International Health Trends and Perspectives

Exploring educators' perception of issues involving Planetary Health: A qualitative study in the Brazilian Amazon

SPECIAL ISSUE: PLANETARY HEALTH
Research Paper

Paula Regina Humbelino de Melo[1], Tatiana Souza de Camargo[2], Renato Abreu Lima[3], Thiago Ferreira Abreu[4], Raquel de Andrade Cardoso Santiago[5]

[1]Federal University of Rio Grande do Sul (UFRGS) and Federal University of Amazonas (UFAM), Brazil; [2]Federal University of Rio Grande do Sul (UFRGS), Brazil and Planetary Health Alliance, Harvard University, USA; [3]Federal University of Amazonas (UFAM), Brazil; [4]Federal University of Rio Grande do Sul (UFRGS); [5]School of Nutrition of the Federal University de Goiás (UFG), Brazil

Corresponding author: P. R. H. Melo (paulinharhmelo@gmail.com)

ABSTRACT

Background: Planetary Health is a transdisciplinary area that needs to be part of the curriculum of students at all levels of education, starting from basic education with early childhood education. The present work aims to discuss the perceptions of basic education teachers from a riverside school on Planetary Health issues, in addition to knowing the environmental context of communities and/or riverside schools in the Brazilian State of Amazonas. **Methods**: The data collection was done through semi-structured interviews with rural education teachers from the south of the state of Amazonas. For the data analysis, we opted for the content analysis (Bardin, 2009) with the support of the N-Vivo software - version 1.5. **Results**: The results indicated the main environmental problems related to anthropogenic actions in the community and school, in which the following questions stood out: garbage disposal in the river, mineral extraction, lack of basic sanitation, and the predominance of ultra-processed foods in school meals. On the other hand, teachers pointed out the great potential of rural schools to promote the consciousness of children and adolescents on Planetary Health themes. **Conclusion**: Primary school teachers in rural Amazonia are in contact with a rich source for the creation of teaching materials on PH for students, in view of the importance of the inclusion of PH themes in the formative trajectory of children and adolescents in the basic education curriculum. These experiences provide knowledge about the reality of riverside schools, local traditional issues, environmental sustainability, and the changes occurring in ecosystems, especially in the Amazon.

KEYWORDS
Amazon, Basic Education, Children and Adolescents, Planetary Health

BACKGROUND

Planetary Health (PH) is a transdisciplinary field that was first made official in the scientific community in 2015 in a Rockefeller-Lacent Commission Report entitled Safeguarding Human Health in the Anthropocene Epoch. It is a field that aims to understand the interrelationships and interdependence between humans and the environment, as well as to identify solutions for minimizing and adapting to the attacks that the planet has been facing, which severely compromise the future of humanity (Whitmee et al., 2015).

  ISSN 2563-9269

Natural ecosystems are undergoing significant transformations resulting from natural and human actions, with anthropogenic activities being the main responsible for the environmental imbalance that has been changing the dynamics of life on planet Earth. Authors consider that the planet is currently facing a new geological era, known as the Anthropocene (Crutzen, 2002; Waters et al. 2016), an era marked by the action of man on planet Earth and that have been causing many changes in natural ecosystems, especially climate issues.

Understanding human health conditioned to natural systems makes it possible to understand that losses and alterations in these systems bring significant losses to the health of the populations (Whitmee et al., 2015; Myers, 2017; Floss & Barros, 2019; Iyer et al., 2021).

Significant changes in natural ecosystems include loss of biodiversity, extreme weather events, rising temperatures, deforestation, ocean acidification, sea level rise, and changes in biogeochemical cycles. Planetary Health assesses the negative impacts of the consequences of these ecosystem changes on the health and well-being of living organisms, among which many species have not even been identified and are threatened with extinction.

The intensity of the changes in environmental ecosystems caused by human activities has been intensifying since the Industrial Revolution, so researchers introduced the existence of planetary limits stand out as a paradigm that assesses the risks that anthropogenic actions are jeopardizing in the maintenance of ecosystems at a planetary level (Steffen et al., 2015).

For Rockström et al. (2009), planetary boundaries are safe operational dimensions between natural systems and humanity, being directly related to the planet's biophysical processes. Planetary limits include global climate change, rate of biodiversity loss, interferences in the nitrogen and phosphorus cycle, stratospheric ozone depletion, ocean acidification, freshwater use, land use changes, chemical pollution and aerosol loading atmospheric. Out of these nine limits established in studies, three planetary systems have already exceeded the established limits, which are the rate of loss of biodiversity, climate change and interference in the nitrogen cycle.

These planetary dimensions allow us to think about the urgency to minimize and adapt the effects of human actions on terrestrial systems to ensure Planetary Health, especially when considering that these changes go beyond environmental preservation issues, which involve health, well-being, and prosperity (Morisetti & Jason, 2017; Bell et al. al., 2018).

AMAZON ECOSYSTEM: BRIEF CONTEXTUALIZATION

The Amazon ecosystem is considered one of the richest carbon reserves in the world, also acting as a carbon sink (Hope, 2019). This biome is considered a genuine laboratory of species with vast diversity, and many species are still not known to science (Ceballos et al., 2020), which are traditional inhabitants that depend on the Amazon biome for their survival (Zaman, 2022). The Amazon region is home to approximately 40,000 species of vascular plants, of which, almost 30,000 are endemic (Mittermeier et al., 2003).

One of the richest ecosystems on our planet is the Amazon rainforest, located in six countries: Brazil, Bolivia, Colombia, Ecuador, Peru, and Venezuela. This biome is known worldwide for its rich biodiversity, hydrographic basin, and heterogeneity. However, deforestation of the Amazon Forest has been enormously compromising biodiversity and the dynamics of life on the planet since this forest influences the environmental balance worldwide.

However, some authors point out that this sink is close to its inflection point, with the risk of transforming the largest world's tropical forest into a savannah and a significant carbon emitter (Wit & Mourato, 2022; Sampaio et al., 2019). The anthropogenic actions are compromising the dynamic balance of ecosystems in the Amazon region and its rainforest, threatening humanity - since climate change compromises biodiversity, the process of water cycling, and carbon storage. All these elements have drastic effects on the health of populations, harming the way of life of forest guardians (Delgado et al., 2022).

IHTP, *2*(3), SI: 61-80, 2022 ISSN 2563-9269

Deforestation is mainly caused by fires, livestock activities, logging activities, land grabbing, impunity for environmental crimes, construction works, and political setbacks. According to data from the Instituto do Homem e Meio Ambiente da Amazônia (Imazon), in 2021, the Amazon rainforest experienced a record of deforestation in the last ten years, a rate of 29% higher than in 2020, a total of 10,362 km2. Amazonas was the second state that most deforested in 2021, with a devastated area with an increase of 49%, going from 1,395 km2 in 2020 to 2,071 km2 in 2021.

