



TRAILS OF WISDOM AND SUSTAINABILITY: THE GUARANÍ KAIOWÁ KA'A PORÃ ETHNOBOTANICAL GARDEN

Carlos Busón Buesa¹
Carlos Otávio Zamberlan²
Moisés Centenaro³

Abstract: This article examines the proposal for the Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden, conceived to connect environmental conservation, Indigenous cultural recognition, rural education, and territorial development in Mato Grosso do Sul, Brazil. The discussion starts from Guaraní Kaiowá traditional knowledge and its relationship with regional biodiversity, relating these elements to critical environmental education, cultural itineraries, and participatory forms of governance. The article considers Latin American experiences with ethnobotanical gardens and initiatives involving Indigenous communities, while also discussing the Garden's integration into the Caminho para os Ervais, a cross-border cultural itinerary linking Brazil and Paraguay. The analysis identifies educational, cultural, and socioeconomic possibilities, but also constraints that condition implementation, including financial sustainability, effective community participation, free, prior and informed consent, and protection of traditional knowledge against unauthorized use. It also considers possibilities associated with circular economy practices, cultural tourism, and interdisciplinary research, provided that these activities remain subject to community rights and decisions. The article concludes that the Garden may function as a space for biocultural conservation and contextualized learning, but its legitimacy depends on governance mechanisms that ensure Guaraní Kaiowá agency, fair benefit-sharing, and adaptation to the specific social, environmental, and political conditions of the territory. The proposal is therefore discussed as a planned territorial and educational initiative rather than an established institution.

Keywords: Ethnobotanical garden; Guaraní Kaiowá; environmental education; traditional knowledge; cultural itineraries.

TRILHAS DE SABEDORIA E SUSTENTABILIDADE: O JARDIM ETNOBOTÂNICO GUARANÍ KAIOWÁ KA'A PORÃ

Resumo: O artigo analisa a proposta do Jardim Etnobotânico Guaraní Kaiowá Ka'a Porã, concebido para articular conservação ambiental, valorização cultural indígena, educação do campo e desenvolvimento territorial em Mato Grosso do Sul. A discussão parte do conhecimento tradicional Guaraní Kaiowá e de sua relação com a biodiversidade regional, relacionando-o a práticas de educação ambiental crítica, itinerários culturais e formas participativas de governança. O texto examina experiências latino-americanas de jardins etnobotânicos e iniciativas vinculadas a comunidades indígenas, além de discutir a integração do Jardim ao Caminho para os Ervais, itinerário cultural transfronteiriço entre Brasil e Paraguai. A análise identifica possibilidades educativas, culturais e socioeconômicas, mas também limites que condicionam a implantação da proposta, entre eles a sustentabilidade financeira, a participação efetiva das comunidades, o consentimento prévio, livre e informado e a proteção dos conhecimentos tradicionais contra usos não autorizados. São consideradas ainda alternativas de economia circular, turismo cultural e pesquisa interdisciplinar, desde que subordinadas aos direitos e às decisões comunitárias. Conclui-se que o Jardim pode funcionar como espaço de conservação biocultural e aprendizagem contextualizada, porém sua legitimidade depende de mecanismos de governança que assegurem protagonismo Guaraní Kaiowá, repartição justa de benefícios e adaptação às condições sociais, ambientais e políticas específicas do território.

Palavras-chave: Jardim etnobotânico; Guaraní Kaiowá; educação ambiental; conhecimento tradicional; itinerários culturais.

1 Doutor em Comunicação e Educação em Entornos Digitais pela Universidad Nacional de Educación a Distancia (UNED). Universidade Federal de Mato Grosso do Sul (UFMS), Programa de Pós-Graduação em Comunicação, Campo Grande, Mato Grosso do Sul, Brasil. ORCID: <https://orcid.org/0000-0002-1446-2252>. Lattes: <http://lattes.cnpq.br/9703179551724178>. E-mail: carlos.buson@ufms.br.

2 Doutor em Economia pela Universidade Federal do Rio Grande do Sul (UFRGS). Universidade Estadual de Mato Grosso do Sul (UEMS), Programa de Pós-Graduação em Desenvolvimento Regional e de Sistemas Produtivos, Ponta Porã, Mato Grosso do Sul, Brasil. ORCID: <https://orcid.org/0000-0001-9975-9612>. Lattes: <http://lattes.cnpq.br/6411327863419201>. E-mail: carlos.otavio@uems.br.

3 Doutor em Administração pela Universidade do Vale do Rio dos Sinos (UNISINOS), com pós-doutorado em Administração pela Universidade Federal de Mato Grosso do Sul (UFMS). Universidade Estadual de Mato Grosso do Sul (UEMS), Programa de Pós-Graduação em Desenvolvimento Regional e de Sistemas Produtivos, Ponta Porã, Mato Grosso do Sul, Brasil. ORCID: <https://orcid.org/0000-0003-2299-9102>. Lattes: <http://lattes.cnpq.br/0770148606375046>. E-mail: m.centenaro@uems.br.



