

Environmental conservation, spatial mobility, and living conditions of traditional populations in protected areas: for adequate health access models in the Amazonian context

Conservação ambiental, mobilidade espacial e condições de vida de populações tradicionais em áreas protegidas: por modelos de acesso à saúde adequados ao quadro amazônico

Conservación ambiental, movilidad espacial y condiciones de vida de poblaciones tradicionales en áreas protegidas: por modelos adecuados de acceso a la salud al contexto amazónico

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Protected areas in the Brazilian Amazon have great social relevance and can be defined as socio-ecological systems in multiscale functional landscapes¹. In the local context, conservation units with sustainable use such as Extractive Reserves can legally guarantee the collective right to land for traditional populations². In contrast to access to resources, resident populations can perform important environmental services in multilevel governance systems³. The success of protected areas should not be measured exclusively by the maintenance of forest cover, but also by their impacts on the people who reside there. Public policies should not be directed exclusively to natural resources, they also need to include people.

However, the maintenance of residents challenges the distribution of infrastructures in regions with low population density. The dispersed occupation along the rivers implies that the number of people (or voters) in each area can be insufficient to justify public investment in schools and primary health care units, for example. The ways in which certain public services are normally structured in the Brazil may enhance difficulties regarding this topic. Thus, how to ensure good coverage and quality of education (under the regional and local responsibility) in a federal conservation unit that spreads throughout several municipalities? How to integrate the federal, state, and municipal spheres for health management in such large regions, guaranteeing access to those living in small communities, located far from central nodes of public service network?

To understand human dimension in the context of protected areas, one must analyze the spatial organization of the population. Firstly, because the right to land use can encourage permanent settlements in rural areas, reducing rural-to-urban migration, a striking characteristic of the historic occupation of the North Region⁴. When looking for answers to questions such as those previously raised, one should consider that uneven infrastructures and services implementation can lead to temporary or definitive displacements among rural communities, and between rural communities and cities, resulting a movement contrary to what is expected in conservation units with sustainable use. Secondly, because population's spatial mobility contributes to the complexity of the Amazonian context, ending the dichotomy of forest versus city. Regarding extensive urbanization⁵, the bibliography has highlighted the rural-urban imbrication in this urbanized forest⁶, in a series of important articulations for the lives of those who remain in rural communities and for those who move to urban centers⁷. Such dynamics should be considered in the implementation of policies, even in areas with a predominance of forests.

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Access to health and education, essential for better living conditions of residents, is a motivation for the recurring (and expensive) trips to the city and to the multilocal living – the distribution of part of the members of a family in the city and part in the rural communities⁸. Decisions to come and go, including migration and commuting, have implications for family life and land uses, and may positively or negatively affect the management of environmental resources^{9,10}. Consequently, since environmental measures must consider traditional residents, actions aimed at their well-being, such as those in the field of public health, also need to consider their effects on spatial mobility and on the management of protected areas. This presupposes the intersectoral integration of the spheres of management, which is quite challenging in practice.

Therefore, observing the context of conservation mosaics leads to a reflection on the implementation of public services, management, and conservation of the Amazon biome. Protected areas mosaic is an element provided for in the Brazilian National System of Nature Conservation Units (SNUC) aiming at shared and integrated management of the territory². Mosaics may consist of two or more federal-, state-, or municipal-protected areas, including integral protection conservation units (with stricter rules of use and settling), conservation units of sustainable use (less restricted), and indigenous and *quilombolas* territories. The management of extensive areas under different units is complex: it occurs by a consultative council represented by the conservation units, the responsible governmental spheres, the nongovernmental organizations (NGOs) that operate in the region and the resident populations (by community-based organizations and representatives of indigenous peoples and *quilombolas*).

Based on the Lower Rio Negro Mosaic (Figure 1), the spatial mobility of residents is a possible response to the insufficient coverage of infrastructures in rural areas of the Amazon, and what are the possible implications of this response for people's lives and for the management of resources in conservation units.

The whole mosaic has a considerable variation in forest cover according to the spatial distribution of the population: forest cover is usually lower in rural communities near rivers than in conservation units; in the vicinity of the largest urban centers, forest cover is considerably lower than in all other parts. This occurs due to denser human occupation around the urban area of Manaus (Amazonas State) and more dispersed in the more distant conservation units.

