



The importance of ethnoecological studies for the conservation and sustainable use of biodiversity: a critical analysis of six decades of support by FAPESP

Eliana Rodrigues¹ , Cristiana Simão Seixas^{2*} , Thamara Sauini¹ & Cristina Adams³

¹Universidade Federal de São Paulo, Centro de Estudos Etnobotânicos e Etnofarmacológicos, Departamento de Ciências Ambientais, Diadema, SP, Brasil.

²Universidade Estadual de Campinas, Núcleo de Estudos e Pesquisas Ambientais, Campinas, SP, Brasil.

³Universidade de São Paulo, Escola de Artes, Ciências e Humanidades, Instituto de Energia e Ambiente, Grupo de Pesquisa em Governança Florestal, São Paulo, SP, Brasil.

*Corresponding author: csseixas@unicamp.br

RODRIGUES, E., SEIXAS, C.S., SAUINI, T., ADAMS, C. **The importance of ethnoecological studies for the conservation and sustainable use of biodiversity: a critical analysis of six decades of support by FAPESP.** *Biota Neotropica* 22(spe): e20221403. <https://doi.org/10.1590/1676-0611-BN-2022-1403>

Abstract: This paper aims to assess the area of ethnoecology within funding provided by the São Paulo Research Foundation (FAPESP) to projects and events in order to discuss the importance of this area for the conservation and sustainable use of biodiversity and the opportunity to advance this area of knowledge. The paper presents a retrospective analysis of the 75 projects and 21 events organized in the area of ethnoecology that received support from FAPESP in the last 60 years. For this purpose, a search was performed in the FAPESP databases using the keywords *Ethnoecology, Ethnobiology, Ethnoscience, Ethnoichthyology, Ethnotaxonomy, Ecological Anthropology, Ethnobotany, Ethnozoology, Ethnofarmacology, Traditional Knowledge, Traditional Ecological Knowledge, Indigenous Knowledge, Ethnography, Human Ecology and Ethnoarcheology*. Research Support modality accounted for most of the projects (88%), with 45.3% of funding occurring in the decade of 2000–2009. No project was supported in the first two decades and only eight were part of the BIOTA Program. The main areas of submission were Biological Sciences (46.7% of projects and 47.6% of events) and Humanities (38.7% of projects). The research questions and methods of the projects developed over the last four decades were analyzed critically and comparatively. Given the data collected, an increase of ethnoecological projects supported by the BIOTA Program and through the thematic modality may contribute to advance this area of knowledge and to cross the path from inter to transdisciplinary science.

Keywords: *Ethnoecology; conservation; biodiversity; sustainability.*

A importância dos estudos etnoecológicos para a conservação e uso sustentável da biodiversidade: uma análise crítica das seis décadas de apoio pela FAPESP

Resumo: O artigo objetiva avaliar a área da etnoecologia dentro dos financiamentos de projetos e eventos apoiado pela Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) com vista a discutir a importância da área para a conservação e uso sustentável da biodiversidade e as oportunidades para avançar esta área do conhecimento. O artigo traz uma retrospectiva dos 76 projetos e 21 eventos organizados na área de Etnoecologia, que receberam apoio da FAPESP nos últimos 60 anos. Para tanto, foi realizada uma busca nas bases de dados da FAPESP considerando as palavras-chave: *Etnoecologia, Etnobiologia, Etnociência, Etnoictiologia, Etnotaxonomia, Antropologia Ecológica, Etnobotânica, Etnozoologia, Etnofarmacologia, Conhecimento Tradicional, Conhecimento Ecológico Tradicional, Conhecimento Indígena, Etnografia, Ecologia Humana e Etnoarqueologia*. A maior parte dos projetos foram desenvolvidos na modalidade Auxílio à Pesquisa (88%), sendo a década de destaque a de 2000–2009 (44,7%). Nenhum projeto foi localizado nas duas primeiras décadas, e apenas 8 fizeram parte do Programa Biota. As principais áreas de submissão foram as Ciências Biológicas (46% dos projetos e 47% dos eventos) e as Ciências Humanas (38% dos projetos). As perguntas de pesquisa e métodos dos projetos desenvolvidos ao longo das quatro últimas décadas foram analisados de forma crítica e comparativa. Diante dos dados levantados, um aumento de projetos etnoecológicos apoiados pelo programa Biota e na modalidade Temático pode contribuir para um avanço desta área do conhecimento e para cruzar o percurso da interdisciplinaridade à transdisciplinaridade.

Palavras-chave: *Etnoecologia; conservação; biodiversidade; sustentabilidade.*

Ethnoecology in Context

Ethnoecology – as the etymology of the word makes clear – is the science that studies the relationship of a people and the biotic and abiotic environment in which they live and reproduce socially: ethno (nation, people) and ecology (science that deals with relationships between living beings and their environment). In light of the knowledge about the nature of diverse peoples, some of the researchers who have most contributed to the advancement of science related to ethnoecology and related areas include Miguel Alexiades, Fikret Berkes, Brent Berlin, Philippe Descola, Roy Ellen, Tim Ingold, Robert E. Johannes, Bruno Latour, Darrell A. Posey, Victor Toledo, and Nancy Turner, among others.

Without intending to investigate herein the emergence of this field of knowledge, ethnoecology is, by nature, an interdisciplinary field and included in many other disciplines. Toledo & Alarcón-Chaires (2012) investigate the various definitions of and approaches to the discipline by several authors since the 1950s; they open their discussion saying that “... *there is not one but several ethnoecologies*”. An example is the school of *Comprehensive Ethnoecology* proposed by the Brazilian José Geraldo Marques (Marques 1995).