Amazon is “burning” and the rate of respiratory diseases also increases due to the effects of climate change, where the decrease in precipitation, fires associated with deforestation, and climate change are extremely harmful to communities due to air polluted with particles that have negative effects on human health (Butt et al. 2021; Machado-Silva et al., (2020). The impacts of climate and environmental changes on human health are vital to align adaptive strategies for regions with more vulnerability, such as the Amazon region (Smith et al., 2014).

Besides deforestation and wildfires, water resources in the Amazon represent the landscape and are the main sources of livelihood for many families living in riverside communities having fish as the animal protein most consumed by these residents (Doria et al., 2018). Yet, rivers, lakes, and streams are means of transportation in the gigantic Amazon rainforest. For Fearnside (2008), traditional peoples are threatened by climate change because they depend on the forest for their survival. Thus, environmental policies and stricter inspections to protect people and the environment are fundamental.

PLANETARY HEALTH EDUCATION: CHALLENGES AND POSSIBILITIES

Education is still a powerful strategy for changing human behavior, especially concerning interrelationships with environmental systems. The human species influences the natural systems in which they live and consequently suffer from the responses of these impacts, making it necessary to think about transdisciplinary proposals and guide solutions that understand and face environmental problems and their effects on health.

Guzmán et al. (2021) created a framework for an Education in PH, with five domains that enable understanding of knowledge, practices in Planetary Health, such as: First domain - "Interconnection within nature" - is about the essentiality of valuing and respecting nature and existing dimensions, including different knowledge and cultures. The second domain - "Anthropocene and health" - addresses how environmental impacts which are connected to health. The third domain - "Systems thinking and complexity”- where there are interactions between elements of nature and human health at different geospatial and temporal scales. The fourth domain - "Equity and justice" – is based on the rights of humans and the rights of nature, where everyone needs to achieve full vitality. The fifth domain - "Construction and systems change" - is primordial for the construction of movements committed to solving the issues addressing Planetary Health.

Although the five domains were created as frameworks to guide education in Planetary Health for all levels of higher education, they can also be inserted in basic education, because of the rich vision of approaches that encompass essential issues for the integration of environmental and human health

In Brazil, the environment themes are part of the curriculum in basic education, as transversal themes, and official documents for education incorporates it, such as National Curricular Parameters (PCNs) and National Common Curricular Base (BNCC). However, it is essential to expand the way of approaching environmental problems and think of broader perspectives, which make it possible for us to be in the Anthropocene, with the same reason environmental changes cause damage to survival on the planet.

PH is a recent area that should be part of all areas of activity, and basic education is fundamental for the insertion of such significant and necessary themes since the planet is going through environmental crises that need to be solved or minimized soon. In basic education, PH is still incipient. Some works suggest an interconnection of themes involving natural

  ISSN 2563-9269

ecosystems and the way we live on planet Earth. The São Paulo Declaration on Planetary Health brought up the need to teach PH at all levels of education with a multidisciplinary and participatory approach so that schools, teachers, students, parents, and communities can awaken to changes in the way of living on the planet Earth, as a proposal for the protection the health of the planet, human health, and future generations (Myers et al., 2021).

Upon this perspective, Goal 4.7 of the 2030 Agenda emphasizes that students must have knowledge and skills that allow them to promote sustainable development through education and lifestyle for sustainable development, human rights, gender equality, promotion of a culture of peace, non-violence practices, global citizenship and appreciation of cultural diversity and the contribution of culture to sustainable development (UN, 2015).

To carry out the education in PH, a decolonial science approach is essential, where it is possible to promote interrelationships between scientific education and different types of knowledge, especially the dialogues with environmental themes with other knowledge, such as health, well-being, equity, and culture. In this context, the work sought to broaden the discussions about the categories of analysis, based on the perceptions of teachers, from a riverside school in the Amazon region, about environmental problems, and how they permeate the educational context and the community involved in the perspective of expanding the space of the school as responsible for fostering representative notes for education. In this sense, this article aimed to understand teachers' perceptions from a riverside school on Planetary Health, considering local and global environmental issues, considering that rural schools in the Amazon region still live in a context of inequality.

It is worth noting that children and young people must be responsible for environmental sustainability, as they will be the most affected and/or benefited by the intensifying ecological changes. This study presents subsidies for reflections on the role of educational institutions on planetary issues, considering the biome of the Amazon and its rainforest, climate changes, and the health of its populations. Thus, research in school environments is potentiating and necessary towards themes such as Planetary Health.

METHODS

The research was carried out in a rural school in Amazonas, Brazil, created by Decree #031/96 from October 25, 1996. Located in a traditional riverside community named Lago do Uruapiara/AM, at geographic coordinates 6°20'25"S 62°1'19"W, 172 km distant from the urban area of the municipality of Humaitá/AM (Figure 1.). The study was of a descriptive qualitative nature to answer a main hypothesis, which is “How to teach Planetary Health to rural education students in Amazonas, considering local environmental issues?”

The research subjects were ten teachers from different subjects (Natural Sciences, Portuguese Language, Mathematics, Geography, History and Physical Education) who teach classes for elementary and high school in the rural school unit in Amazonas.

Data Collection

The interviews lasted approximately half an hour for each teacher. For data collection, semi-structured interviews were carried out with school professionals. This collection technique is based on pre-formulated guiding questions (Table 1), where respondents freely approach the topic (Minayo, 2008).

The interviews were recorded with the consent of the participants and transcribed in full, guaranteeing the anonymity of those surveyed. For the analysis of qualitative data, content analysis was chosen, being a set of techniques that aim to obtain an understanding of the topic studied, including three stages: pre-analysis, exploration of the material and treatment and interpretation of the results (Bardin, 2009). The interviews were recorded with the consent of the participants and transcribed in full, guaranteeing the anonymity of the respondents. For the analysis of qualitative data, content analysis was chosen, as a set of techniques that aim to obtain an understanding of the studied subject, including three stages: pre-analysis, exploration of the material and treatment and interpretation of the results (Bardin, 2009).

Data Analysis

  ISSN 2563-9269

The pre-analysis of the data began with the transcription of the interviews, where the material was organized, the data transferred to the Nvivo 1.5 software for organization, coding, and generation of results, following the content analysis method (Bardin, 2009). To praise the methodological reliability in qualitative research, the contributions of Cardano (2017) were sought. He describes the concept of qualitative research through which one can find the ways for the construction of accurate representations of social phenomena and their main values. With this methodological path, qualitative research specifically responds to a general requirement that covers the entire domain of social research that guide the complexity of the phenomena under study, including the principles of the theory of argumentation presented by the author in the Qualitative Research Manual (Cardano, 2017).

