

Antrosolization from the urban social perspective

Antrossolização da perspectiva social urbana

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ABSTRACT

The soil as a natural resource is classified as a natural and finite capital, having both ecological and social functions. Thus, one of the environmental problems of the technogen is the modification of surface layers in urban environments, which is little discussed by soil science scientists. In this context, the present work aims to understand the perception of the urban population about soils submitted to the anthrosolization process, as well as to emphasize the importance of the soil for the understanding of processes and environmental services related to it. The methodological procedures consisted of: 1) Bibliographic survey; 2) Elaboration and application of the questionnaire via Google Forms platform for non-academic public of Geosciences and Agrarian areas; 3) Processing and analysis of descriptive statistics; and 4) Data analysis. As for the question of the multiple functionalities of the soil, greater significance was obtained indicating the modification of soils by anthropogenic actions, by means of urban work and without association to environmental impacts. In general, the urban population presents a significant knowledge about the importance of the soil in the urban context, but not about the compromising of the ecosystem functionalities of the resource. There is a need for greater popularization of soil education, with emphasis on the teaching-learning approach beyond the agrarian sciences, in the face of the reality imposed by the technogens and, therefore, the right and indirect impacts of this resource on the urban environment.

Keywords: Urban soils, Social perception, Teaching of soils.

RESUMO

O solo como recurso natural é classificado como um capital natural e finito, possuindo funções tanto ecológicas quanto sociais. Assim, uma das problemáticas ambientais do tecnógeno é a modificação das camadas superficiais em ambientes urbanos, o que é pouco discutido pelos cientistas da ciência dos solos. Nesse contexto, o presente trabalho tem por objetivo compreender a percepção da população urbana acerca de solos submetidos ao processo de antrossolização, bem como ressaltar a importância do solo para entendimento de processos e serviços ambientais relacionados a ele. Os procedimentos metodológicos consistiram em: 1) Levantamento bibliográfico; 2) Elaboração e aplicação do questionário via plataforma Google *Forms* para público não acadêmico das áreas de Geociências e Agrárias; 3) Processamento e análise de estatística descritiva; e 4) Análise dos dados. Os resultados obtidos indicaram que a fonte de conhecimento acerca da temática de solos urbanos se exhibe de forma heterogênea, obtendo os âmbitos familiares, cursos comunitários e familiar. Já quanto a questão das múltiplas funcionalidades do solo, obteve-se maior significância indicando a modificação de solos por ações antropogênicas, por meio de obrar urbanas e sem associação a impactos ambientais. De modo geral, a

população urbana apresenta um significativo conhecimento sobre a importância do solo no contexto urbano, mas não acerca do comprometimento das funcionalidades ecossistêmicas do recurso. Considera-se há necessidade de maior popularização do ensino de solos, com destaque a abordagem do ensino-aprendizagem para além das ciências agrárias, frente a realidade imposta pelo tecnógenos e, por conseguinte, os impactos diretos e indiretos deste recurso em ambiente urbano.

Palavras-chave: Solos urbanos, Percepção social, Ensino de solos.

1 INTRODUCTION

The human species is recent in Earth's geological history. However, its performance, associated with the technique, has provoked intense alterations in the surface coverings of the earth model, categorizing it as a new geological agent (CRAUL, 1985). The abrupt technification of anthropic activities has created pedological layers with dissimilar behavior of soils with natural genesis. Anthropic activities have interfered in the functioning of the processes, either by direct action or creating factors on them, to decrease, intensify, or even create new processes that would not exist without human interference (ROHDE, 1996).

According to Oliveira (1995), "the new pedological coverings and the new geological formations, which are in generation process, are strongly influenced by the human action. However, these changes depend greatly on the historical moment of modern society and can thus determine the interventions in the physical environment.

In this context, human activities have a significant influence on soil evolution (anthrosolization). According to Kampf and Curi (2012), anthrosolization is defined as the result of human addition of materials, soil movement, fertilization, irrigation, grounding, pickling, among other activities. They are characterized by several pedogenetic processes, such as addition, removal, translocation, and transformation in the soil. Therefore, reflecting on a sub-process of human action.

In this sense, due to the incipient understanding of the behavior of soils in urban environment, conformed highlighted by Rodrigues et al., (2020) it is essential to break the barrier between scientific knowledge and its accessibility to society, given that it makes use of this resource. However, they have no knowledge of its real importance and influence on quality of life.