Added to this is the fact that the object of study of ethnoecology—the human-nature relationship—is also the object of studies of several other disciplines and branches (the subdisciplines), both linked to ethnosciences¹ (e.g., ethnobiology, ethnobotany, ethnozoology, ethnopharmacology, ethnoichthyology, ethnotaxonomy and ethnoarcheology) as well as the more classical disciplines (e.g., human ecology, ecological anthropology, and environmental ethnography). The boundaries between this myriad of disciplines and subdisciplines are fluid; that is, the boundaries between one discipline (or subdiscipline) and another – usually established by norms and methodological approaches – overlap. In the field of ethnosciences, there is a range of disciplines and subdisciplines resulting from different historical trajectories of their formation from different areas of research (Anthropology, Biology, and Linguistics) and countries (Bronzizio et al. 2016, Ellen & Harris 2000).

The discussion of whether ethnobiology is a branch of ethnoecology or vice versa is longstanding and controversial among authors in the field. Through the etymology of the word, ethnobiology – ethno (nation, people) and biology (science that studies living beings) – addresses the relationship between peoples and their biotic elements (animals, plants, fungi, and algae). Ethnoecology, as described above, also addresses relationships with abiotic elements (physical, chemical and geological: winds, tides, climate, stars, landscape, soil, and water). Ethnobiology emerged as a discipline a few decades before ethnoecology. Despite this, we consider ethnobiology as a branch of ethnoecology due to the very nature of its scope.

Similarly, it can be argued that ethnobotany (focusing on plants), ethnozoology (in animals) and ethnomycology (in fungi) are branches of ethnobiology and that ethnoichthyology is a branch of ethnozoology. However, most of these subdisciplines also have an ethnoecological character – as they seek to understand how different peoples observe aspects of flora, fauna, water and soil, aiming to

conserve their environment. In this tangle of ramifications that are often intertwined, there are still others, such as ethnoconservation, proposed by the Brazilian A.C. Diegues (2000), which focuses on the traditional management and conservation of biodiversity by indigenous peoples and local communities.

Each of these disciplines, subdisciplines and branches of knowledge has a particular universe of excerpts. Considering only Ethnobotany, Nolan & Turner (2011) found 17 research topics, including ethnobotany and conservation; symbolic ethnobotany; cognitive ethnobotany; historical and ethnobotanical migrations; ethnobotany and the right to intellectual property; ethnotaxonomic classification systems; and medical ethnobotany.

The overlaps between these and other branches of science can generate confusion both for those in the field and for external researchers, often hindering the choice of reviewers for and peer review of scientific projects and articles. An example of this type of confusion occurs between Ethnobotany and Ethnopharmacology. Ethnobotany is recurrently taken as the study of the relationship between peoples and their medicinal plants; however, this field of knowledge is, in fact, much broader, involving other aspects of the use of plants such as food, fibers, dyes and construction. Ethnopharmacology is the discipline that addresses the use of medicinal resources by different people but is often associated only with plants; however, it also deals with animals, fungi, algae and even minerals. Similarly, there is a certain lack of clarity between the limits (and overlaps) of ethnozoology and ethnopharmacology. For example, should animals used for medicinal purposes by people be investigated via ethnozoology, ethnopharmacology, or ethnomedicine?

The lack of precision of the boundaries between disciplines and subdisciplines (and their respective scopes), often governed by the political interests of scientific societies², sometimes results in a lack of credibility within the academic universe and, consequently, by the agencies that promote scientific research. Another factor that has hindered research in the field of ethnoecology and related fields over many decades is the lack of recognition and appreciation by academic science (also known as Western science) of other knowledge systems (Carneiro da Cunha 2009). There are many terms used in the literature to describe such knowledge systems, some of which are broader – such as *indigenous knowledge* (IK), *traditional knowledge* (TK), *folk knowledge* (FK) – and others more specific – such as *traditional ecological knowledge or traditional environmental knowledge* (TEK) or *local ecological knowledge* (LEK) (Toledo 1992, Berkes 1999, Hunn, 2007). Fortunately, this began to reverse in the last decade, especially after the *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)* recognized in its conceptual framework (Diaz et al. 2015) and incorporated into the construction of its reports the plurality of knowledge systems of indigenous peoples and local communities (IPLC).

¹ Ethnoscience is a field of knowledge that seeks to investigate the complex relationships between peoples, i.e., local, traditional, original and/or indigenous cultures, and nature (Toledo & Alarcón-Chaires, 2012).

² The International Society of Ethnobiology was founded in 1988 in Belém do Pará in an event that brought together more than 600 people from 35 countries, in addition to 16 indigenous organizations, “to address the rapid deterioration of the planet’s biological and cultural diversity and the concerns of communities who face exploitation of their cultural knowledge and resources”, and the Brazilian Society of Ethnobiology and Ethnoecology (SBEE) was founded in 1996.

Despite advances, an issue still remains in several decision-making and research forums: how ethical is it to use a knowledge system (with its values and methods of construction and transmission of knowledge) to validate another knowledge system (with other values and methods)? For example, most of the contemporary concepts attributed to ethnopharmacology concern the validation of the use of biotic elements by biomedicine, which from the epistemological point of view is mistaken if we consider the other areas of ethnosciences (Rodrigues & Oliveira 2020). Validation itself can be called into question when the hegemonic character of academic science is recognized (Carneiro da Cunha 2009) because there is not a single method or a single science. As Feyerabend defends in his work *Against the Method*, from 1975 “... *There may be many sciences.... Western science now reigns supreme throughout the globe, not because of its rationality (because it does not always have it) but because of the use of power.*” The author is not against science; he is against the ideologies that use the name of science for cultural murder, disregarding other forms of knowledge.

