and we get a lot

of dirt and oil. And this part is made of iron, so you really need to wash it in diesel oil first and then blow with the water. How did you do it? You didn't have no water. Like, you're buying mineral water to use? (Marcos, 19 years old).

The authors of EJA already cited in this text show the specificities of this group and the social inequality that accompanies it: “since the beginning of EJA, these young people and adults are the same: poor, unemployed, working in the informal economy, black and at the borders of survival” (ARROYO, 2015, p. 29). The subjects of this study reported the mark of exclusion and difficulties of EJA students as the disaster interfered with the economic issue for individuals who directly depended on the consumption of water from the Rio Doce because they did not have money to enjoy the benefits of buying mineral water.

This population was, therefore, included in the portion of our society that has always counted on the water as a public good, according to Law No. 9.433, January 1997 (BRAZIL, 1997), on the National Policy of Water Resources, in its first paragraph. It now becomes deprived of this right.

In addition to denying this right, not having access to water has an affective value that exceeds the monetary value. Thus, the impact of the tailings sludge also affected the emotional feelings of the subjects, causing pain, suffering, and sadness.

The river Rio Doce is very important in the lives of Valadarenses because many people... we know that they make a living from the river, right? It is part of people's lives. And there are people here who maybe the river may not make so much difference in their lives. But for other people it is essential, you know? Because people who have a better financial condition, they don't make much difference. They are affected, but not as much as the neediest people (Sara, 52 years old).

Thus, subjects report that the water has become an extra expense on their budget, and when they cannot buy it, they end up using the water provided by SAAE, but the fear of acquiring diseases remains.

People still have to include water in their monthly budget because nobody wants to drink tap water because they don't trust it. Even 'they say' the water was good, no one trusts it (Sonia, 26 years old).

Till today we spend more on the water than on some other things. We weren't expecting to spend money on this. Because when you get sick, you expect to spend on medicine. And now with 'this water', so what? It's not like we're going to turn on the tap and drink this water, right? When are we going to have the confidence to do it? Because everyone can say ... drink... It's good... it's good... but you don't have that confidence. You don't! It's something you went through, you saw what the river was like after all (Eva, 56 years old).

We're still buying water. But after they said that they put a substance there to improve the water we had to buy the water, but the two water bottles were not enough, then there came a certain time when my father didn't have any more money to buy, so we... we have a clay filter, you know? We ... I started to drink some water. Not too much because I knew it could cause me great harm, but we did (Pedro 19 years old).

The effects of the destruction of this water resource accentuate social inequalities for the subjects since they do not benefit from the access to quality water which impacts on their scarce economic resources, resulting in more expenses for their survival. Therefore, environmental degradation deepens social inequalities.

5 Conclusion

The article analyzes the perceptions of EJA students on the Rio Doce as they also carry the marks of topophobia. These marks represent the cartographies of fear that became visible after the socio-technical disaster that struck the river.

Topophobic feelings denounce the environmental degradation of the river before the disaster and after the disaster; health concerns due to the contamination of water by tailings sludge; work losses and the tightening of family budget during the disaster as buying water counts for one more expense in their already precarious economy.

Water is a fundamental right implicit in the 1988 Federal Constitution of Brazil (BRAZIL, 1988), and it is the State's responsibility to guarantee this right through the potability for human consumption. However, this is a right that has not been fully guaranteed to populations that depend on water from the river Rio Doce for supply, especially after the socio-technical disaster, whose effects continue to impact the environment and the populations affected by tailings sludge.

The water has continued to be made available for consumption even in the face of the doubtful scenario for the population, the insecurity generated by the SAAE reports and other studies that denounce the presence of heavy metals. Thus, "it is understood that the availability of water of dubious origin constitutes a violation of the fundamental rights of the citizens of the municipality". (MOREIRA, et al., 2017, p. 204 - 205).

The results show that the socio-technical disaster that struck the river Rio Doce, and altered its landscape, changed the relationship between the subjects and the river, causing feelings of insecurity and of loss because the river Rio Doce is also a place of affective memories, which intensifies concerns and the value of the material loss.

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Original Article

THE PERCEPTION OF ADULT AND YOUNG ADULT STUDENTS ON THE RIVER RIO DOCE — CARTOGRAPHIES OF FEAR

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THE PERCEPTION OF ADULT AND YOUNG ADULT STUDENTS ON THE RIVER RIO DOCE – CARTOGRAPHIES OF FEAR

Abstract: The article is part of a series of debates that are concerned with the effects of the socio-technical disaster caused by the Fundão dam collapse in the year 2015, which affected the river Rio Doce, and presents results of a study that sought to understand the perceptions of Adult and Young Adult Education (EJA) students about the river. The theoretical framework establishes a dialogue between EJA, Environmental Education, and the contributions of the geographer Yi-Fu Tuan. The empirical material was produced through mental maps and interviews. The results indicate that the subjects' perceptions on the river are marked by cartographies of fear of environmental degradation, before the disaster and post-disaster, health concerns, household budget, and work loss. The conclusions point to the importance of providing further information about water to the population, and the effects of the disaster, which intensify social inequalities.

Keywords: Adult and Young Adult Education, Environmental Education, river Rio Doce.

PERCEPÇÃO DE ESTUDANTES JOVENS E ADULTOS SOBRE O RIO DOCE – CARTOGRAFIAS DO MEDO

Resumo: O artigo se insere no conjunto de debates cuja preocupação são os efeitos do desastre sociotécnico provocado pelo rompimento da barragem de Fundão, ocorrido no ano de 2015, que afetou o rio Doce, e apresenta resultados de um estudo que buscou compreender as percepções de estudantes da Educação de Pessoas Jovens e Adultas (EJA) sobre o rio. O referencial teórico estabelece um diálogo entre a EJA, a Educação Ambiental, e as contribuições do geógrafo Yi-Fu Tuan. O material empírico foi produzido por meio de mapas mentais e entrevistas. Os resultados indicam que as percepções dos sujeitos sobre o rio são marcadas por cartografias do medo decorrente da degradação ambiental, antes do desastre; e, pós-desastre, preocupações com a saúde, o orçamento familiar e prejuízo

no trabalho. As conclusões apontam a importância de maiores informações sobre a água à população, e que os efeitos do desastre acentuam a desigualdade social.

Palavras-chave: Educação de Jovens e Adultos, Educação Ambiental, rio Doce

PERCEPCIÓN DE ESTUDIANTES JÓVENES Y ADULTOS SOBRE EL RIO DOCE – CARTOGRAFÍA DEL MIEDO

Resumen: El artículo forma parte del conjunto de debates sobre los efectos del desastre socio-técnico provocado por el rompimiento de la represa de Fundão, que afectó al río Doce, en el año 2015, y presenta los resultados de un estudio que buscó comprender las percepciones de los estudiantes de Educación de Jóvenes y Adultos (EJA) sobre el río. El referencial teórico establece un diálogo entre la EJA, la Educación Ambiental, y las contribuciones del geógrafo Yi-Fu Tuan. El material empírico fue producido por medio de mapas mentales y entrevistas. Los resultados indican que las percepciones sobre el río están marcadas por cartografías del miedo que surgen de la degradación ambiental antes del desastre; y, después del desastre, preocupaciones sobre la salud, el presupuesto familiar y el perjuicio en el trabajo. Las conclusiones apuntan la importancia de más informaciones sobre el agua a la población, y que los efectos del desastre acentúan la desigualdad social.

Palabras clave: Educación de Jóvenes y Adultos (EJA), Educación Ambiental, río Doce.