The present paper had as main objective to understand the perception of the urban population about soils submitted to anthrosolization process, as well as to elucidate the

importance of soil science for understanding processes and environmental services related to this natural resource.

2 MATERIAL AND METHODS

The research consisted of a qualitative-quantitative and exploratory approach, whose collection of data inherent to the study was carried out through a digital questionnaire, in addition to the bibliographical review on the subject in question. The methodological procedures adopted were divided into four stages that consisted of: 1) Bibliographic survey; 2) Elaboration and application of the questionnaire via Google Forms platform for non-academic public in the Geosciences and Agrarian areas; 3) Processing and analysis of descriptive statistics via Microsoft Excel program; and 4) Data analysis.

The methodology was based on qualitative-quantitative character (GIL, 2010), from the form via Google Forms platform (Table 1) for data collection to the public not belonging to the Geosciences and Agrarian areas of knowledge, being the same applied through social media, obtaining the cut of 172 people in medium and urbanized cities. The concepts worked were urban soils, environmental services, source of knowledge and environmental impacts in anthropized environment. The questionnaire consisted of eight open questions, which are described in Table 1. In order to ascertain the public perception of urban cities about the soil resource in relation to environmental impacts and environmental services.

Table 1. Details of the questions included in the electronic questionnaire.

1. Age
 2. Level of Training
 3. Sex
 4. For you, what is an urban soil?
 5. Is it common in your city to use landfill, gully compaction and paving of public roads?
 6. For you, are landfills and dumps considered soil?
 7. Do landfill areas need specific study?
 8. Should the subject of "urban soils" be taught in school?
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The data collected during the interviews were analyzed from descriptive statistics for the determination of frequencies and to subsidize the elaboration of graphs and tables. The other information concerning qualitative character were discussed in the body of the

article. The analysis of descriptive and graphical statistics was carried out via Microsoft Excel program.

3 RESULTS AND DISCUSSIONS

Of the 172 participants, 66% were female and 34% male (Figure 1A). Santos (2019) states that women are important agents in soil conservation, this may be related to the activities of the home performed, making them more aware of the importance of the use, management, and conservation of natural resources such as soil and water. In relation to the predominant age group, it corresponded between 25-64 years with 67%, followed by 26% (15-24 years), 4% (from 65 years), and 3% (0-14 years) (Figure 1B).

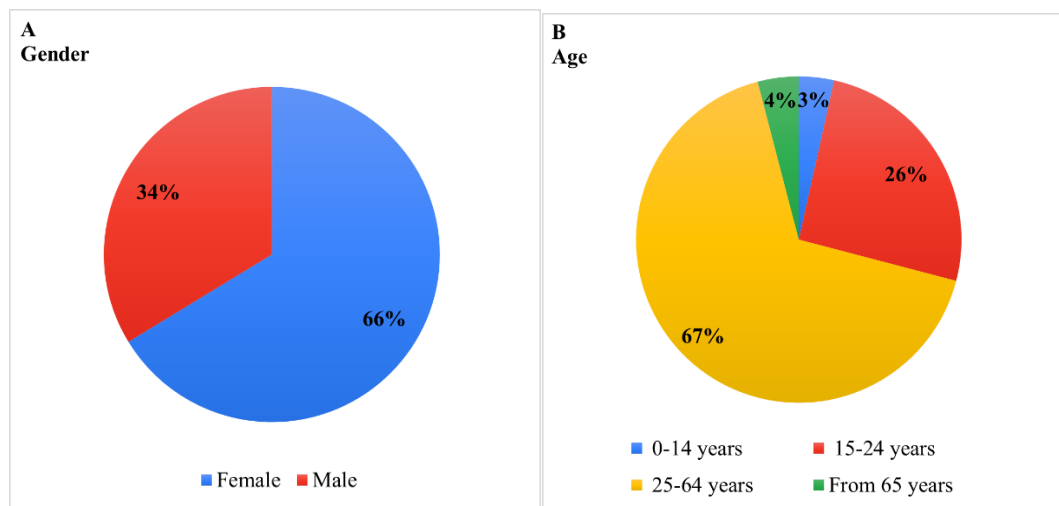


Figure 1. Percentage distribution regarding sex (A) and age (B).