Who are these local peoples and communities that ethnoecological research investigates? There are thousands of ethnicities and more than 6,900 languages spoken around the globe (IPBES 2019); between a quarter and half of these languages (and the knowledge associated with them) are threatened with extinction (Lewis 2009, Loh & Harmon 2014). In Brazil, the human groups investigated and involved in these areas of science include both indigenous peoples (there are 305 ethnic groups and 274 languages spoken) and traditional populations, including caíçaras, caboclos, ribeirinhos, quilombolas, caipiras, and small rural producers, to name a few.

The importance of these indigenous peoples and traditional communities for the conservation and sustainable use of biodiversity has been demonstrated for decades. Today, a quarter of the planet's habitable areas is inhabited and/or managed by indigenous peoples and traditional communities, and these areas include approximately one-third of the protected areas and one-third of the areas with low human intervention (IPBES 2019). The ecological knowledge that these peoples have regarding the elements and the functioning of the system they inhabit is of paramount importance for their own well-being and resilience (Armitage et al. 2012), for the conservation of biodiversity (Alcorn 1993, Toledo 2001, Carneiro da Cunha et al. 2021–22), for the development of restoration practices within degraded areas of the planet (IPBES 2018), and for the development of new drugs.

This article seeks to explore whether and how the universe of ethnoecology and related areas that investigate the human-nature relationship (e.g., other branches of ethnosciences, human ecology, ecological anthropology, environmental anthropology, and environmental ethnography) has been addressed in research promoted by the state of São Paulo over the six decades since the creation of the São Paulo Research Foundation (Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP). It also seeks to explore the outcomes of these ethnoecological studies for the conservation and sustainable use of biodiversity and the empowerment of the peoples and communities involved in them and the prospects for future research in this area of knowledge. By delimiting this scope, we make the caveat that numerous other studies in ethnoecology and related areas were and are being conducted outside the scope of FAPESP and that they will not be addressed here.

Six Decades of Research in Ethnoecology and Related Areas Supported by FAPESP

1. Data collection and analysis

To trace the history of research supported by FAPESP in the last 60 years in the area of ethnoecology and related areas that study the human-nature relationship, searches were conducted between 15 and 18/01/2022 in the Virtual Library of FAPESP (collection from 1990 to 2022). In this search, the following keywords were used: ethnoecology, ethnobiology, ethnoscience, ethnoichthyology, ethnotaxonomy, ecological anthropology, ethnobotany, ethnozoology, ethnopharmacology, traditional knowledge, traditional ecological knowledge, indigenous knowledge, ethnography, human ecology and ethnoarchaeology. To search for projects prior to 1990, data were provided by the Scientific Coordination of FAPESP. A total of 303 studies developed between 1962 and 1989, in the areas of botany, zoology, ecology and oceanography, were identified. In these searches, only the projects in the modalities Regular Support, Young Researcher and Thematic were considered, developed by institutions within the State of São Paulo between 1962 and 2022, as detailed in Table 1 and in Figure 1. The other modalities, i.e., Scientific Initiation Scholarships, Master's and Doctorate, Visiting Professor, and Scientific-Journal Publications, were excluded from the search because our focus was on researchers already established in the state of São Paulo – with the possibility of requesting support from FAPESP for projects – and not on researchers in training or visitors.

During the search, only studies that clearly had an ethnoecological character were selected. For example, several studies in the areas of anthropology, ethnography, and ecology, although they had some relationship with the subject, did not directly address the human-nature relationship in its multiple dimensions and therefore were not selected. Other studies did not make clear which human groups were the target of the study, presenting them in a generalist manner, such as the traditional populations of the Atlantic Forest. This, in a way, made it difficult to analyze the data on which human groups have been the target of studies in this area of knowledge, not to mention the controversial issue of intellectual property discussed worldwide.

In addition to the assessment of research projects, we also conducted a search on events organized in Brazil and supported by FAPESP in the area of ethnoecology and related areas. We used the same keywords for the project search. Notably, we considered only support for the organization of events; the modality participation in events (in Brazil or abroad) was not considered herein, as detailed in Table 1 and in Figure 1.

For the analysis of the projects and events, we used descriptive statistics and content analysis of the key questions and objectives of the projects.

2. Results and discussion

The following provides an overview of the distributions of projects and events over the decades and the areas chosen for submissions. Subsequently, we discuss the focuses of the studies conducted and how they have transformed over the decades. The subtitles of the sections for each decade reflect the main research questions investigated at the time. Finally, we present the main human groups investigated.

Table 1. The 75 projects in the Ethnoecology area (Regular Support, Thematic and Young Researcher) and the 21 Events supported by FAPESP between 1962 and 2022.