Table 2 consists of axes of formulated analysis in the initial stage. The codifications and their main references on the themes passed through the phase of interference, interpretation, and descriptive analysis of the data. Thus, to better understand the analyses, a word cloud was created in the Nvivo 1.5 software (Figure 2.) to represent the frequency of the most cited words in the interviews. In the presentation of the research results, excerpts from the interviewees' statements are presented, always preserving their anonymity.

Ethics

The research was submitted and approved by the Ethics Committee for Research with Human Beings (CEP) of the Federal University of Rio Grande do Sul (UFRGS/Brazil), under the code CAAE 42320821.6.0000.5347, which is part of the data collection developed within the scope of doctoral activities in the Graduate Program in Science Education (PPGECi) at the UFRGS.

RESULTS AND DISCUSSION

The study focused on a sample set of rural education teachers in Amazonas to understand the issues on the themes of Planetary Health. With the word cloud presented from the interviews (Figure 2), the terms most frequently mentioned by the teachers referred to the main environmental problems faced by the Amazon region, which coincide with several other places on the planet.

Environmental Catastrophes in Southern Amazonas

From the thematic axis "*Environmental disasters and Planetary Health*", we can figure out which are the main environmental problems that have arisen (deforestation, river littering, mineral extraction, temperature rise), pointing out for the need to insert public policies in educational institutions and the awareness for the pointed problems. It should be noted that the teachers were unanimous in answering that the planet is experiencing major environmental crises as well as understanding the harmful effects that humans have caused to planet Earth by using the available natural resources inconsequently. Some lines from these interviews are highlighted below.

We talk a lot to them, about what can bring harm to the health of the planet, these environmental catastrophes, for example, pollution, burning, carbon dioxide, river pollution […], but we argue a lot about it, about wiping out all natural resources. It's not just the mining part. So, is the mining deforesting? Well, it's polluting with the burning of fuel. It's deforesting because every mining raft cuts down a tree to make it, so it's deforesting, that is, one thing leads to another. Some fires are very recurrent (Teacher A).

It's getting worse, it's getting hotter, it's not the needy people who do it, but the people who have money […], as long as people aren't aware that they're running out. For example, we tell students not to throw the trash on the floor and put it in the trash or their pocket until they see the garbage bin. But we work traveling and seeing people throwing cans and bags in the river. They know they can't do that, but they keep doing it, a very cultural issue and for not knowing what happens. When you don't have anything to eat or plant, the land doesn't have more minerals for plants to grow in the soil. Everyone has to do a little, unity is strength, but unfortunately, it is complicated (Teacher B).

I think we are getting to the peak of what we are doing: pollution is an example. It's getting hotter, the floods changing the season. Sometimes we think it's

  ISSN 2563-9269

going to dry up, and it's filling up. The air harms people with respiratory diseases because of this much-polluted climate, especially in big cities. Some communities suffer from contamination by heavy metals. People who drink contaminated water pollute the rivers. In the community, there is a lot of mining; there is a large number of mining rafts (Teacher C).

Every day things happen in the world that affects nature itself. Things made by man, when we talk about it in schools, we don't have any support. There is a lack of public policy on this at school because it is at school that we have to guide this through. After all, there is no way to go from house to house guiding each family, and there at school, it is good to discuss these catastrophes and tell students that all this will worsen our form of life here (Teacher D).

With the word cloud organized from the fragments presented in the teachers' speeches, that clearly represent environmental catastrophes and planetary issues in the Amazon through Figure 3, where there are negative associations compromising Planetary Health. On the other hand, positive associations may represent beneficial integrations that need to be valued for mitigation and adaptation to planetary issues.

The pollution of these bodies of water through the disposal of garbage in the river was one of the problems most pointed out in the interviews since the community is in the riverside context. In the specific case of this paper, the pollution of rivers and lakes seems to be a major problem, considering that teachers mainly mentioned the pollution of these ecosystems. Plastic pollution in riverside environments is highlighted due to the harm done to local economic activities, making transport in these environments difficult, that contaminates the waters and compromises the livelihoods of the populations residing in these locations, what is also associated with floods (van Emmerik & Schwarz, 2020) and to the accumulation of microplastics to other aquatic ecosystems (Dos Reis et al., 2021; He et al., 2020).

Another problem that was pointed out was the possible pollution by heavy metals, considering that in the studied region there is an ore extraction process, and that mercury, the main element used for the separation of gold in its extraction process, presents high toxicity (Arrifano et al., 2021; Beckers & Rinklebe, 2017). This contamination affects the population in a contradictory way, while mineral extraction is a source of income. Fish are at the top of the food chain of the populations living in the Amazon region, making these populations the most exposed to mercury contamination in the world (Pestana et al., 2022; Silva Filho et al., 2021; Passos et al., 2008).

At school, one of the main challenges with the gold extraction process is truancy since students help their parents and family in these processes. Thus, Planetary Health education needs to be associated with life, especially in a context that is still largely forgotten, such as rural communities and rural schools.

In the riverside context, there is a scenario of great inequity. Thus, it becomes a priority for government officials and parliamentarians to plan more effective social assistance policies for rural populations, with the creation and strengthening of cooperatives for the sale of local products, such as: fish, and local plants such as *Euterpe oleracea, Bertholletia excelsa, Musa ssp, Theobroma grandiflorum, Bactris gasipaes, Manihot esculenta, Theobroma cacao*, and others. Since that the riverside communities present productive diversity of native species valuing food from the communities themselves allows for local development, income generation for small farmers and improves the quality of food that is offered to populations (dos Santos & Torres, 2022).

Deforestation and the increase in temperature in recent years were highlighted in the speeches of teachers, when they pointed out the harmful effects of deforestation, being something that brings direct connections with other themes that are part of PH.

It is important to highlight that climate change at global and regional levels results in extreme events, loss of biodiversity, degradation of habitats, changes in hydrological cycles, increase in greenhouse gases, global warming, economic, social, environmental, and health damages. In addition to these issues, it is worth noting that the forest inhabitants of the Amazon, such as the indigenous, riverine people and quilombolas (Afro-descendants) are the ones who suffer most directly from conflicts over land and exploitation in these regions since the impacts of changes in

  ISSN 2563-9269

ecosystems affect mainly the socially disadvantaged classes and rural communities (Butler et al., 2019). In this way, it is essential to think that these individuals represent the forest and are the greatest guardians of this biome.

Discussions about the problems in the Amazon region, presented by educators are necessary to further justify the insertion of PH in basic education, especially in those regions where people suffer directly from environmental problems. Thus, schools are pointed out as a privileged space to deal with such unique themes, since raising awareness among students is a way of solving the great environmental problems, since these spaces are frequented by children and adolescents with powerful voices to spread the theme, rethink future actions to ensure a sustainable planet.