1 Introduction

The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden is conceived as an educational, cultural, and environmental space grounded in the ancestral knowledge of the Guaraní Kaiowá people. It was designed to promote environmental conservation, cultural valorization, and community development within the specific context of the state of Mato Grosso do Sul. In response to the rapid environmental, cultural, and social transformations affecting the region, the ethnobotanical garden emerges as an innovative initiative that integrates Indigenous traditional knowledge with critical and environmental education, fostering meaningful learning and the development of an emancipatory socio-environmental awareness (Freire, 1987; Capra, 2004).

Rural education, understood as an educational process linked to the social and cultural realities of rural life, finds in the Garden a particularly suitable setting for contextualized learning. Arroyo and Fernandes (1999) link the construction of rural basic education to rural subjects and social movements and to the concrete conditions in which they live. In this sense, the Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden can provide a space for intercultural dialogue in which Guaraní Kaiowá ancestral knowledge engages with contemporary scientific knowledge without losing its autonomy or its own criteria of transmission.

Environmental education is another essential component of the project. From a critical perspective, Loureiro (2004) treats environmental education as a social and educational practice that cannot be reduced to the transmission of information and requires reflection on socio-environmental relations. Capra (2004) reinforces the need for a systemic understanding of life in which connections among living organisms and their environment are considered. Within this framework, ethnobotany workshops, guided educational visits, and other activities could make the Garden a space for environmental education for students, researchers, and visitors.

Furthermore, the Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden has a strong intercultural dimension. Posey (1999) brings together contributions linking Indigenous knowledge, cultural values, and biodiversity conservation. Within this framework, the Garden can be conceived as a space for intergenerational transmission, provided that this function is defined with the participation of the communities that hold the knowledge. This perspective can be placed in dialogue with Lévi-Strauss (1989), who analyzes the so-called “savage mind” as a logical form of classification and knowledge constructed through relations with the natural world.

In addition, the Garden reinforces and complements the Caminho para os Ervais project. The itinerary was already proposed by Busón Buesa and Zamberlan (2018), who examined historical routes along the Brazil-Paraguay border and articulated them as a binational cultural integration route. Busón Buesa et al. (2020) later developed this perspective as a territorial development strategy based on cultural itineraries. In this context, the Ethnobotanical Garden



could become part of this network, connecting traditional knowledge, biodiversity, and environmental education.

Finally, the cultural dimension of the Garden can be linked to cultural routes in the terms established by the ICOMOS Charter on Cultural Routes (2008), which treats this category at a territorial scale and sets out principles for its research, protection, conservation, and management. The 2003 UNESCO Convention, in turn, provides a reference for safeguarding practices, knowledge, and expressions recognized by communities themselves as intangible cultural heritage (UNESCO, 2003).

This article examines concrete possibilities for the educational, cultural, and sustainable development of the Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden, with particular emphasis on its potential to become a model for rural education and cultural conservation not only in the state of Mato Grosso do Sul but also as a replicable reference for other regions of Brazil and Latin America.

2 Theoretical Framework

The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden is situated within an educational perspective that goes beyond traditional approaches by adopting a critical and transformative view of rural education. Within this approach, Paulo Freire's (1987) thought is particularly relevant. His pedagogy of the oppressed emphasizes the importance of dialogue, critical consciousness, and the recognition of popular knowledge as a foundation for learning. According to Freire (1987), education should take place through a dialogical process in which educators and learners share and collectively construct knowledge.

Complementing this perspective, Arroyo and Fernandes (1999) relate rural education to the participation of rural subjects and social movements and to the construction of educational proposals linked to their historical, social, and cultural conditions. This approach makes it possible to conceive the Garden as a situated educational space rather than simply transferring school models or content defined outside the territory.

In the field of environmental education, the contributions of Fritjof Capra (2004) and Carlos Frederico Bernardo Loureiro (2004) are relevant. Capra (2004) proposes a systemic understanding of life in which interconnections among living organisms and the environment occupy a central place. Loureiro (2004), in turn, situates critical environmental education as a social and educational practice that goes beyond the simple transmission of information.

The intercultural dimension of the Ethnobotanical Garden can be discussed through works that relate knowledge, culture, and biodiversity. Posey (1999) brings together contributions on the cultural and spiritual values of biodiversity and on the centrality of Indigenous knowledge to



conservation. Toledo (2002), within ethnoecology, proposes a conceptual framework for studying Indigenous knowledge of nature. Complementarily, Lévi-Strauss (1989) analyzes the so-called “savage mind” as a logical form of classification and knowledge.