N°	Period	Process Number (Area)	Coordinator	Project name
				(♦ Regular Support, ♣ Thematic, ♠ Young Researcher, *BIOTA Program)
Projects (1990–1999)				
1	1992–1993	92/01390-9 (Ecosystem Ecology)	Alpina Begossi	Forrageamento ótimo: pesca e dieta em comunidades de pescadores da região de Ubatuba – II parte.♦
2	1993–1994	93/00433-9 (Social Psychology)	Maria Luisa Sandoval Schmidt	Existência, tradição e religiosidade em comunidades da Estação Ecológica Juréia-Itatins♦
3	1993	92/04691-0 (Indigenous Ethnology)	Lux Boelitz Vidal	Os Kayapó-Xikrin: relações de gênero e socialização das crianças♦
4	1994	94/02877-4 (Indigenous Ethnology)	Lux Boelitz Vidal	Socialização das crianças e transmissão de conhecimento entre os Kayapo-Xikrin do Bacaja.♦
5	1995–1996	95/02193-0 (Indigenous Ethnology)	Dominique Tilkin Gallois	Representações do mundo da floresta entre os Waiãpi do Amapari♦
6	1995–1996	95/01702-9 (Anthropological Theory)	Maria Manuela Ligeti Carneiro da Cunha	A pedra da serpente: saber e classificação na etnozoologia Katukina.♦
7	1995–1996	95/03605-0 (Indigenous Ethnology)	Maria Aracy de Pádua Lopes da Silva	Aves e símbolos – conhecimento e cosmologia Xavante.♦
8	1995–1997	94/06258-7 (Ecosystem Ecology)	Alpina Begossi	Uso de recursos por comunidade de caiçaras da mata Atlântica: etnobiologia, modelos de subsistência e territorialidade.♦
9	1996–1999	96/03697-5 (Indigenous Ethnology)	Lux Boelitz Vidal	Os estilos tecnológicos e seus significados culturais: uma etnografia das técnicas de produção dos sistemas visuais dos Koyapo-Xikrin e dos Asurini do Xingu.♦
10	1996–1998	96/01036-1 (Ecosystem Ecology)	Alpina Begossi	Uso de recursos no Médio Araguaia: pesca, uso de peixes e plantas, e tabus alimentares♦
11	1997–1999	96/07485-2 (Rural Anthropology)	Walter Neves	Consumo alimentar, nutrição e desenvolvimento: a práxis da intervenção em duas comunidades caboclas da Ilha de Ituqui, Baixo Amazonas, Pará♦
12	1997–2000	95/04560-0 (Indigenous Ethnology)	Sílvia Maria Schmuziger de Carvalho	A “anga ete”: pensamento mítico e práticas guaranis; e seus modelos♦
13	1997–2001	95/09512-4 (Ethnopharmacology)	Luiz Claudio Di Stasi	Estudo etnofarmacológico na Floresta Tropical Atlântica (SP) e triagem farmacológica de espécies nativas com atividade analgésica e antiulcerogênica♣
14	1997–1998	96/08127-2 (Applied Botany)	Maria Christina de Mello Amorozo	Concepções de saúde-doença – uso de plantas medicinais e procedimentos preventivos pelas comunidades de agricultores tradicionais do Município de Santo Antônio de Laverger, Mato Grosso.♦
15	1997–1998	97/03681-4 (Rural Anthropology)	Maria Manuela Ligeti Carneiro da Cunha	A pedra da serpente: saber e classificação na etnozoologia katukina.♦
16	1998–2000	98/03760-4 (Applied Botany)	Lin Chau Ming	Plantas medicinais do horto Florestal de Itatinga: uma visão do uso pelos moradores da comunidade.♦
17	1998–1999	98/05322-4 (Applied Botany)	Lin Chau Ming	Uso de plantas medicinais pela comunidade de moradores da Fazenda Lageado – Botucatu/USP.♦
18	1999–2002	97/14514-1 (Rural Sociology)	Alpina Begossi	Floresta e mar: usos e conflitos no Vale do Ribeira e Litoral Sul do estado de São Paulo♣
19	1999–2001	99/00146-6 (Applied Ecology)	Marta Mirazón Lahr	Crescimento, fertilidade e Reprodução social: adaptações biológicas e sociais da população de Mamirauá.♦
20	1999–2020	99/05061-9 (Ethnopharmacology)	Elisaldo Luiz de Araújo Carlini	Usos tradicionais de plantas psicoativas por dois grupos humanos no Brasil: uma reflexão sobre a simbólica e princípios ativos.♦

Continue...