It is believed that science education in riverside communities needs to be based on the elements of the territory, biodiversity, and traditional cultural knowledge, considering the need to unite strategies of ancient knowledge of local populations with scientific knowledge, in addition to thinking about making a transdisciplinary connection between areas, knowledge, and above all, to be part of the actions and practices adopted by educational institutions, such as the environment and school meals.

Health Demands Linked to Environmental Issues

The theme "*Main health demands linked to environmental issues*" was pointed out in the categories of waterborne diseases, specifically in times of drought and respiratory illnesses caused by the smoke from deforestation in nearby communities, according to some statements below:

Sometimes the children get sick with a stomach ache, it must be a water worm because they throw the sewage into the river, in the drought the well water gets bad too and they end up feeling sick (Teacher E).

We see the pollution of rivers, pollution provoked by mining, we know that they are polluting the river. There is a mining raft near the lake. Sometimes, we see children with stomach aches, and diarrhea, 5 to 6 students leaving school with diarrhea. Sometimes we wonder whether the food or the water might have caused that. There was a week when there were too many students with diarrhea. Then, we could see that the well was dry and had dirty water. So, they started to put chlorine in the water reservoir. Some other times, some students went to school with a problem of skin stains. Later we discovered that was caused by their jumping into water pounds near septic tanks (Teacher F).

From my point of view, there are some respiratory problems due to the fires, when students get a lot of flu and colds (Teacher B).

Water-related diseases and respiratory diseases were highlighted in the speeches of teachers from the riverside school. It is essential to align with the themes discussed in the topic about the main environmental catastrophes of the community and school, since contaminated water results from the pollution in the collection sites or water storage, and respiratory diseases come from air pollution.

Riverside communities in Amazonas State have the absence and/or precariousness of basic sanitation, and most of the time, the sanitary sewage is done directly in rivers, lakes, and streams. In addition, water is provided in these communities through artesian wells, which are often close to contaminated areas or even directly from rivers, lakes, and streams. In addition to this, there is still water that receives sewage being used for consumption and food preparation, increasing cases of diseases caused by polluted water consumption.

We know that water is essential for life; however, changes in natural ecosystems are bringing negative results to the health of populations. Waterborne diseases caused by the presence of microorganisms, parasites, and insect vectors most often affect the most vulnerable people, the children, and the elderly the most affected (Prüss-Üstun et al., 2008). Thinking in the context of the school, we highlight children as the most affected group by diseases resulting from the consumption of contaminated water and food. The main water-related diseases are: diarrheal diseases, malnutrition, intestinal nematode infections, lymphatic filariasis, trachoma, schistosomiasis, malaria, and dengue (Prüss-Üstun et

  ISSN 2563-9269

al., 2008). For Ataíde et al (2021), intestinal parasites interfere with students' school performance, requiring work on healthy habits and hygiene care.

For Luo et al. (2022), water pollution in rural communities is still incipiently addressed, being a critical point in developing countries, but water pollution control policies are essential, with a view to improving the beneficial effects, such as ecological improvement, health, well-being and sustainable development, which can also be a way of reducing inequality.

For Fewtrell et al. (2005), access to safe water and sanitation managed with safety and basic hygiene (WASH) is indispensable for the health, well-being, dignity, and socioeconomic development of humanity. Thus, one of the strategies to mitigate issues related to WASH is awareness campaigns in educational programs with different audiences, including children, mothers, workers, and community members (Anthoni et al., 2022).

Another problem pointed out by the teachers is respiratory diseases, which we highlight the flu, pneumonia, bronchitis, asthma, and rhinitis. All these diseases are mainly caused by external factors, such as air pollution. We highlight here the professors' speech regarding deforestation, in which it is considered one of the main causes of CO2 emission into the atmosphere, linked to socioeconomic issues, cuts to agriculture, livestock, and wood extraction, in addition to droughts, forest fires, and degradation of forest areas due to climate change (D'Amato et al., 2017).

Thus, the reality pointed out by the teachers is representative in the general context. In our research, we have riverside populations that, despite having an important role in the maintenance of forests, live within a context of inequality. We emphasize that climate-related changes bring more pronounced effects on populations with lower socioeconomic levels, on women, children, and indigenous communities (Cunsolo & Ellis, 2018). Moreover, other research demonstrated that one of the causes of hospitalizations for respiratory diseases is due to smoke from fires (Machado-Silva et al., 2020; Alves, 2020).

Plants and the Health of the Planet: Necessary Interconnections

Regarding the "*Link between the health of the planet and the plants*," the teachers brought the main positive points they could visualize considering the relationship between plants and the planet's health. Among the processes, they mentioned breathing, food, and medicine. Still, they also said they suffered from major anthropogenic attacks, such as falling trees, deforestation, and fires, as shown below.

Plants have everything to do with the health of the planet because if the human being continues to destroy nature, cutting trees down, burning and removing trees from the water beds, life on the planet will be difficult because it is the plants that also provide the oxygen that we breathe and hold the water beds (Teacher A).

There are a lot of plants there; most people treat diseases with plants, it is their resource, being healthier. Some plants are also used for food (Teacher C).

We are in the Amazon, right? Plants are everything to the planet. When we go down the river, we see the trees already cut down. We can see that when the river changes its course, everything changes. Heatwaves might be caused because they cut down the trees, but they don't replace them. The tree is everything on the planet (Teacher B).

As for the relationship of plants with the health of the planet pointed out by the teachers for reflection, they mentioned positive points, such as the process of breathing, food, and medicines, but also negative notes, due to the attacks that these beings have been suffering with anthropogenic actions - such as felling, deforestation, and burning. Deforestation in the Amazon means changes in natural ecosystems and loss of biodiversity, which are irreversible events (Gomes et al., 2010), which compromise the fundamental dynamics of life on earth. Thus, we emphasize the need to work hard on the problems and solutions for Amazon, considering all existing destruction scenarios.

In addition to these issues, the traditional knowledge of Amazonian peoples about plants is

  ISSN 2563-9269

highlighted, which can be widely disseminated to minimize the impacts that natural systems are facing with deforestation and/or fires. The report entitled Healing the Amazon (Watts, 2022) briefly presents the role of riparian peoples in maintaining health in the Amazon region; however, it is essential to offer these populations decent conditions for survival. The NGO Health in Harmony (HIH) is an example of partnerships with communities, offering populations health, livelihood, education, and reforestation.

School Feeding and Related Challenges

About the theme "*school lunch*", discussions arose about the main food that is part of the school lunch, mainly ultra-processed foods, such as canned food, sausages, and chocolate. In addition to the necessary remarks for Planetary Health, such as the need to include regional food, creating a school garden and a cooperative to supply food to schools and generate income for the community was endorsed.

I think a place like this should have fish for these children. It's a healthy food, but they don't have it, they send it in cans, a lunch that I don't understand [...], fish, which is good food, is not in the school lunch. They send canned sardines. Why not stewed fish? They could do it well and easily. I don't understand these people. They don't seem to understand that some of the food children eat are the real cause for some infections (Teacher I).