Finally, the cultural and heritage dimension of the Ethnobotanical Garden is linked to the concept of cultural routes formalized in the ICOMOS Charter (2008), which emphasizes their historical, territorial, and relational character. The 2003 UNESCO Convention is relevant to safeguarding practices and knowledge associated with intangible cultural heritage. For Lowenthal (1985), the contemporary relationship with the past helps explain how heritage is interpreted and reworked in the present.

This theoretical framework provides a solid basis for understanding the educational, cultural, and sustainability potential of the Guaraní Kaiowá Ka’a Porã Ethnobotanical Garden, highlighting its capacity to integrate traditional knowledge, critical education, and environmental conservation.

2.1 Rationale

The creation of the Guaraní Kaiowá Ka’a Porã Ethnobotanical Garden originated in the critical reflection stimulated by Environment Week, held in Ponta Porã in 2018. The event prompted a substantial reassessment of traditional approaches to environmental conservation, resulting in an innovative proposal committed to regional sustainable development. From this renewed environmental perspective emerged the idea of establishing a space dedicated to preserving the ancestral knowledge of Guaraní Kaiowá ethnobotanical culture, as well as conserving the plant and animal species characteristic of the border region of Mato Grosso do Sul.

The project uses two initiatives in the University of Georgia's sister-garden network as comparative references: the Jardín Etnobotánico Nugkui in Santa María de Nieva, Peru, and the Jardín Etnobotánico Comunitario at ECOSUR in Chiapas, Mexico (University of Georgia, n.d.). The institutional source records research and design collaboration, faculty and student exchanges, and exchanges of plant specimens within this network. These experiences can serve as comparative precedents without assuming their direct transfer to the Guaraní Kaiowá context.

The proposal also refers to the historical use of yerba mate and to botanical repertoires documented in the mission region. The manuscript by Pedro de Montenegro (1663–1728), catalogued by the Biblioteca Nacional de España as dating to around 1711, compiles descriptions of the properties and uses of trees, plants, herbs, and roots from the missions and the province of Tucumán, with references also to Brazil and the East (Montenegro, 1711). It is used here as a historical source on colonial-period botanical practices; by itself, it does not establish direct continuity between those records and present-day Guaraní Kaiowá knowledge.



The state of Mato Grosso do Sul faces growing environmental challenges arising from intensive economic activities, uncontrolled urban expansion, and diverse social and political pressures. Against this background, the creation of this Ethnobotanical Garden becomes important for implementing effective strategies to mitigate these environmental impacts and improve the quality of life of the local population.

2.1.1 Technical and Scientific Rationale

At present, Mato Grosso do Sul lacks a botanical garden dedicated to highlighting the role of plants in the region's everyday and scientific life. The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden addresses this gap by providing a permanent scientific space for interdisciplinary research, bringing together professionals from agronomy, forestry, pharmacy, biology, medicine, environmental sciences, and other fields. The project is intended to become a regional reference, distinguished by careful representation of local biomes, rigorous scientific management, continuous publication of research, and the establishment of national and international exchanges with other research institutions and botanical gardens.

2.1.2 Educational Rationale

Botanical gardens can combine research, plant conservation, and education, and the experience of the Rio de Janeiro Botanical Garden described by Saisse and Rueda (2008) shows how such spaces can support environmental education and training. The Guaraní Kaiowá Ethnobotanical Garden aims to provide an informative and interactive environment with educational identification of plant species, guided visits, educational workshops, horticultural and gardening activities, and themed events. In this sense, the project seeks to connect practical activities with interpretation of the region's natural and cultural context (Capra, 2004; Loureiro, 2004).

2.1.3 Social Rationale

As public spaces for education and conservation, botanical gardens can receive diverse audiences and host environmental education activities (Saisse; Rueda, 2008). By creating a living cultural space, the Guaraní Kaiowá Ethnobotanical Garden would provide a meeting place centered on biodiversity and could support social and cultural inclusion activities. The project also relates to Agenda 21, especially Chapter 36, which recognizes education, public awareness, and training as components of sustainable development (United Nations, 1992). The Garden therefore plans training activities for teachers and students in the region, with educational materials addressing local and global environmental issues.



2.1.4 Research, development, and innovation (R&D&I) rationale

The project is grounded in a proposal for Scientific Research, Educational Development, and Technological Innovation (R&D&I), seeking to generate knowledge applicable to regional needs. It encompasses the life sciences, natural resources, and environmental technologies, while also incorporating mathematics, physics, energy, chemistry, industrial design, information technologies, the humanities, and the social sciences. Botanical gardens can combine research, plant conservation, and education (Saísse; Rueda, 2008), functions that this proposal connects to the training of students and researchers.

Furthermore, because of the permanent nature of the planned facilities, the Guaraní Kaiowá Ethnobotanical Garden will provide stability and continuity for research, offering an environment conducive to the professional development of biologists, agronomists, forestry engineers, physicians, pharmacists, and other professionals engaged in research and technological innovation.