...Continuation

Projects (2000–2009)				
1	2000–2002	00/07963-9 (Geology)	Arlei Benedito Macedo	Mapeamento participativo do uso de recursos naturais feito pelos moradores do Parque Nacional do Jaú, Amazonas♦
2	2000–2003	01/00718-1 (Theoretical Ecology)	Alpina Begossi	Pesqueiros e territórios na pesca artesanal, parte II: áreas costeiras do Rio de Janeiro e da Bahia.♦
3	2000–2004	99/04529-7 (Ecosystem Ecology)	Walter Barrella	Os peixes e a pesca na Mata Atlântica do sul de estado de São Paulo (Brasil)♦*
4	2000–2001	98/16160-5 (Ecology)	Alpina Begossi	Uso de recursos do Rio Negro: etnoictiologia e etnobotânica de ribeirinhos♦
5	2001–2003	01/01091-2 (Ethnopharmacology)	Lin Chau Ming	Plantas antimaláricas da calha do Rio Solimões e região de Manaus.♦
6	2002–2004	01/14526-7 (Ecology)	Alpina Begossi	Etnoecologia de peixes marinhos comerciais tropicais no litoral da Bahia e de São Paulo.♦
7	2002–2003	01/07618-2 (Applied Ecology)	Alpina Begossi	Manejo local e conservação de recursos naturais na Mata Atlântica (Vale do Ribeira, São Paulo)♦
8	2002–2003	01/10822-0 (Anthropology)	Lux Boelitz Vidal	Produção, uso e descarte da cultura material e a formação do registro arqueológico; um estudo da cerâmica dos Asuriní do Xingu e da cestaria dos Kayapó-Xikrin sob uma perspectiva etnoarqueológica♦
9	2003–2005	02/10259-7 (Indigenous Ethnology)	Dominique Tilkin Gallois	Documentação Wajãpi: memória para o futuro♦
10	2003–2005	03/02952-7 (Indigenous Ethnology)	Fabiola Andréa Silva	A curadoria da coleção etnográfica Kayapo-Xikrin no âmbito do museu de arqueologia e etnologia da Universidade de São Paulo.♦
11	2003–2007	01/05263-2 (Ecology)	Alpina Begossi	Etnoecologia do mar e da terra na costa paulista da Mata Atlântica: áreas de pesca e uso de recursos naturais♦*
12	2003–2005	02/09467-4 (Plant Genetics)	Elizabeth Ann Veasey	Coleta, uso e caracterização da diversidade genética de germoplasma de batata-doce (<i>Ipomea batatas</i> (L.) (Lam.) e cará (<i>Dioscorea</i> spp.) em roças de agricultura tradicional do Vale do Ribeira, SP, Brasil.♦
13	2003–2006	02/07687-7 (General Biology)	Lin Chau Ming	Estudos etnobotânicos qualitativos e quantitativos em comunidades tradicionais no PETAR – Parque Estadual e Turístico do Alto Ribeira e seu entorno, Iporanga – SP♦*
14	2004–2005	04/06782-1 (Anthropology)	Fabiola Andréa Silva	Cultura material e dinâmica cultural: um estudo etnoarqueológico sobre os processos de manutenção e transformação de conjuntos tecnológicos entre os Asuriní do Xingu♦
15	2004–2006	04/02301-9 (Ecosystem Ecology)	Alpina Begossi	Etnobiologia de pescadores artesanais da costa do Brasil.♦
16	2005–2007	05/00117-9 (Rural Anthropology)	Rui Sérgio Sereni Murrieta	Antropologia ecológica da agricultura de corte e queima de populações quilombolas do Vale do Ribeira, SP♦
17	2005–2009	04/04677-6 (Phytotechnics)	Izabel de Carvalho	Estudo etnobotânico dos recursos vegetais nos terreiros de uma comunidade remanescente de quilombos do Vale do Ribeira, SP.♦
18	2006–2007	06/50221-0 (Ecology)	Miguel Petrelli Junior	Uso de recursos pesqueiros no Médio Rio Negro (AM).♦
19	2006–2008	05/60226-6 (Anthropology)	Fabiola Andréa Silva	Cultura material e dinâmica cultural: um estudo etnoarqueológico sobre os processos de manutenção e transformação de conjuntos tecnológicos entre os Asuriní do Xingu.♦
20	2006–2007	06/50818-6 (Indigenous Ethnology)	Dominique Tilkin Gallois	Redes sociais e xamanismo na região do Baixo Oiapoque (AP).♦

Continue...

...Continuation

Nº	Period	Process Number (Area)	Coordinator	Project name (♦ Regular Support, ♣ Thematic, ♠ Young Researcher, *BIOTA Program)
21	2006–2008	06/50435-0 (Ecology)	Alpina Begossi	Etnobiologia de peixes costeiros: Centropomidae, Serranidae e Pomatomidae♦
22	2007–2008	06/56240-6 (Pharmacognosy)	Eliana Rodrigues	Plantas brasileiras com possíveis efeitos no Sistema Nervoso Central descritas em literatura antiga.♦
23	2007–2008	06/59861-1 (Pharmacognosy)	Eliana Rodrigues	Implantação de um Centro de Estudos Etnobotânicos e Etnofarmacológicos (CEE) – UNIFESP♦
24	2007–2009	06/54312-0 (Genetics)	Teresa Losada Valle	Estudos comparativos de informações etnobotânicas e biológicas em mandioca (<i>Manihot esculenta</i> Crantz) visando uma possível estruturação genética da espécie.♦
25	2007–2010	07/02557-1 (Interdisciplinary)	John Bernhard Kleba	Acesso aos recursos genéticos, conhecimentos tradicionais associados e repartição de benefícios: lei e prática no Brasil♦
26	2008–2010	08/52446-4 (Rural Anthropology)	Rui Sérgio Sereni Murrieta	Memoria social e ecologia histórica: a agricultura de coivara das populações quilombolas do Vale do Ribeira e sua relação com a formação da mata Atlântica local♦
27	2008–2010	08/50243-9 (Pharmacognosy)	Eliana Rodrigues	Drogas vegetais comercializadas nas ruas da cidade de Diadema: uma avaliação interdisciplinar.♦
28	2008–2010	07/04805-2 (Plant Genetics)	Elizabeth Ann Veasey	Diversidade genética em acessos de inhame (<i>Dioscorea</i> spp.) originários de roças de agricultura tradicional e variedades comerciais avaliados por marcadores microsatélites♦
29	2008–2010	08/00080-6 (Applied Ecology)	Nivaldo Nordi	Sustentabilidade de Sistemas alimentares e Produtivos em Comunidades locais da Região Lagunar de Cananéia e Iguape, SP♦
30	2008–2010	07/58700-7 (Ecology)	Alpina Begossi	Ecologia e etnoecologia de Lutjanidae♦
31	2009–2011	08/03822-3 (Applied Ecology)	Elizabeth Ann Veasey	Conservação da agrobiodiversidade e dinâmica sócio-econômica entre pequenos agricultores em comunidades rurais da Baixada Cuiabana em Mato Grosso♦
32	2009–2011	08/10631-0 (Other Specific Sociologies)	João Luiz de Moraes Hoefel	Pharmacia do mato: transformações socioambientais e uso de plantas medicinais nas APA's Cantareira (SP) e Fernão Dias (MG)♦
33	2009–2011	08/58278-6 (Archeology)	Fabiola Andréa Silva	Território e história dos Asurini do Xingu: um estudo bibliográfico e etnoarqueológico sobre a trajetória histórica dos Asurini do Xingu (seculo XIX aos dias atuais)♦
34	2009–2011	08/08737-4 (Applied Ecology)	Flavio Antonio Maës dos Santos	Avaliação do impacto ecológico do extrativismo sobre populações de duas espécies de cerrado: <i>Mauritia flexuosa</i> L.f (Arecaceae) e <i>Himatanthus drasticus</i> (Mart.) Plumel (Apocynaceae)♦
Projects (2010–2019)				
1	2010–2012	09/53382-2 (Pharmacognosy)	Eliana Rodrigues	Levantamento etnofarmacológico entre os caboclos da Reserva Extrativista do Rio Unini, AM♦*
2	2010–2014	9/11154-3 (Applied Ecology)	Alpina Begossi	Ecologia da pesca artesanal em Paraty: forrageio ótimo e etnoecologia♣
3	2010–2012	09/52539-5 (Applied Ecology)	Rui Sérgio Sereni Murrieta	Etnoecologia de grandes mamíferos em capoeiras de duas comunidades quilombolas do Vale do Ribeira, SP.♦
4	2011–2015	09/53638-7 (Ethnopharmacology)	Lin Chau Ming	Rede de pesquisa de compostos químicos vegetais para controle de malária a partir da etnofarmacologia nos estados do Amazonas e Acre♣
5	2011–2014	11/10529-3 (Fishery Resources and Fishery Engineering – Marine)	Lucy Satiko Hashimoto Soares	Função da Baía de Todos os Santos no ciclo de vida das raias♦