In terms of level of education, the descriptive data were quite heterogeneous, but 43% of the interviewees have completed higher education (Figure 2), followed by another considerable portion of 20% with only completed high school. Based on the obtained results, the level of education of each interviewee influences their knowledge about the subject of study of this work, considering that, in general, part of the educational themes related to natural resources are better worked during the most advanced academic training, such as technical and undergraduate levels. Thus, Freire (1995), states that to study is to unveil, gain understanding of the object and perceive its dynamics with other objects in the environment it is inserted.

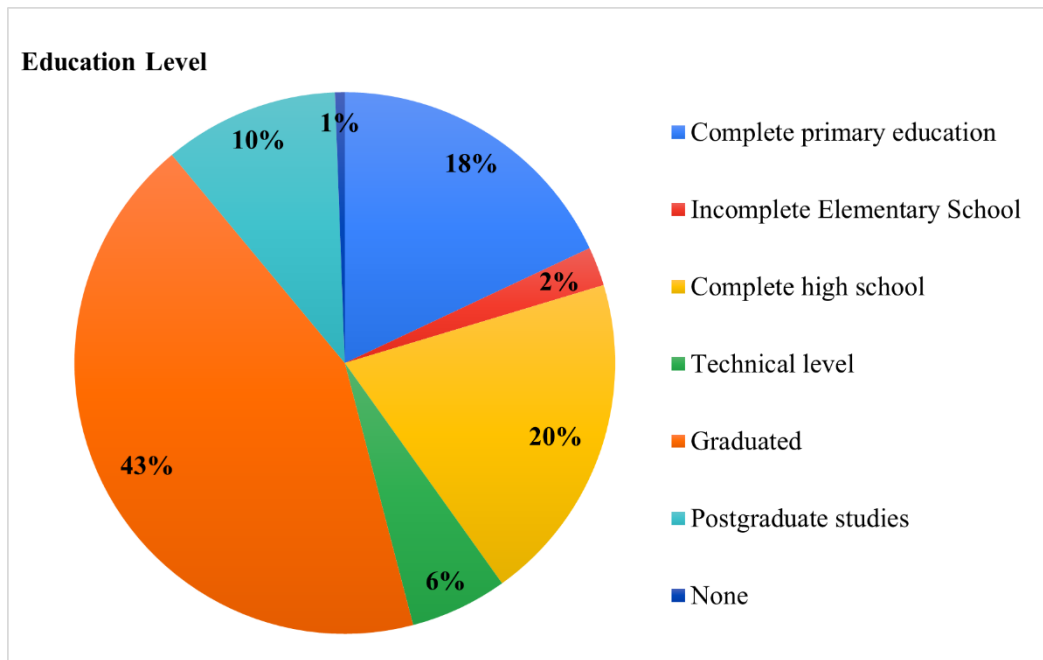


Figure 2. Percentage distribution of the level of training

According to the perception about the concept of soil in urban environment, it was found that 83% of the sampled population confirm that these correspond to soils modified by human actions in urban and industrial environments, while the percentage of 10% and 6% chose to conceptualize them as a resource used in urban centers as support and sustaining cities, and soils contaminated by urban and industrial waste, respectively (Figure 3).