2.2 Objectives

2.2.1 General Objective of the Initiative

The project's general objective is to promote improvements in the urban environment of the municipality of Amambai by providing a cultural and educational attraction in Mato Grosso do Sul. It seeks to articulate science, culture, sustainability, tourism, and creativity while promoting social development, employment generation, and the strengthening of regional cultural and environmental identity.

2.2.2 Specific Objectives

- Promote positive environmental impacts through the conservation of regional biodiversity.
- Conduct technical and scientific research on native plant species, especially those threatened with extinction.
- Foster a culture of environmental conservation that strengthens sustainable tourism at the local and regional levels.
- Value and disseminate Indigenous historical and cultural heritage through integration with regional cultural itineraries.

2.3 Infrastructure

The implementation of this project provides for adaptable and accessible structural modules, including dedicated areas for the protection and display of plant species, research and teaching laboratories, cultural spaces, social gathering areas, and a range of educational facilities.



All environments will be designed according to criteria of sustainability, universal accessibility, and technical, scientific, and social suitability for the needs of the community and visitors.

In this way, the Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden is intended to become a regional landmark for education, research, environmental conservation, and sustainable development, aligned with the highest academic and social standards expected of a project of this scope.

3 Development Perspectives

3.1 Educational Perspective

The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden has substantial educational potential and is aligned with the principles of critical education (Freire, 1987) and environmental education (Capra, 2004). Its conception as a living learning space enables the implementation of a wide range of educational activities, contributing directly to Sustainable Development Goal (SDG) 4, Quality Education, of the United Nations 2030 Agenda (United Nations, 2015). Educational actions include

- Creation of educational programs for schools and universities. The Garden will offer environmental education and ethnobotany programs integrating content on biodiversity, sustainability, and Indigenous traditional knowledge. These programs will be adapted to different age groups, from basic education through higher education.
- Ethnobotany and conservation workshops. Practical workshops will enable visitors to learn about the medicinal, culinary, and cultural uses of plants while valuing Guaraní Kaiowá traditional knowledge (Posey, 1999). This approach contributes to SDG 4 by promoting equitable access to quality education.
- Integration of the Garden into regional cultural itineraries. As part of a network of cultural routes in Mato Grosso do Sul, the Garden would be incorporated into guided visits, promoting educational and cultural tourism and engaging with SDG 11, Sustainable Cities and Communities, which includes the protection of cultural and natural heritage (United Nations, 2015).

3.2 Cultural Perspective

The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden also seeks to contribute to the preservation and recognition of traditional knowledge and practices identified by the communities themselves, in dialogue with the 2003 Convention on intangible cultural heritage, and to the valorization of the diversity of cultural expressions under the 2005 Convention (UNESCO, 2003, 2005). These dimensions also relate to SDG 10, Reduced Inequalities, and SDG 16, Peace, Justice



and Strong Institutions, of the 2030 Agenda (United Nations, 2015):

- Revalorization of Guaraní Kaiowá traditional knowledge. The Garden is intended as a space for the preservation and transmission of ancestral knowledge, particularly concerning medicinal and food plants, cultural practices, and oral narratives, within an approach that recognizes Indigenous knowledge of nature and its cultural dimension (Posey, 1999; Toledo, 2002).
- Spaces for cultural events. The Garden will host cultural fairs, exhibitions of Indigenous handicrafts, musical performances, and other activities that strengthen the cultural identity of the local community.
- Creation of an integrated cultural route. The Garden would serve as a point on a cultural itinerary connecting other sites of historical and cultural interest in the region, such as Indigenous villages, museums, and protected natural areas. The ICOMOS Charter on Cultural Routes (2008) provides the specific conceptual framework for this territorial articulation. The Camino de las Perlas experience in La Guajira offers a Latin American example of the relationship among cultural routes, cultural and environmental heritage, ancestral knowledge, and sustainable development (Pérez Mendoza; Busón Buesa; Pineda Arroyo, 2024).

3.3 Sustainability Perspective

Sustainability is one of the proposed pillars of the Ethnobotanical Garden. The project relates to SDG 13, Climate Action, SDG 15, Life on Land, and SDG 12, Responsible Consumption and Production, of the 2030 Agenda (United Nations, 2015):

- Conservation of native plant species. The Garden would function as a space for native-plant conservation and biodiversity education, functions compatible with those attributed to botanical gardens by Saísse and Rueda (2008).
- Use of agroecological practices and soil conservation. Sustainable cultivation techniques, such as composting, biological pest control, and agroecological management, are proposed as management options to be defined during implementation according to environmental conditions and with the participation of those responsible for the Garden.
- Implementation of circular economy projects. The Garden could promote the production and commercialization of handicrafts and other products linked to local practices and knowledge, provided that such activities are defined through community participation and appropriate mechanisms for consent and benefit sharing. As a comparative reference, the Hilos por Mma project, developed with Indigenous Wayuu women in La Guajira, combined environmental education, circular economy practices, waste reuse, and income generation through handicrafts (Pérez Mendoza; Busón Buesa, 2024).