Continue...

...Continuation

6	2012–2014	11/19108-0 (Applied Ecology)	Renata Pardini	Determinantes da atividade e consumo de caça em região de fronteira agrícola na Amazônia Oriental♦
7	2013–2015	12/17651-1 (Human Geograpy)	Cristina Adams	Impactos do sistema agrícola itinerante sobre os solos de remanescente de Mata Atlântica com uso e ocupação por comunidades quilombolas no Vale do Ribeira (São Paulo, Brasil)♦
8	2013–2015	12/24520-0 (Applied Botany)	Lin Chau Ming	Avaliação de mudanças ambientais, culturais e socioeconômicas como fatores de efeito no uso e conservação de plantas medicinais por comunidades remanescentes de Quilombo no município de Alcântara, Maranhão♦
9	2014–2018	13/00069-0 (Prehistoric Archeology)	Pedro José Tótora da Glória	Saúde e estilo de vida dos Paleoamericanos de Lagoa Santa: uma abordagem etnobiológica♦
10	2015–2016	14/26084-9 (Indigenous Ethnology)	Dominique Tilkin Gallois	Diálogos ameríndios: uma experiência de escuta e registro de saberes indígenas♦
11	2016–2020	14/16939-7 (Applied Ecology)	Alpina Begossi	Pescadores & garupas [<i>Epinephelus marginatus</i>]: ecologia, etnoecologia e segurança alimentar na costa brasileira♣
12	2016–2018	15/12046-0 (Pharmacognosy)	Eliana Rodrigues	Etnobotânica participativa: conservação e desenvolvimento local no Parque Estadual da Serra do Mar – Núcleo Picinguaba, Ubatuba, SP, Brasil♦*
13	2016–2018	15/19439-8 (Applied Ecology)	Cristiana Simão Seixas	Gestão de recursos naturais em sistemas socioecológicos: integrando conservação ambiental e desenvolvimento local♦*
14	2017–2019	16/07756-1 (Other Specific Sociologies)	Celia Regina Tomiko Futemma	Pequenos Produtores Rurais, Gestão, Cooperação e os Sistemas Complexos Sócio-Ecológicos♦
15	2017–2019	16/23183-1 (Public Health Nursing)	Eliseth Ribeiro Leão de Andrade Silva	Saúde indígena: aspectos culturais da experiência dolorosa em indígenas do Amazonas♦
16	2017–2022	16/04680-4 (Interdisciplinary)	Helbert Medeiros Prado	A práxis na paisagem e a experiência do conhecimento ecológico entre quilombolas e caboclos (Mata Atlântica e Amazônia)♣
17	2018–2022	17/25157-0 (Prehistoric Archeology)	Jennifer Watling	Pessoas, plantas e paisagens na Amazônia♦
18	2019–2023	19/07794-9 (Prehistoric Archeology)	Eduardo Góes Neves	Povos indígenas e o meio ambiente na Amazônia Antiga♣
Projects (2020–2022)				
1	2020–2022	18/16648-3 (Taxonomy of Recent Groups)	Domingos Garrone Neto	Desvendando aspectos taxonômicos e biológicos do trairão, <i>Hoplias lacerdae</i> Miranda-Ribeiro, 1908 (Teleostei, Characiformes, Erythrinidae), uma espécie ameaçada no Estado de São Paulo, sudeste do Brasil♦*
2	2020–2022	19/27565-4 (Human Geography)	Raul Borges Guimarães	Nhemboaty Mirim : um sistema de vigilância e monitoramento saudável e sustentável do Parque Estadual da Serra do Tabuleiro e da Terra Indígena Morro dos Cavalos (SC) com base em geotecnologias e mapeamento participativo♦
3	2020–2023	19/19313-5 (Pharmacognosy)	Eliana Rodrigues	Etnobotânica participativa: conservação e desenvolvimento local no Parque Estadual Serra do Mar – Núcleo Picinguaba, Ubatuba, SP, Brasil – fase 2♦*
Events (Década de 1980–1989)				
1	1984	84/02780-9 (Zoology)	Nelson Papavero	Mini-Curso sobre Etnozoologia
Events (Década de 1990–1999)				
1	1998	98/04817-0 (Botany)	Lin Chau Ming	2º Simpósio de Etnobotânica e Etnoecologia, São Carlos – SP

Continue...