One of the weakest parts of the school lunch is about vegetables. I was talking to a teacher in the community that I grew up eating regional things that I cannot see here. But I had already worked at a school where there were days of the month when we changed the menu, replacing canned food and sausage for bananas and porridge (Teacher B).

There should be a complement or incentive for the school to produce, a way to insert the student in the activity, working on several subjects. Unfortunately, they don't even have the incentive to build their vegetable garden. The students need more. There should be a cooperative that distributes vegetables and fruits to schools (Teacher D).

Food is a critical topic in Planetary Health, which involves an approach to the production chain, from seed preparation to the table (Fardet & Rock, 2020). Food production often harms human and planet health, as forests are destroyed, biodiversity loss, increased emission of greenhouse gases, climate change, and various health damages occur. In this sense, Cassol & Schneider (2015) state that there are other problems that permeate food issues, such as: public health (malnutrition and obesity), environmental problems derived from food production (pollution and contamination with chemicals), and excessive purchases and food waste.

From the perspective of educational institutions and Planetary Health, we thought of discussing what the school offers to riverside students, given that they live in the Amazon rainforest, the cradle of incredible biodiversity and regional foods. Undoubtedly, the data presented in the interviews were worrisome since ultra-processed foods, such as canned food, sausages, and chocolate drinks, are the most consumed by riverside students, in addition to the absence of regional food in lunch, fruits and vegetables. There are several health problems arising from ultra-processed foods since these foods are high in calories, rich in sugar, sodium, trans-fats, and low in fiber and protein, which with high consumption are associated with chronic non-communicable diseases (NCDs). In this context, when talking about food, we are encompassing health, quality of life, and environmental sustainability (Monteiro et al., 2019; Popkin et al., 2021), in addition to the loss of culinary diversity and regional food traditions (Morais Sato, 2020).

In this sense, we think of the Amazon as a forest that is extremely rich in regional products that can be part of students' school lunches, such as *Euterpe oleracea, Bertholletia excelsa, Musa ssp, Theobroma grandiflorum, Bactris gasipaes, Manihot esculenta, Theobroma cacao,* and fish, among others. It is worth highlighting the need for public policies to be allied with environmental and population health issues.

The Food Acquisition Program (PAA) and the National School Feeding Program (PNAE) were created with the purpose of providing healthy, quality, safe food from family farming. Law 11,947/2009 brought advances to the PNAE, which include the extension to the entire public basic education network and the guarantee that at least

  ISSN 2563-9269

30% of the transfers from the National Fund for the Development of Education (FNDE) are from food products from familiar agriculture. It is worth mentioning that encouraging the advancement of local family farming means helping to combat the misery and poverty of rural populations as well as promoting sustainability and ensuring health.

The main justification for the use of ultra-processed foods in school lunches was due to the lack of energy to preserve food. Anyhow, we ask: Does this food guarantee nutrition security for students? or yet, are the residents of riverside communities in the Amazon region properly assisted with their rights? Considering what was discussed in this topic, the riverside population certainly lives in a context of inequity since their fundamental rights provided by the Brazilian Federal Constitution are not guaranteed.

The creation of vegetable gardens in schools and a cooperative in the community were two of the alternatives pointed out by the teachers once this was foreseen by the PNAE. Undoubtedly, such issues are critical in terms of Planetary Health since the offering of diversified and healthy regional food is a solution to health issues since food plays a key role in this context. The creation of the cooperative will make it possible to offer local food but also to assist community residents, who often seek out illegal mining to support their families. Here we reinforce the need for the government to have a resilient look at these necessary issues.

In 2021, three recommendations for health policy in Brazil regarding Planetary Health were released in The Lancet Countdown Policy Brief Brazil. Among the recommendations, we highlight the insertion of the Planetary Health diet, including the diet in school lunches, as well as the use of regional foods based on the biodiversity of Brazilian regions. This recommendation benefits human health since the consumption of healthy and diversified food is essential, in addition to contributing to family farming and, consequently, reducing the environmental impacts related to food production in industrialization processes (Barros et al., 2021).

Potential of Riverside Schools to Intervene in Environmental Problems

The last axis is aimed at knowing the "*potential of rural schools to intervene in environmental problems*", so the primary category was the need to promote student awareness - given that they have little knowledge about these themes and have a significant role to play in preserving their locality.

Yes, it has great potential! I think that, first of all, information is what counts more. People are somewhat naive here. We could bring more information to students and make them more aware (Teacher B).

I believe schools are one of the planet's saviors, but it also depends on home working. For example, I have a project to make a vegetable garden at school, so I get there, and I do everything. Everyone needs to do something at home, but the students find that difficult. If everyone does a little at school, there will be more demand for work. The school could have help from the government with other resources. I believe there is a chance to improve our planet (Teacher E).

Schools need incentives, so everyone must be aware of the difference they can make by the fact of being from the countryside and knowing that environmental problems cause impacts that affect everybody's lives, even because they know a lot about plants and so many local things (Teacher I).

After these results, it is essential to raise discussions about the need for the insertion of PH in primary schools at all levels of education. By doing this, PH will provide opportunities for everyone to understand the urgency of minimizing environmental impacts and seeing the planet Earth as our home, in addition to considering the human being as part of the planet (Guzmán et al., 2021).

In this context, the codified themes from the perceptions of schoolteachers pointed out the main environmental problems of the school and riverside community in the Amazonas State. Thus, it is crucial that schools must address these themes in the curriculum in a responsible and resilient way with teaching strategies that enable a connection between the triad: education, health, and environment.

IHTP, *2*(3), SI: 61-80, 2022 ISSN 2563-9269

Given all the approaches and contexts of this paper, the schools were pointed out by the teachers as potential spaces for the insertion and discussion of themes that involve Planetary Health. In fact, Planetary Health education needs to be part of the documents that guide education at a global level but based on knowledge of the region itself.

To advance planetary issues, it is indisputable to think that children and young people need to be part of this context of change, as cited in the São Paulo Declaration on Planetary Health (2021), which pointed to the school and all those involved in the educational sector with a fundamental role to protect and minimize the impacts that humanity is causing on the planet and consequently on our health. Furthermore, excluding this public means delaying the global process in combating the great climate crisis, since what is often observed is an education with a curriculum disconnected from the issues that link human health and environmental health, not teaching skills that allow an efficient defense of environmental issues (Arora et al., 2022).

In the case of the Amazon Region, it is essential to combine all the anthropogenic issues that are happening with solutions so that together we can create resilient human beings capable of intervening and changing this context that has only worsened in recent years. Furthermore, in educational institutions, there are children and young people who represent the future of the planet, and it is essential to enable minds that think of the planet as a home. The awareness of students is fundamental, especially in rural schools, with students who have little knowledge about certain subjects often throwing garbage in the river due to a lack of knowledge about the decomposition time, the harm to the environment, and health. Thus, it is necessary for professionals from all areas of activity to enable transdisciplinary dialogues to address issues such as these.