4 Challenges and Opportunities

The development of the Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden presents promising prospects but also faces critical challenges that reflect the specific realities of the state of Mato Grosso do Sul. A thorough understanding of these challenges is essential to ensuring the project's success and sustainability.

4.1 Challenges

Financial sustainability is one of the challenges. The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden has educational and cultural potential, but its continuity would require a model capable of combining funding sources and management mechanisms consistent with its social and environmental objectives. From a sustainable-development perspective, economic viability should be considered together with social and environmental dimensions rather than treating revenue generation as an isolated objective (Sachs, 2008).

To ensure this sustainability, a diversified financial strategy is recommended, including

- Institutional partnerships. Establish agreements with universities, schools, environmental and cultural government departments, non-governmental organizations (NGOs), and international institutions that support conservation and environmental education projects.
- Generation of own-source revenue. Develop sustainable economic activities, such as the production and commercialization of products derived from medicinal plants and natural cosmetics, while always respecting the principles of fair benefit-sharing for Indigenous communities (Santilli, 2009).
- External fundraising. Participate in national and international funding calls, particularly in areas such as biodiversity conservation, environmental education, and the valorization of Indigenous culture.
- Sustainable tourism. Integrate the Garden into the region's cultural itineraries, such as the Caminho para os Ervais (Busón Buesa et al., 2020), promoting ecotourism and cultural tourism. This integration can attract visitors and generate revenue from admission fees, guided visits, and handicraft products.
- Education and research. Implement courses, workshops, and continuing education programs for students, researchers, and visitors, generating revenue while strengthening the Garden's educational function.

To ensure transparency and efficiency in the use of resources, the creation of a Sustainability Fund managed by a Participatory Management Council is recommended, with



revenues reinvested in the maintenance and development of the Garden in accordance with collectively defined priorities.

Another challenge concerns participatory management and governance. The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden should adopt a model that gives Guaraní Kaiowá communities an active voice in decisions affecting the project. The consultation and participation duties established by ILO Convention No. 169, together with Brazilian legislation on associated traditional knowledge, provide normative references for such participation (International Labour Organization, 1989; Brasil, 2015). A Participatory Management Council is therefore recommended, with representation from Indigenous communities, educators, researchers, and partner institutions and responsibility for strategic decisions, planning, and monitoring. The experience analyzed by Pérez Mendoza, Busón Buesa, and Carabali Angola (2021), in another Latin American Indigenous context, reinforces the need to incorporate communities' own perceptions of territory, vulnerability, and cultural practices into development processes, without automatically transferring its conclusions to the Guaraní Kaiowá context.

Another challenge concerns the protection of ancestral knowledge. The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden has among its objectives the preservation and valorization of Indigenous traditional knowledge, which must be protected against misappropriation and unauthorized commercial use (Santilli, 2009; Posey; Dutfield, 1996). The following measures are recommended: i) fair and equitable benefit-sharing: access activities and economic exploitation covered by applicable law should follow the corresponding benefit-sharing mechanisms under the Nagoya Protocol, adopted in 2010, and Brazilian Law No. 13,123/2015 (Secretariat of the Convention on Biological Diversity, 2011; Brasil, 2015); ii) community-controlled documentation: any recording or systematization of knowledge should occur with participation of the knowledge holders, agreed access rules, and without assuming that documentation alone automatically creates legal protection; for associated traditional knowledge of identifiable origin, the relevant legal requirements should be observed (Brasil, 2015); iii) consultation and consent: activities that legally constitute access to associated traditional knowledge should comply with prior informed consent requirements under Law No. 13,123/2015, while decisions and measures directly affecting Indigenous peoples should observe the consultation and participation duties established by ILO Convention No. 169 (Brasil, 2015; International Labour Organization, 1989); iv) education and awareness: programs should strengthen community understanding of rights associated with traditional knowledge; v) product identification: designations of origin, certifications, or other forms of identification should be adopted only when legally appropriate and defined with the community; and vi) legal protection: agreements and procedures should ensure



appropriate authorization and benefit-sharing where applicable (Posey; Dutfield, 1996; Brasil, 2015).