...Continuation

N°	Period	Process Number (Area)	Coordinator	Project name
				(♦ Regular Support, ♣ Thematic, ♠ Young Researcher, *BIOTA Program)
Events (Década de 2000–2009)				
1	2000	00/03934-4 (Applied Botany)	Lin Chau Ming	3 Simpósio Brasileiro de Etnobiologia e Etnoecologia, Piracicaba, S.P.
2	2001	01/09944-4 (Applied Ecology)	Maria Christina de Mello Amorozo	1.o Seminário de Etnobiologia e Etnoecologia do Sudeste, Rio Claro, SP
3	2002	01/05730-0 (Anthropological Theory)	Walter Neves	Workshop modernidade invisibilidade sociedades caboclas na Amazônia, São Paulo, SP
4	2002	01/14293-2 (General Biology)	Lin Chau Ming	4 Simpósio Brasileiro de Etnobiologia e Etnoecologia, Recife, PE
5	2006	06/52840-9 (Ethnopharmacology)	Lin Chau Ming	7 Workshop de Plantas Medicinais: da planta ao Medicamento, Botucatu, SP
6	2006	06/56912-4 (Applied Botany)	Lin Chau Ming	6 Simpósio Brasileiro de Etnobiologia e Etnoecologia, Porto Alegre, RS
7	2007	06/59743-9 (Ecology)	Alpina Begossi	15th International Conference of the Society for Human Ecology, Rio de Janeiro, RJ
8	2007	07/51011-1 (Ecology)	Alpina Begossi	Research and education for local populations towards sustainability: examples from fisheries.
9	2007	07/55510-2 (Pharmacognosy)	Eliana Rodrigues	4 Seminário de Etnobiologia e Etnoecologia do Sudeste, Diadema, SP
Events (Década de 2010–2019)				
1	2010	10/51545-9 (Chemistry)	Vanderlan da Silva Bolzani	XXI Simpósio de Plantas Medicinais do Brasil, João Pessoa – PB
2	2012	12/14309-0 (Pharmacognosy)	Vanderlan da Silva Bolzani	XXII Simpósio de Plantas Medicinais do Brasil
3	2013	13/00537-4 (Interdisciplinary)	Jose Carlos Sebe Bom Meihy	Seminário Internacional “Conhecimentos compartilhados: tradição e modernidade”
4	2013	13/16053-6 (Applied Botany)	Lin Chau Ming	VI Seminário de Etnobiologia e Etnoecologia do Sudeste
5	2015	15/08991-1 (Medicine)	Carlos Eduardo Pereira Corbett	Simpósio Antropologia Médica: Visões sobre os sofrimentos: análise interdisciplinar das diversas concepções culturais sobre a saúde.
6	2015	15/06748-2 (Museology)	Marília Xavier Cury	IV Encontro Paulista Questões Indígenas e Museus / V Seminário Museus, Identidades e Patrimônios Culturais
7	2016	16/04513-0 (Applied Ecology)	Dalva Maria da Silva Matos	II Simpósio Internacional de Ecologia
8	2016	16/17462-5 (Pharmacognosy)	Dulce Helena Siqueira Silva	XXIV Simpósio de Plantas Medicinais do Brasil
9	2017	17/03582-1 (Interdisciplinary)	Luiz Felipe Domingues Passero	Busca por Compostos Ativos para as Doenças Causadas por Protozoários – Do Conhecimento Tradicional à Síntese Estrutural
10	2017	17/14143-9 (Pharmacognosy)	Rosemeire Cristina Linhari Rodrigues Pietro	XIII Jornada Paulista de Plantas Medicinais

An Overview of Projects and Events Funded Over Six Decades

A total of 75 projects were located, of which 66 (88%) were funded through the Regular Support modality, three were funded through the Young Researcher modality (4%) and six were funded through

the Thematic modality (8%), in addition to eight developed under the BIOTA Program (Table 1).

The first projects included in the BIOTA Program date to 2003, four years after its creation, on March 25, 1999. Since then, only 14.5% of the 55 projects subsequent to this date were developed within the BIOTA Program. As the pillars of this program are