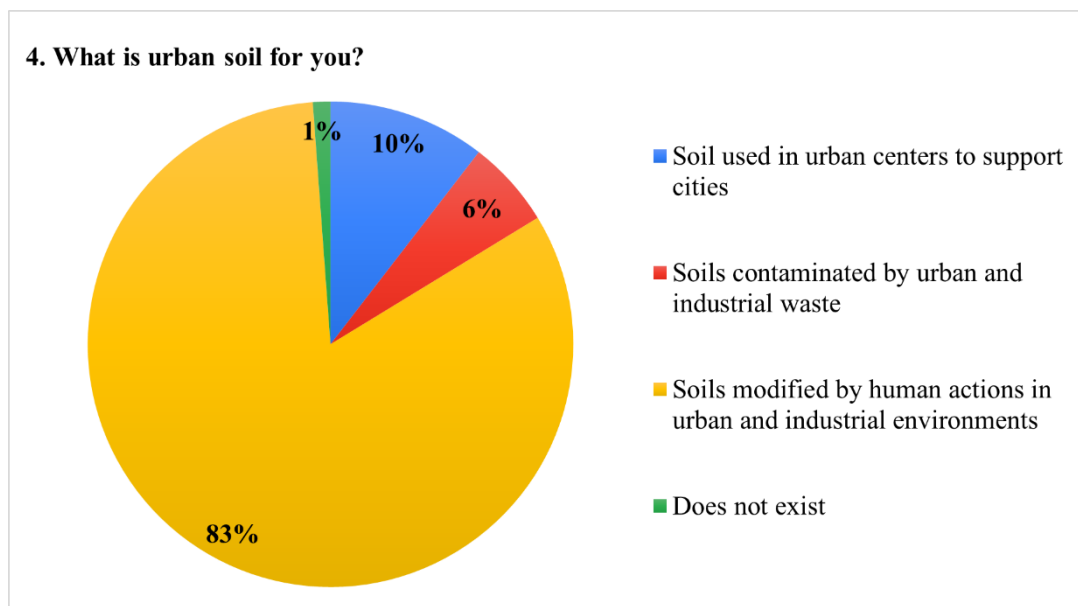


Figure 3. Question 4: What is an urban soil for you?

It is noteworthy that the percentage of 6%, reinforces the idea of the soil, as a dirty object, which for a long time was an option of "world pot". The 83% is in line with the concept proposed by Pedron et al. (2004) and IUSS (2014) in which they define urban soil as soils found in urban and/or industrial environments, deeply modified by human action, whose properties and pedogenesis are defined by local activity, being present in landfills, highways, urban areas, and mined areas.

In this sense, the search for pedological knowledge is a challenge to venture into the diversity of existing knowledge in everyday life, linked to anthropic impacts on the resource. As Falconi (2011) points out, "Thinking about soil education in the daily life of the metropolis means discovering how the "soil" content, legitimated by school subjects and academic knowledge of soil science, can dialogue with the wealth and diversity of everyday knowledge.

Question 5 portrays the questioning about the practice of landfill use, ravine cutting, compaction and paving of public roads, where 65% of the population say such works are frequent (Figure 4).

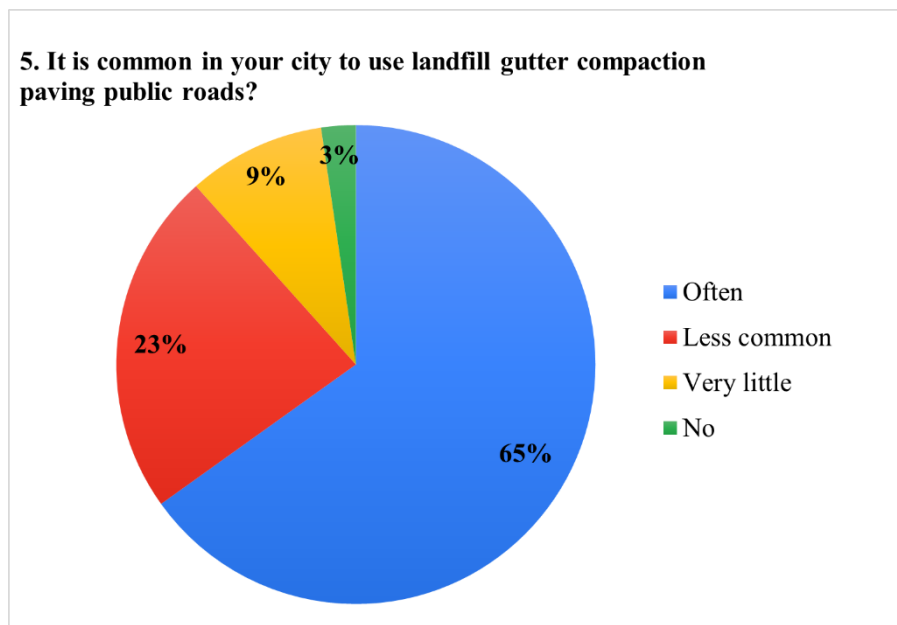


Figure 4. Question 5: Is it common in your city to use landfill, gully compaction and paving of public roads?

As observed, most of the interviewees present knowledge about the practices questioned, and it is evident that despite being day-to-day conceptions, many do not link these activities with the protection of the soil resource, and possibly are unaware of the complications they can bring to the urban environment. According to Nucci (2008) and

Girão et al. (2007), the search for improvements in the quality of life of society in a poorly planned way, affects changes in nature, threatening the balance of the ecosystem and making urbanization an environmental problem, through floods, mass movement, silting up, contamination and pollution of rivers, lakes, and groundwater.