The proximity of the eastern part of the mosaic with the city of Manaus facilitates daily commuting to the city center, which can make it 'unnecessary' to implement services in these surroundings communities. Furthermore, in some communities are concentrated residences with temporary occupation ("summer houses") of residents of Manaus, who regularly use services in the city. On the other hand, the most remote communities have a small number of residents, which is a barrier to the allocation of public resources for the implementation of certain infrastructures. In a survey of 110 communities during 2022, 77% of them had schools (mostly elementary schools, with multi-grade classrooms). However, having infrastructure does not mean having the corresponding service: interviewees considered the conditions of 61% of the schools as inadequate. Attending classes mostly implies daily commuting to nearby communities, or temporary relocation of children and young people to other communities or to a city. The coverage of health infrastructures was even worse: only 22% of the communities visited had a primary healthcare unit or similar facility, and in the existing health facilities lacked on-duty professionals (data not yet published from the study *Traditional Populations in Protected Areas: Socio-Environmental Dynamics and Management of Conservation Units in the Lower Rio Negro Mosaic, in Amazonas*).

The lack of services in rural areas often leads residents to move to urban centers. However, while occupying peripheral areas of the city can improve access to urban services, commuting is more difficult for residents living in more remote areas. In 16% of the communities, locals use a "boatlance" (*ambulancha*), a small boat donated by NGOs to transport the sick to primary health units in cities or other communities. The frequency of trips tends to be inversely proportional to the distance between community and urban center, and the length of stay depends greatly on the financial conditions of each family, with a clear advantage for those who own their own home or have relatives in the city.

Patients are not the only to navigate the rivers and streams, since access to health care is also associated with the locomotion of service providers. Almost all interviewees reported having received some type of medical service locally in the past years, including public health teams visits (mobile

toral planning in the coordination of expensive efforts that do not guarantee the recognition of the service quality by the communities.

The stimulus for moving to the urban centers contributes to the precarious occupation in the peripheries of the cities, and the managers cannot ignore this. Besides this unwanted effect, the patient mobility strategy can impact in different ways. For example, the centralization of medical-hospital services and the medicalization of childbirth increasingly take women to the city for delivery. In the Lower Rio Negro Mosaic, we found a considerable number of childbirths outside the communities visited: 81% of children aged 0 to 14 were not born in their mothers' community. This practice favors the decline of the traditional occupation of midwives and reduces the role of these women in communities. There are also effects of migration on the composition of households: in some cases, underage children do not live with their parents, since they are studying in other locations. However, in other cases grandchildren live with their grandparents. Arrangements with relatives living in other communities or in the city imply mutual aid, such as sending monetary resources and food, which can affect the management of resources in conservation units. Similar to people flow between locations, resources also flow from the forest to the city and vice versa.

However, although commuting are a burden for the residents (for monetary cost, time spent, and these aforementioned situations), the spatial mobility of the population allows for the community to maintain their homes in the conservation units. Thus, the possibility of recurrent commuting to access services in cities can act as a discouragement for migration or permanent residence to urban peripheries. Regarding this complex scenario with elements that are sometimes apparently contradictory, it is essential that the agents reflect towards the adaptation of models of access to health that are in fact coherent with local contexts.

Notably, the arrangement of comunidades ribeirinhas and the low population density (Figure 2) are coherent with the way of life and production based on seasonal economic activities and traditional character, such as farming, fishing, non-timber and timber forest management. Of relative low impact, this type of occupation can act as a barrier to external predatory uses and, thus, could be better supported by offering services that provide better living conditions and the permanence of traditional populations.

In the beginning of the 21st century, deforestation rates in Brazil were controlled ¹². Recently, deforestation has increased again even in protected areas. The change in the Federal Government in 2023 restored the environmental protection agenda and the rights of indigenous and traditional populations. It is expected that this resumption will lead to the proposal of measures that respect the low density and dispersed population distribution, ensuring that residents of protected areas have access to infrastructure and services where they live. Bringing health to people in the forest is not only a humanitarian issue of local significance. It is a guarantee for the permanence of those who can contribute to maintaining living conditions on a planetary scale.

Figure 2

Aerial view of the São João do Ipecaçu Community, Amanã Sustainable Development Reserve, Amazonas State, Brazil.



Source: José Diego Gobbo Alves (collection of the *Traditional Populations Project in Protected Areas: Socio-Environmental Dynamics and Management of Conservation Units in the Lower Rio Negro Mosaic, in Amazonas*).

Additional information

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