

# Science, Industry, and the Forgotten Guardians of Amazonian Knowledge

Mariana Barbieri and Susana Frases\*

*Laboratório de Biofísica de Fungos, Instituto de Biofísica Carlos Chagas Filho, Universidade Federal do Rio de Janeiro, Brazil*

**\*Corresponding author**

Susana Frases, Laboratório de Biofísica de Fungos, Instituto de Biofísica Carlos Chagas Filho, Universidade Federal do Rio de Janeiro, Brazil.

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## Introduction

The Amazon is a unique region, distinguished for its immense biodiversity and the deep cultural wisdom of its Indigenous peoples and local communities [1]. Over centuries, these groups have developed extensive knowledge about the environment, including the use of plants for medicine, sustainable ways to manage natural resources, and practices that reflect their cultural heritage [2]. This invaluable wisdom, however, often only receives recognition when linked to economic profit or technological progress.

Science and industry have a complex and often contradictory relationship with traditional knowledge. While they have driven innovations like medicines and food products based on Indigenous wisdom, they have also misused and appropriated this knowledge, often without recognizing or compensating its true guardians. These dynamic highlights a system that prioritizes profit over cultural preservation and social justice [3].

This situation raises important ethical and social questions: Why is traditional knowledge often valued only when it serves economic interests? What steps can be taken to ensure that the benefits derived from this knowledge are shared fairly with the communities that have preserved it for generations? This article explores these questions and calls for a more respectful and equitable approach to engaging with traditional knowledge in the Amazon.

## The Importance of Traditional Knowledge

Traditional knowledge in the Amazon represents a holistic worldview that integrates cultural, spiritual, and ecological dimensions [4]. Indigenous peoples have cultivated a profound understanding of the region's biodiversity through centuries of coexistence with the environment [5,6]. Their expertise encompasses the medicinal properties of plants and sustainable techniques that help maintain the ecosystem's delicate balance [7].

For instance, plants like copaiba (*Copaifera langsdorffii*) and açaí (*Euterpe oleracea*) powerfully illustrate the depth of this knowledge. Copaiba oil, with its well-known anti-inflammatory properties, was used by Indigenous communities for generations – long before it ever became a global commodity [8]. Similarly, the sustainable harvesting of açaí berries reflects an understanding of the forest's cycles, ensuring the resource is not depleted while providing income for local populations [9-11].

Despite its value, traditional knowledge is often dismissed unless it can be commodified. Many pharmaceutical breakthroughs, such as treatments derived from curare or quinine, have roots in Indigenous practices [12-14]. Yet, the communities who have safeguarded and shared these insights rarely receive recognition or compensation, reinforcing a cycle where their contributions are exploited instead of honored.

## The Industrialization of Native Products

The industrialization of native Amazonian products has both showcased the region's biodiversity to the world, creating global markets for items like guaraná (*Paullinia cupana*) and Brazil

nuts (and brought significant challenges, including exploitation, inequality, and environmental harm.

One pressing issue is the appropriation of traditional knowledge without proper recognition or benefit-sharing, often referred to as biopiracy [15]. For example, plants like Ayahuasca (*Banisteriopsis caapi* and *Psychotria viridis*) and Jaborandi (*Pilocarpus microphyllus*) have been patented or commercialized without involving the communities that have preserved and used them for generations [16,17].

Moreover, the pursuit of profit in the industrialization of natural resources often overlooks the need for environmental balance and social equity. For example, the growing demand for products like açai has, in some cases, led to unsustainable harvesting practices that disrupt local ecosystems [18]. Additionally, this demand can create challenges for nearby communities, including displacement or unfair working conditions [19]. These realities underscore the importance of questioning who truly benefits from the global trade in these resources, and at what cost to those who live closest to them.

### Rethinking the Value of Traditional Knowledge

The relationship between traditional knowledge and industrialization reveals uncomfortable truths about how we value knowledge, culture, and the environment. Traditional knowledge is often dismissed as “folklore” until it becomes profitable, and the benefits rarely reach the communities that have preserved it. This exposes deep inequalities, as Indigenous contributions are undervalued and the industrialization of native products often repeats colonial exploitation—extracting resources and knowledge for global markets while leaving original custodians with the consequences. Moving forward requires recognizing traditional knowledge as essential cultural and ecological heritage, and adopting ethical practices that respect Indigenous rights, ensure fair benefit-sharing, and protect ecosystems.

### Conclusion

The traditional knowledge of the Amazon is a priceless heritage that embodies centuries of wisdom, cultural identity, and environmental stewardship [20]. However, its value is often only recognized when it can be commodified, leaving the communities that safeguard this knowledge marginalized. The industrialization of native products, while offering opportunities for innovation, has too often perpetuated systems of exploitation and inequality [21].

Meeting these challenges requires a more ethical and inclusive approach—one that respects Indigenous rights, ensures fair benefit-sharing, and values traditional knowledge as cultural and ecological heritage. This shift can lead to a more just and sustainable relationship with both communities and the environment.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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