4.2 Opportunities

Despite the challenges outlined above, the Ethnobotanical Garden offers important opportunities that, if appropriately developed, could contribute significantly to sustainable local development

- Integration with networks of cultural itineraries. The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden could become a point in a regional network connecting traditional knowledge with cultural and natural heritage. The ICOMOS Charter on Cultural Routes (2008) provides the specific framework for treating cultural routes at a territorial scale and guiding their research, protection, conservation, and management. Links with intangible heritage should preserve the role of communities in identifying and safeguarding their own knowledge and practices (UNESCO, 2003).
- Connection with the Caminho para os Ervais. The Garden should be integrated into the Caminho para os Ervais project, promoting the value of yerba mate culture and the knowledge associated with its cultivation and traditional use. This integration would allow the Garden to become a stop on a cultural route in the Brazil-Paraguay border region (Busón Buesa et al., 2020).
- Linkages with other cultural itineraries. The Garden can establish partnerships with other cultural and natural sites in the region, including Indigenous villages, natural parks, museums, and archaeological sites, thereby strengthening a regional network of cultural and educational tourism.
- Heritage education and cultural tourism. The Garden can develop educational materials specifically addressing Guaraní Kaiowá cultural heritage and its relationship with the sustainable use of biodiversity, while promoting cultural tourism activities based on ethnobotany workshops, cultural exhibitions, and guided visits.
- Outreach and awareness. Implement a communication strategy that promotes the Garden as a cultural tourism destination, highlighting its connection with the region's cultural itineraries and its importance for environmental conservation and the valorization of Indigenous culture.
- Institutional alliances. Strengthening partnerships with regional universities, public schools, NGOs, and government agencies can create a robust institutional base and increase technical, scientific, and political support for the project. In particular, collaboration with local academic institutions can foster contextualized research relevant to the region's socio-environmental needs (SDG 17).



- International support. Actively pursuing international cooperation, particularly in areas such as environmental preservation and the valorization of Indigenous culture, can provide significant technical and financial support. International organizations often show interest in innovative projects that integrate environmental sustainability, social justice, and the valorization of cultural diversity, creating a strategic opportunity for the Ethnobotanical Garden (SDG 17).
- Research and innovation. The Garden can become a distinctive space for scientific research and innovation, particularly in ethnobotany, agroecology, critical environmental education, and the development of sustainable social technologies. Partnerships with universities and research centers could foster studies that not only contribute to environmental conservation but also strengthen the autonomy and resilience of local communities (SDG 9).

To maximize these opportunities and mitigate existing challenges, an integrative approach is recommended, grounded in institutional cooperation, effective community participation, and continued recognition of the specific sociocultural context of Mato Grosso do Sul.

5 Discussion

The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden is situated within the complex and challenging socio-environmental context characteristic of the state of Mato Grosso do Sul. Despite its relevance and considerable potential, the project must critically consider local conditions, including the historical socioeconomic vulnerability of Indigenous communities, recurrent land conflicts, and a political context that is often unfavorable to environmental protection and cultural valorization. These factors constitute concrete obstacles that must be addressed to ensure the initiative's success and sustainability.

The Jardín Etnobotánico Nugkui in Peru and the Jardín Etnobotánico Comunitario at ECOSUR in Mexico are used here as comparative references because both are part of the sister-garden network documented by the University of Georgia (n.d.). The institutional documentation records collaboration in research and design, faculty and student exchanges, and exchanges of plant specimens. These cases do not justify assuming institutional, cultural, or environmental equivalence with Mato Grosso do Sul.

The comparison with these initiatives should therefore be limited to documented aspects and should not assume direct transfer of their models. The Ka'a Porã proposal must be assessed in relation to local conditions, Guaraní Kaiowá territorial and cultural rights, and the forms of community participation established in the project's own design.

To address these specific circumstances and enhance the positive impact of the Guaraní



Kaiowá Ka'a Porã Ethnobotanical Garden, the following measures are recommended

- Strengthen local and participatory governance by directly involving representatives of the Indigenous community, regional academic institutions, civil society organizations, and local public agencies, thereby establishing more transparent and inclusive management (SDGs 16 and 17).
- Develop educational and cultural programs that explicitly engage with local realities, addressing not only general environmental issues but also the social, cultural, and economic conflicts experienced by the Guaraní Kaiowá, thereby contributing to genuinely critical and contextualized education (SDGs 4 and 10).
- Build connections with national and international networks for environmental protection and cultural valorization, seeking technical, financial, and political support capable of sustaining the project in the face of potential local political and institutional challenges (SDG 17).
- Implement clear communication and awareness strategies aimed at generating broad social and institutional support for the cultural, social, and environmental importance of the Ethnobotanical Garden, reinforcing its recognition as regional heritage of fundamental importance to local sustainability (SDG 11).

In this sense, the project should not merely replicate international models but critically adapt them to the particular realities of Mato Grosso do Sul, taking into account its historical, political, and socioeconomic contexts in order to ensure effectiveness, legitimacy, and long-term sustainability.

6 Conclusions

The Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden constitutes a promising and innovative initiative within the socio-environmental context of Mato Grosso do Sul. By proposing the integration of environmental conservation, the valorization of Indigenous culture, and critical education, the project responds to the longstanding demands of Guaraní Kaiowá communities for recognition and respect for their ancestral knowledge and traditional territory in a state marked by land conflicts, intense environmental pressures, and substantial political challenges.