FINAL CONSIDERATIONS

After the data presented in this paper with teachers from a riverside school in the Brazilian Amazon region, we think about the representativeness in the global and local context, considering that the Amazon has an indispensable role in the future of the planet and humanity, being essential to reflect the various environmental issues that were presented in the speeches of the interviewed teachers. The Amazon biome is at a critical point in which everyone needs to think and reflect on the existing interconnections for the mitigation and adaptation to climate change that has several catastrophic effects on humanity.

All events related to disturbances to natural environments need to be known in depth and solved to avoid a greater tragedy. In this context, the interviewed teachers brought to light the main environmental disasters in the riverine scenario of the Amazon region. The experience of primary school teachers in rural Amazonia is a rich source for the creation of teaching materials on PH for students, considering the inclusion of PH themes in the formative trajectory of children and adolescents in the basic education curriculum.

The analysis in the school context allowed us to think about how urgent and necessary an education on Planetary Health is, especially in a scenario like the Amazonian region, so rich, essential and suffers deep anthropogenic attacks. It is worth noting that Planetary Health, in terms of the area of study, is still very incipient, especially in the context of education. However, it is these educational spaces that need to be gateways to relevant discussions that contribute to solid and comprehensive training in issues involving the health of the planet and the health of populations.

Yet, we consider that these spaces are potential for disseminating issues that can change the way of thinking and acting, allowing children and adolescents to be resilient and able to fight for such an urgent cause that compromises their and future generations. Yet, there is a need for Planetary Health education to be part of the curriculum, with a decolonial perspective, so that governments have a look at everyone, especially residents of traditional communities and rural schools.

ACKNOWLEDGEMENT

The authors acknowledge and thank the Federal University of Rio Grande do Sul (UFRGS), Federal University of Amazons (UFAM), Amazonas State Foundation for Research Support (FAPEAM),

  ISSN 2563-9269

Development, Economy, Science, Technology, and Innovation Secretariat (SEDECTI) and Planetary Health Ambassador Program 2022.

REFERENCES

Alves, L. (2020). Amazon fires coincide with increased respiratory illnesses in indigenous populations. *The Lancet Respiratory Medicine, 8*(11), e84.

Anthonj, C., Setty, K., Ferrero, G., Poague, K., Yaya, A. M. A., Augustijn, E. W., & Marsh, A. J. (2022). Do health risk perceptions motivate water- and health-related behaviour? A systematic literature review. *Science of the Total Environment*, 152902.

Arora, R., Spikes, E. T., Waxman-Lee, C. F., & Arora, R. (2022). Platforming youth voices in planetary health leadership and advocacy: an untapped reservoir for changemaking. *Lancet Planetary Health, 6*(2), e78-e80.

Arrifano, GDP, Augusto-Oliveira, M., Souza-Monteiro, JR, Macchi, BDM, Lima, RR, Suñol, C., ... & Crespo-Lopez, ME (2021). Revisitando os papéis astrocíticos na intoxicação por metilmercúrio. *Molecular Neurobiology,* 58 (9), 4293-4308.

Ataíde, A. R., Acioli, A. N. S., de Araújo Pantoja, T. M., & Lima, R. A. (2021). DE PILATOS A EDUCAÇÃO PROFILÁTICA HUMANIZADA: o "vamos lavar as mãos" na escola. Revista Ensino de Ciências e Humanidades-Cidadania, *Diversidade e Bem Estar-RECH, 5*(2, jul-dez), 243-260.

Barros, E., Camargo, TS., Santiago, R., Stein, A., Vianna, D., Floss, M, & Saldiva, P, (2021). Policy brief for Brazil. *Lancet Countdown. Disponível* em: https://www.lancetcountdown.org/resources/

Bardin L. (2009). Análise de conteúdo. Lisboa: *Editora Áries 70*, 2009.

Beckers, F., & Rinklebe, J. (2017). Cycling of mercury in the environment: Sources, fate, and human health implications: A review. *Critical Reviews in Environmental Science and Technology, 47*(9), 693-794.

Bell, J. E., Brown, C. L., Conlon, K., Herring, S., Kunkel, K. E., Lawrimore, J., ... & Uejio, C. (2018). Changes in extreme events and the potential impacts on human health. *Journal of the Air & Waste Management Association, 68*(4), 265-287.

Brasil. Lei no 11.346, de 15 de setembro de 2006. Cria o Sistema Nacional de Segurança Alimentar e Nutricional-SISAN com vistas em assegurar o direito humano à alimentação adequada e dá outras providências. *Diário Oficial da União*, 2006.

Brasil. Resolução/CD/FNDE no 6, de 08 de maio de 2020. Dispõe sobre o atendimento da alimentação escolar aos alunos da educação básica no âmbito do Programa Nacional de Alimentação Escolar – PNAE. *Diário Oficial da União*, 2020.

Butler, C. D., Higgs, K., & McFarlane, R. A. (2019). Environmental health, planetary boundaries and Limits to Growth. *Encyclopedia of Environmental Health*, 533.

Butt, E. W., Conibear, L., Knote, C., & Spracklen, D. V. (2021). Large air quality and public health impacts due to Amazonian deforestation fires in 2019. *GeoHealth, 5*(7), e2021GH000429.

Cardano, M (2017). *Manual de pesquisa qualitativa. A contribuição da teoria da argumentação*. Tradução: Elisabeth da Rosa Conill. Petrópolis, Rio de Janeiro: Vozes.

Cassol, A., & Schneider, S. (2015). Produção e consumo de alimentos: novas redes e atores. *Lua Nova: revista de cultura e política*, 143-180.

Ceballos, G., Ehrlich, P. R., & Raven, P. H. (2020). Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction. *Proceedings of the National Academy of Sciences, 117*(24), 13596-13602.

Crutzen, P. J. (2016). Geology of mankind. In Paul J. Crutzen: *A pioneer on atmospheric chemistry and climate change in the Anthropocene* (pp. 211-215). Springer, Cham.

Cunsolo, A, & Wllis, NR. (2018). Ecological grief as a mental health response to climate change-related loss. *Natura Climate Change, 8*(1), 275-281.

D'Amato, G., Vitale, C., Rosario, N., Neto, H. J. C., Chong-Silva, D. C., Mendonça, F., ... & D'Amato, M. (2017). Climate change, allergy and asthma, and the role of tropical forests.