However, 35% confront the 65% of interviewees claiming that they use such practices infrequently, very infrequently, or not at all (Figure 4). Although these are practices inserted into the urban environment to solve occasional problems such as inadequate disposal of solid urban waste, land movement, and problems such as flooding, flooding, and deterioration of water bodies. It is valid to emphasize that this is a reality observed differently for each region or city, depending on the local problems faced. However, this does not justify the lack of perception of those interviewed about this issue, nor that some regions are free of problems, because when well planned and executed these works are essential for the good functioning of daily urban life.

The information obtained through question 4 and 5 (Figure 3 and 4), indirectly demonstrate the conception that the urban population presents knowledge about the importance of soil in the urban context, but even so, the conceptual understanding about what comes to be soil is compromised, reinforced by the results obtained in question 6. When questioned, 56% of the population consider landfills and dumps as soil and another 44% disagree with this thought (Figure 5). This reinforces the urban population's lack of basic knowledge about natural resources essential to life and about basic sanitation services linked to the disposal of urban solid waste, influenced by several factors, among them the lack of solid contact with the resource or concrete information about it.

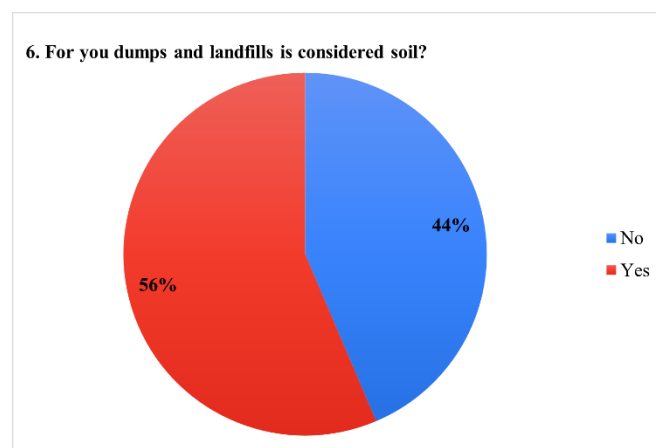


Figure 5. Question 60: For you dumps and landfills is considered soil?

It is also important to make clear that landfills and dumps are spaces destined for the disposal of solid waste generated by the development of human activities not corresponding to the soil. In both cases, the soil is used as the basis for disposal, but in landfills, waste is disposed of irregularly on it, without any form of special care with this resource. In this sense, landfills are designed to avoid any health and quality problems in the soil, to avoid or reduce the contamination of this and the water resources.

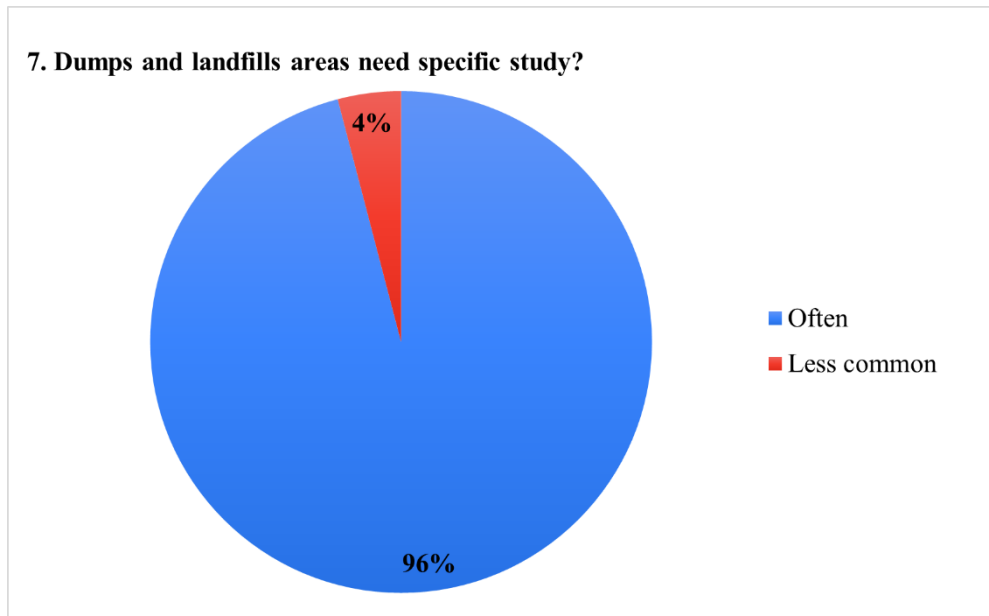


Figure 6. Question 7: Do landfills and dump areas need specific study?