The educational approach grounded in Paulo Freire's (1987) principles and in the relationship between biological diversity and cultural values discussed in Posey (1999) provides a framework for structuring educational, cultural-identity, and conservation activities. Because the Garden remains a proposal, its effects on critical education, environmental defense, or regional development cannot be asserted before implementation and evaluation.

However, for the Garden to realize its full potential, significant challenges related to sustainable financing, participatory management, and the effective inclusion of Indigenous



communities in decision-making processes will need to be overcome. It will also be necessary to establish robust strategic alliances with academic institutions, social organizations, and public agencies, as well as to develop transparent and participatory mechanisms for management and monitoring.

Future research should consider not only the Garden's immediate impact in terms of conservation and environmental education but also its role in mitigating social inequalities and addressing socio-environmental conflicts affecting Indigenous communities in the state. Further studies could examine the role of public and private institutions in maintaining the project's financial and political sustainability, as well as assess the long-term impact of implemented educational initiatives.

In addition, the Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden model could be considered for adaptation in other communities, provided that each implementation is defined through local participation and respect for territorial and cultural specificities. A future network of community ethnobotanical gardens could support exchange among experiences without implying automatic openness of traditional knowledge. Mechanisms for protection, authorization, and benefit-sharing should follow both the literature on traditional resource rights and applicable Brazilian law (Posey; Dutfield, 1996; Santilli, 2009; Brasil, 2015).

Finally, with genuinely participatory management grounded in intercultural dialogue and respect for regional particularities, the Guaraní Kaiowá Ka'a Porã Ethnobotanical Garden could emerge as a national and international reference model, not only for conservation and environmental education but especially for socio-environmental justice and the valorization of Indigenous culture, offering concrete and inspiring responses to the socio-environmental challenges of Mato Grosso do Sul and beyond.

References

- ARROYO, Miguel Gonzalez; FERNANDES, Bernardo Mançano. A educação básica e o movimento social do campo. Brasília, DF: Articulação Nacional Por Uma Educação Básica do Campo, 1999. Coleção Por Uma Educação Básica do Campo, n. 2.
- BRASIL. Lei n. 13.123, de 20 de maio de 2015. Brasília, DF: Presidência da República, 2015. Disponível em: https://www.planalto.gov.br/ccivil_03/_ato2015-2018/2015/lei/13123.htm. Acesso em: 17 set. 2026.
- BUSÓN BUESA, Carlos; ZAMBERLAN, Carlos Otávio. Rescate de caminos históricos como pauta de desarrollo sostenible. El camino para los yerbales, una ruta cultural de integración binacional. Desenvolvimento, Fronteiras & Cidadania, v. 2, n. 1, p. 11–16, 2018. Disponível em: <https://periodicosonline.uems.br/index.php/fronteiracidadania/article/view/2625>. Acesso em: 17 set. 2026.
- BUSÓN BUESA, Carlos; ZAMBERLAN, Carlos Otávio; SONAGLIO, Cláudia Maria; MISSIO, Fabrício José. A proposta do caminho para os ervais: desenvolvendo territórios através da criação de itinerários culturais na fronteira Brasil-Paraguai. Espaço, Tempo y Forma. Serie VI, Geografía, n. 13, p. 35–54, 2020. DOI: 10.5944/etfvi.13.2020.27170. Disponível em: <https://doi.org/10.5944/etfvi.13.2020.27170>. Acesso em: 17 set. 2026.
- CAPRA, Fritjof. A teia da vida: uma nova compreensão científica dos sistemas vivos. 9. ed. São Paulo: Cultrix,



2004.

FREIRE, Paulo. *Pedagogia do oprimido*. 17. ed. Rio de Janeiro: Paz e Terra, 1987.

ICOMOS. *Carta de Itinerarios Culturales*. Québec: ICOMOS, 2008. Disponível em: <https://openarchive.icomos.org/id/eprint/3141/>. Acesso em: 17 set. 2026.

INTERNATIONAL LABOUR ORGANIZATION. *Indigenous and Tribal Peoples Convention*, 1989 (No. 169). Geneva: ILO, 1989. Disponível em: <https://www.ilo.org/resource/c169-indigenous-and-tribal-peoples-convention-1989>. Acesso em: 17 set. 2026.

LÉVI-STRAUSS, Claude. *O pensamento selvagem*. Tradução de Tânia Pellegrini. Campinas, SP: Papirus, 1989.

LOUREIRO, Carlos Frederico Bernardo. *Trajetória e fundamentos da educação ambiental*. São Paulo: Cortez, 2004.

LOWENTHAL, David. *The past is a foreign country*. Cambridge: Cambridge University Press, 1985.