  ISSN 2563-9269

World Allergy Organization Journal, 10(1), 1-8.

de Morais Sato, P., Couto, M. T., Wells, J., Cardoso, M. A., Devakumar, D., & Scagliusi, F. B. (2020). Mothers' food choices and consumption of ultra-processed foods in the Brazilian Amazon: A grounded theory study. *Appetite*, 148, 104602.

de Wit, F., & Mourato, J. (2022). Governing the diverse forest: Polycentric climate governance in the Amazon. *World Development, 157*, 105955.

Delgado, R. C., de Santana, R. O., Gelsleichter, Y. A., & Pereira, M. G. (2022). Degradation of South American biomes: What to expect for the future?. *Environmental Impact Assessment Review, 96*, 106815.

Doria, C. R. D. C., Athayde, S., Marques, E. E., Lima, M. A. L., Dutka-Gianelli, J., Ruffino, M. L., ... & Isaac, V. N. (2018). The invisibility of fisheries in the process of hydropower development across the Amazon. *Ambio, 47*(4), 453-465.

Dos Reis, M., de Alencastro Graça, P. M. L., Yanai, A. M., Ramos, C. J. P., & Fearnside, P. M. (2021). Forest fires and deforestation in the central Amazon: Effects of landscape and climate on spatial and temporal dynamics. *Journal of Environmental Management, 288,* 112310.

dos Santos, T. T. B., & Torres, R. L. (2022). O programa nacional de alimentação escolar e a importância do fortalecimento da agricultura familiar para a promoção da soberania e segurança alimentar e nutricional no Brasil. *Retratos de Assentamentos, 25*(1), 41-68.

Fardet, A., & Rock, E. (2020). Ultra-processed foods and food system sustainability: what are the links?. *Sustainability, 12*(15), 6280.

Fearnside, P. M. (2008). *Mudanças climáticas globais e a floresta amazônica.* A biologia e as mudanças climáticas no Brasil. RiMa editora, São Carlos. 316p, 131-150.

Fewtrell, L., Kaufmann, R. B., Kay, D., Enanoria, W., Haller, L., & Colford Jr, J. M. (2005). Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis. *The Lancet infectious diseases, 5*(1), 42-52.

Floss, M. & Barros, EF. (2019). Planetary health: a call for action of Family doctors from around the world. *Revista Brasileira de Medicina de Família e Comunidade, 14*(41), 1992.

Gomes, J. M., Carvalho, J. O. P. D., Silva, M. G. D., Nobre, D. N. V., Taffarel, M., Ferreira, J. E. R., & Santos, R. N. J. (2010). Sobrevivência de espécies arbóreas plantadas em clareiras causadas pela colheita de madeira em uma floresta de terra firme no município de Paragominas na Amazônia brasileira. *Acta Amazônica, 40*, 171-178.

Guzmán, C. A. F., Aguirre, A. A., Astle, B., Barros, E., Bayles, B., Chimbari, M., ... & Zylstra, M. (2021). A framework to guide planetary health education. *The Lancet Planetary Health, 5*(5), e253-e255.

He, B., Wijesiri, B., Ayoko, GA, Egodawatta, P., Rintoul, L., & Goonetilleke, A. (2020). Fatores influentes na ocorrência de microplásticos em sedimentos fluviais. *Ciência do Meio Ambiente Total*, 738 , 139901.

Hope, M. (2019). The Brazilian development agenda driving Amazon devastation. *The Lancet Planetary Health, 3*(10), e409-e411.

Imazon, Instituto do Homem e Meio Ambiente da Amazônia. (2022, janeiro 17). Desmatamento na Amazônia cresce 29% em 2021 e é o maior dos últimos 10 anos. Imazon.com. Acessado em agosto, 2022, em https://imazon.org.br/imprensa/desmatamento-na-amazonia-cresce-29-em-2021-e-e-o-maior-dos-ultimos-10-anos/

Iyer, H. S., DeVille, N. V., Stoddard, O., Cole, J., Myers, S. S., Li, H., ... & Golden, C. D. (2021). Sustaining planetary health through systems thinking: Public health's critical role. *SSM-Population Health, 15,* 100844.

Lavers, J. L., Bond, A. L., & Rolsky, C. (2022). Far from a distraction: Plastic pollution and the planetary emergency. *Biological Conservation,* 272, 109655.

Luo, Y., Wu, J., & Xu, Y. (2022). Can self-governance tackle the water commons? Causal evidence of the effect of rural water pollution treatment on farmers' health in China. *Ecological Economics*, 198, 107471.

Machado-Silva, F., Libonati, R., de Lima, T. F. M., Peixoto, R. B., de Almeida Franca, J. R., Magalhães, M. D. A. F. M., ... & DaCamara, C.

  ISSN 2563-9269

C. (2020). Drought and fires influence the respiratory diseases hospitalizations in the Amazon. *Ecological Indicators,* 109, 105817.

Mittermeier, R. A., Mittermeier, C. G., Brooks, T. M., Pilgrim, J. D., Konstant, W. R., Da Fonseca, G. A., & Kormos, C. (2003). Wilderness and biodiversity conservation. *Proceedings of the National Academy of Sciences, 100*(18), 10309-10313.

Minayo, M. C. S. (2008). *O desafio do conhecimento. 1*1 ed. São Paulo: Hucitec.

Monteiro, C. A., Cannon, G., Levy, R. B., Moubarac, J. C., Louzada, M. L., Rauber, F., ... & Jaime, P. C. (2019). Ultra-processed foods: what they are and how to identify them. *Public health nutrition, 22*(5), 936-941.

Morisetti, N. & Blackstock, J. J. (2017). Impacto of a changing climate on global stabilitv, wellbeing, and planetary health. *The Lancet, 1*(1), e10-11.

Myers, SS., Pivor, JI. & Saraiva, AM, (2021). The São Paulo Declaration on Planetary Health. *The Lancet, 398*(10308), p1299.

Myers, S. S. (2017). Planetary health: protecting human health on a rapidly changing planet. *The Lancet, 390*(10114), 2860-2868.

Nations, U. (2015). *Transforming our world: The 2030 agenda for sustainable development*. New York: United Nations, Department of Economic and Social Affairs.

Passos, C. J. S., Da Silva, D. S., Lemire, M., Fillion, M., Guimaraes, J. R. D., Lucotte, M., & Mergler, D. (2008). Daily mercury intake in fish-eating populations in the Brazilian Amazon. *Journal of exposure science & environmental epidemiology, 18*(1), 76-87.

Pestana, I. A., de Rezende, C. E., Almeida, R., de Lacerda, L. D., & Bastos, W. R. (2022). Let's talk about mercury contamination in the Amazon (again): The case of the floating gold miners' village on the Madeira River. *The Extractive Industries and Society,* 101122.

Popkin, B. M., Barquera, S., Corvalan, C., Hofman, K. J., Monteiro, C., Ng, S. W., ... & Taillie, L. S. (2021). Towards unified and impactful policies to reduce ultra-processed food consumption and promote healthier eating. *The Lancet Diabetes & Endocrinology, 9*(7), 462-470.