Considering all the problems discussed about the use of landfills, the interviewees were also questioned about the need for specific studies for such spaces. 94.6% of questioned believe that these areas deserve a study directed to their respective conditions and purposes (Figure 6). Respect the regulations for the installation of the landfill (MONTAÑO et al. 2012), adequate treatment of contaminant leachate (PACHECO; ZAMORA, 2004), and the abolition of open dumps are some of pointed examples. Thus, it is possible to notice that despite the lack of society information, the community is aware of a possible threat to nature from poorly executed works. .

In question 8, the percentage of 93% pointed out in "Frequently" reinforces the need for dissemination and awareness about soil science, since the perception of preservation/conservation of natural resources in our society is not common (Figure 7). In this sense, the propagation and valorization of soil education should be in favor of better learning and scientific dissemination of knowledge in soils.

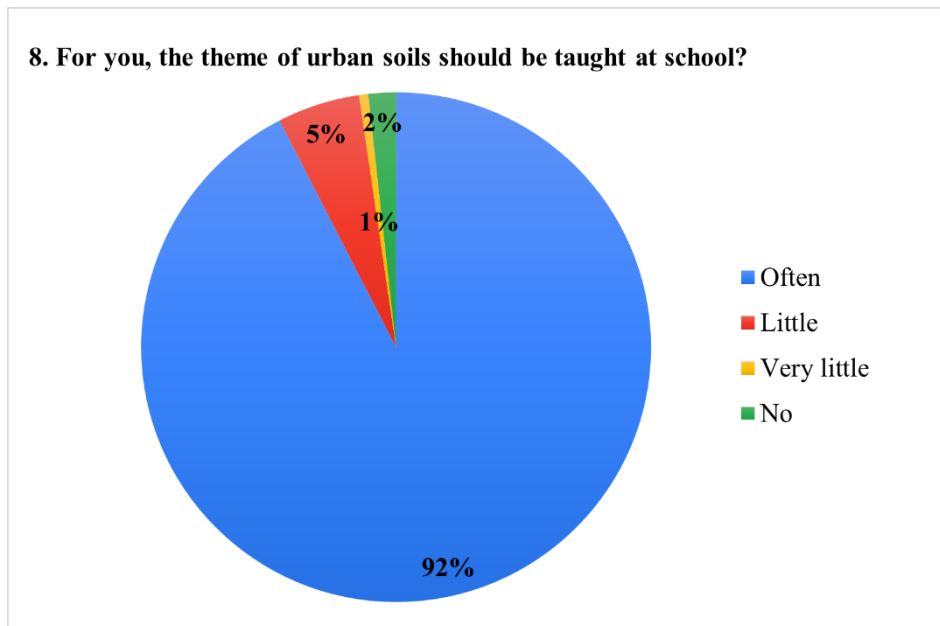


Figure 7. Question 8: "Should you teach the theme of "urban soils" at school?"

In this sense, we have examples of references such as, *Solo na Escola/ USP-ESALQ Project*, *ABC na Educação Científica-Mão na massa Project*, *Solo na Escola/UFPR Program*, *Trilhando pelos Solos/UNESP Project*, *O Solo na Escola Fundamental: Vamos a Mão na Massa – UFGD Project*, *Nossos Solos, Nossa Vida/ UFT Project*, *Embrapa na Escola/ RJ Program*, and *Colóide Project - UNESP*. These projects focus mainly on addressing the processes of soil formation and dissociation, also emphasizing the soil in addition to being a support for agriculture. And so, based on new methodologies, they sharpen the curiosity, aiming at a didactic approach of soil science for teachers, students, and population.

4 CONCLUSIONS

The urban population has relevant knowledge about the importance of the soil and its functionalities, but there is no holistic perspective on the commitment of ecosystem services, triggered by processes of compaction, erosion, landslides, floods, pollution, generating possible environmental risks.

It is considered that there is a need for greater popularization of soil education, with emphasis on the teaching-learning approach beyond the agrarian sciences, in the face of the reality imposed by the technogens and, therefore, the right and indirect impacts on the resource in urban environment.

It is noteworthy that more studies are needed covering the context of urban environments and the anthropogenic impact on the resource, in addition to a more heterogeneous and multidisciplinary sampling.

The study pointed out the need for projects aimed at the exploration and presentation of the importance of soil ecosystem services, as well as the demonstration of the risks that soil degradation can bring to the multiple functionalities of this resource, reflecting in irreversible damage to cities, greater development and repair costs in urban centers.

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