MONTENEGRO, Pedro de. *Libro primero de la propiedad y virtudes de los árboles y plantas de las misiones y provincia del Tucumán, con algunas del Brasil y del Oriente* [manuscrito]. Misiones del Paraguay, [ca. 1711]. Biblioteca Nacional de España, MSS/10314, identificador bdh0000042551. Disponível em: <https://bdh-rd.bne.es/viewer.vm?id=0000042551&page=1>. Acesso em: 17 set. 2026.

PÉREZ MENDOZA, Katherin; BUSÓN BUESA, Carlos; CARABALI ANGOLA, Alexis. *La percepción de la vulnerabilidad climática y económica de la población costera de La Guajira por parte de las comunidades indígenas locales*. *Desenvolvimento, Fronteiras & Cidadania*, v. 5, n. 8, p. 145–169, 2021. DOI: 10.61389/dfc.v5i8.7076. Disponível em: <https://doi.org/10.61389/dfc.v5i8.7076>. Acesso em: 17 set. 2026.

PÉREZ MENDOZA, Katherin; BUSÓN BUESA, Carlos. *Hilos por Mma: una propuesta de desarrollo local y educación ambiental adaptado a la Agenda 2030*. *Desenvolvimento, Fronteiras & Cidadania*, v. 8, n. 1, p. 45–64, 2024. Disponível em: <https://periodicosonline.uems.br/index.php/fronteriacidadania/article/view/8577>. Acesso em: 17 set. 2026.

PÉREZ MENDOZA, Katherin; BUSÓN BUESA, Carlos; PINEDA ARROYO, Mónica. *La creación de un itinerario y paisaje cultural en La Guajira como propuesta de desarrollo sostenible*. *Desenvolvimento, Fronteiras & Cidadania*, v. 7, n. 1, p. 1–25, 2024. Disponível em: <https://periodicosonline.uems.br/index.php/fronteriacidadania/article/view/8578>. Acesso em: 17 set. 2026.

POSEY, Darrell Addison (ed.). *Cultural and spiritual values of biodiversity: a complementary contribution to the Global Biodiversity Assessment*. London: Intermediate Technology Publications; Nairobi: United Nations Environment Programme, 1999.

POSEY, Darrell Addison; DUTFIELD, Graham. *Beyond intellectual property: toward traditional resource rights for Indigenous peoples and local communities*. Ottawa: International Development Research Centre, 1996.

SACHS, Ignacy. *Caminhos para o desenvolvimento sustentável*. Organização de Paula Yone Stroh. 3. ed. Rio de Janeiro: Garamond, 2008.

SAÍSSE, Maryane V.; RUEDA, María Manuela. *Educação ambiental em jardins botânicos: um caso brasileiro*. *Ambientalmente Sustentável*, v. 2, n. 6, p. 7–19, 2008. DOI: 10.17979/ams.2008.02.06.762. Disponível em: <https://revistas.udc.es/index.php/RAS/article/view/ams.2008.02.06.762>. Acesso em: 17 set. 2026.

SANTILLI, Juliana. *Agrobiodiversidade e direitos dos agricultores*. São Paulo: Peirópolis, 2009.

SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY. *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity*. Montreal: Secretariat of the Convention on Biological Diversity, 2011. Protocol adopted in Nagoya, Japan, on 29 Oct. 2010. Disponível em: <https://www.cbd.int/abs/text/>. Acesso em: 17 set. 2026.

TOLEDO, Víctor M. *Ethnoecology: a conceptual framework for the study of Indigenous knowledge of nature*. In: STEPP, John R.; WYNDHAM, Felice S.; ZARGER, Rebecca K. (ed.). *Ethnobiology and biocultural diversity*. Athens, GA: International Society of Ethnobiology, 2002. p. 511–522.

UNESCO. *Convenção para a Salvaguarda do Patrimônio Cultural Imaterial*. Paris: UNESCO, 2003. Disponível em: <https://ich.unesco.org/en/convention>. Acesso em: 17 set. 2026.

UNESCO. *Convenção sobre a Proteção e Promoção da Diversidade das Expressões Culturais*. Paris: UNESCO, 2005. Disponível em: <https://www.unesco.org/creativity/en/2005-convention>. Acesso em: 17 set. 2026.

UNITED NATIONS. *Agenda 21*. Rio de Janeiro: United Nations Conference on Environment and Development, 1992. Disponível em: <https://sdgs.un.org/publications/agenda21>. Acesso em: 17 set. 2026.

UNITED NATIONS. *Transforming our world: the 2030 Agenda for Sustainable Development*. New York: United



Nations, 2015. Resolution A/RES/70/1. Disponível em: <https://sdgs.un.org/2030agenda>. Acesso em: 17 set. 2026.

UNIVERSITY OF GEORGIA. Latin American and Caribbean Studies Institute. Sister Gardens. Athens, GA: University of Georgia, [n.d.]. Disponível em: <https://laci.uga.edu/sister-gardens>. Acesso em: 17 set. 2026.