Pruss-Ustun, A., & World Health Organization. (2008). *Safer water, better health: costs, benefits and sustainability of interventions to protect and promote health*. World Health Organization.

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, FS, Lambin, EF & Foley, JA (2009). Um espaço operacional seguro para a humanidade. *Nature, 461* (7263), 472-475.

Sampaio, G., Borma, L. S., Cardoso, M., Alves, L. M., Randow, C. V., Rodriguez, D. A., ... & Alexandre, F. F. (2019). Assessing the possible impacts of a 4 C or higher warming in Amazonia. In *Climate change risks in Brazil* (pp. 201-218). Springer, Cham.

Silva Filho, E. C., Loureiro, S. M. D. S., Souza Filho, C. F. M. D., & Bertaso, J. M. (2021). *Impactos socioambientais da mineração sobre povos indígenas e comunidades ribeirinhas na Amazônia* (v. 1).

Smith, L. T., Aragao, L. E., Sabel, C. E., & Nakaya, T. (2014). Drought impacts on children's respiratory health in the Brazilian Amazon. *Scientific Reports, 4*(1), 1-8.

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., ... & Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science, 347*(6223), 1259855.

van Emmerik, T., & Schwarz, A. (2020). *Plastic debris in rivers.* Wiley Interdisciplinary Reviews: Water, 7(1), e1398.

Waters, C. N., Zalasiewicz, J., Summerhayes, C., Barnosky, A. D., Poirier, C., Gałuszka, A., ... & Wolfe, A. P. (2016). The Anthropocene is functionally and stratigraphically distinct from the Holocene. *Science, 351*(6269), aad2622.

Watts, J. (2022). Healing the Amazon. The Lancet, 399(10337), 1767-1768.

Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., de Souza Dias, B. F., ... & Yach, D. (2015). Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. *The Lancet, 386*(10007), 1973-2028.

Yalwaji, B., John-Nwagwu, H. O., & Sogbanmu, T. O. (2022). Plastic Pollution in the Environment in Nigeria: A Rapid Systematic Review of the

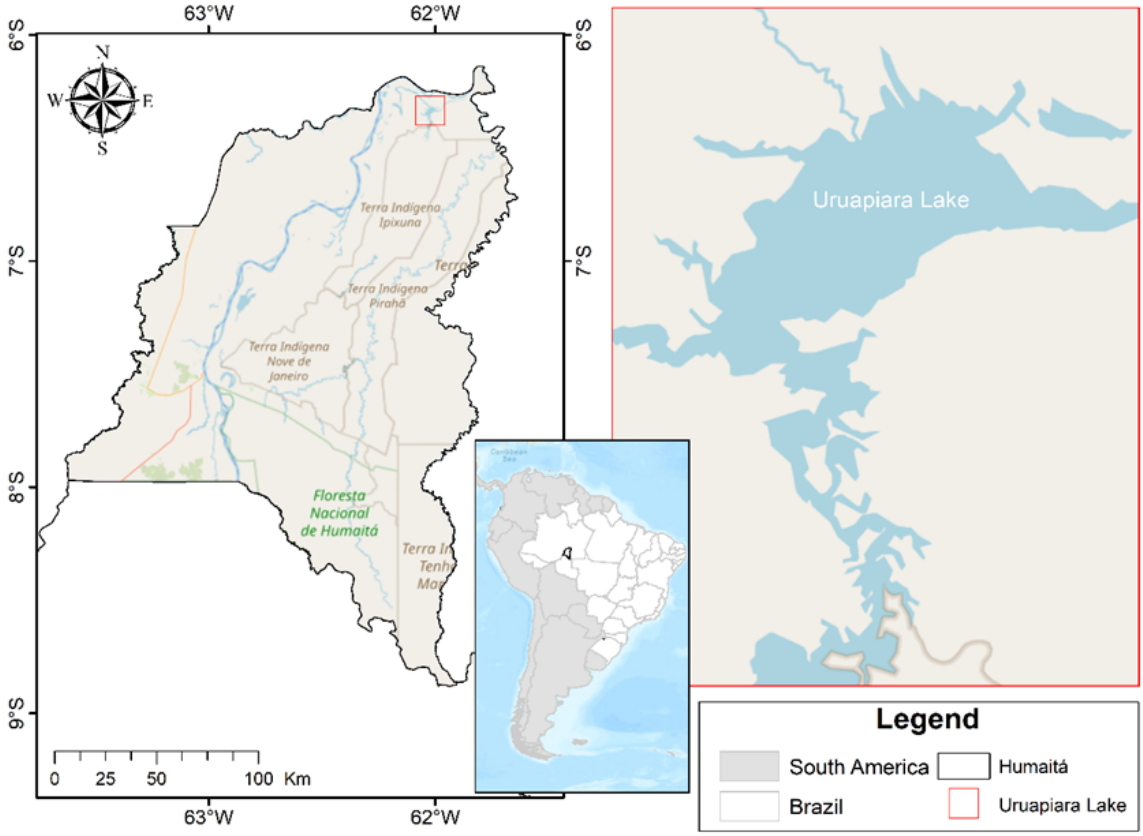
  ISSN 2563-9269

Sources, Distribution, Research Gaps, and Policy Needs. *Scientific African,* e01220.

Zaman, K. (2022). The environmental cost of deforestation in Brazil's Amazon Rainforest: Controlling biocapacity deficit and renewable wastes for conserving forest resources. *Forest Ecology and Management, 504*, 119854.

  ISSN 2563-9269

Figure 1. Location of the Study Area



  ISSN 2563-9269

Table 1. Guiding Questions for the Semi-Structured Interview

	Questions
1	What do you, as a teacher, think about the health of the concerning the various existing environmental catastrophes?
2	What are the main health demands that are connected to environmental issues in the community/school?
3	In your opinion, what is the connection between the health of the planet and plants?
4	About the school lunch of rural education, which foods are usually part of the lunch? And what is your opinion about these foods?
5	In your opinion, do rural schools have the potential to intervene in environmental issues that involve human health and the health of the planet?

IHTP, *2*(3), SI: 61-80, 2022 ISSN 2563-9269

Table 2. Codifications created from teachers' interviews

	Codifications	Main Codified Themes
I	Environmental disasters and planetary health	Environmental problems Public policies
II	Health demands linked to environmental issues	Waterborne diseases Respiratory diseases
III	Linking the health of the planet and plants	Breathing Agriculture Logging Reforestation
IV	School lunch	Ultra-processed foods Creation of a cooperative
V	Intervention potential of rural schools	Awareness

  ISSN 2563-9269

Figure 2. Word cloud by N-Vivo software according to data collected from interviewed teachers

  ISSN 2563-9269

Figure 3. Positive and negative interactions on Planetary Health in the Amazon region

  ISSN 2563-9269