Ethnoecological studies supported by FAPESP

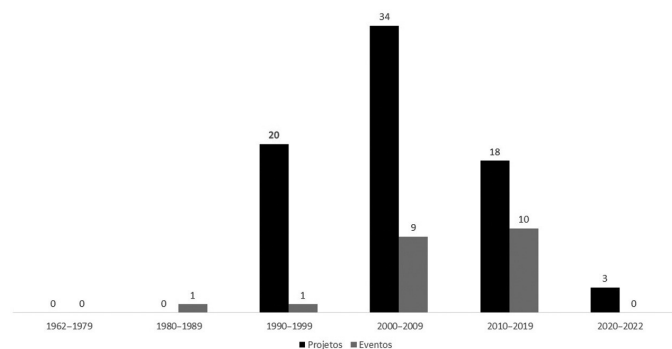


Figure 1. The 75 projects (Regular Support, Young Researcher and Thematic) and the 21 events supported by FAPESP in the six periods. Data collected on 15/1/2022 from the virtual library of FAPESP (and data provided by the Scientific Coordination of FAPESP) using the following keywords: ethnoecology, ethnobiology, ethnoscience, ethnoichthyology, ethnotaxonomy, ecological anthropology, ethnobotany, ethnozoology, ethnopharmacology, traditional knowledge, traditional ecological knowledge, indigenous knowledge, ethnography, ethnoarcheology, and human ecology.

the characterization, conservation, restoration and sustainable use of biodiversity and considering the contribution that projects in ethnoecology and related areas generate for this program, the findings of this assessment make it clear the importance of better publicization of the BIOTA Program among researchers in the area and of opening specific calls for this area, including thematic projects. A key requirement for the success of such calls though is the adoption an interdisciplinary evaluation panel, including reviewers from both social and biological sciences.

Thematic projects enable connections among various areas of knowledge around a theme – these connections are also a striking character of ethnoecology, which involves professionals from various areas of knowledge and from various sectors of society, including researchers, managers and traditional communities, functioning as a team. However, less than 8% of the projects funded by FAPESP in the period analyzed were thematic projects, and only three researchers were among those who obtained projects within this modality: Alpina Begossi (State University of Campinas/UNICAMP), Lin Chau Ming (State University of São Paulo/UNESP) and Eduardo Góes Neves (University of São Paulo/USP).

When considering the totality of projects, the researchers who received the most funding from FAPESP to advance research in the field of ethnoecology and related areas – those with three or more projects – were Alpina Begossi (14 projects); Lin Chau Ming and Eliana Rodrigues (6 each); Dominique Tilkin Gallois, Lux Boelitz Vidal and Fabiola Andréa Silva (4 each); and Rui Sérgio Sereni Murrieta (3). Alpina Begossi was not only one of the pioneers of the field of ethnoecology, ethnobiology and human ecology in Brazil, training several researchers, but is one of the 600 Brazilian researchers among the 100,000 most influential scientists in the world according to the PLOS Biology ranking. Alpina's more than 160 scientific publications indicate the scope of the funding received by FAPESP.

Figure 1 provides an overview of the distribution of the 75 projects supported by FAPESP in the last six decades (1962–2022)

in ethnoecology and related areas. There are practically no projects on this topic in the first two decades; therefore, the focus of our analyses will be on the last four decades. Notably, there was a considerable increase in projects in the areas under study between 1990–1999 (20 projects) and 2000–2009 (34 projects) and a sharp decline observed between 2010–2019 (18 projects). This can be explained by several factors, including i) a crisis in the scientific area of study due to the Brazilian legislation regarding access to traditional knowledge, with the promulgation of Provisional Measure no. 2.186–16 of August 23, 2001 (repealed by Law no. 13.123, of 2015 and still in force), which hindered the development of several projects for more than a decade; and ii) cases of unfounded accusations of biopiracy (such as the “Krahô Case”) among Brazilian researchers, leaving out foreigners and NGOs.

Although the decade beginning with 2020 includes only 2 years and therefore cannot be compared to the others, there are three projects in progress (Figure 1). It is possible that there will be a decline in projects approved in this period due to the COVID-19 pandemic, which began in early 2020, and the institutional dismantling carried out by the federal government starting in 2019. This situation caused delays in several projects, if not all, due to the very nature of these lines of research, which involve direct contact between researchers and traditional communities during fieldwork. Because they are socially vulnerable, these communities were even more isolated during the pandemic and vulnerable to invasions and other violence in their territories. Field work, therefore, had to be canceled and/or postponed for up to two or more years.

Regarding scientific events, in the last six decades, FAPESP has supported the organization of 21 events in Brazil, four of which were international in scope and most of which (90%) occurred in the first two decades of this century (Table 1, Figure 1). With the exception of the Mini-Course on Ethnozoology (process 84/02780-9), Campinas-SP, under the responsibility of Nelson Papavero and organized by the Brazilian Society of Zoology, no event before 1990 had a specific focus in the area of ethnoecology; however, it is possible that in that period, this area of study was included in the agenda of other events, albeit in a discrete manner, such as conferences on botany, ecology and zoology. The decade of 2020 began with a pandemic, resulting in a decline in the provision of face-to-face events worldwide. The researchers who contributed most to the organization of events in this area of knowledge were Lin Chau Ming (6 events) and Alpina Begossi and Vanderlan da Silva Bolzani (2 each).

The requests to FAPESP for funding the 75 projects and organizing the 21 events were made within seven major areas (fields), 19 areas and 20 subareas of knowledge (Table 2). The submissions were concentrated in biological sciences (46.7% of the projects and 47.6% of the events) and human sciences (38.7% of the projects), with an emphasis on the area of ecology, in particular the subareas of applied ecology and anthropology. In particular, i regarding indigenous ethnography, both subareas represent 13% of all approved projects. Together, the projects in the areas of pharmacology (biological sciences) and pharmacy (health sciences) also account for 13% of all projects, highlighting once again the challenges of choosing an area of knowledge for the submission of projects.

Table 2. Major areas, areas and subareas of FAPESP where the 75 projects and the 21 events were sent.

Major areas, areas and subareas	Projects (75)	Events ¹ (21)
Biological Sciences	35	10
General Biology	1	1
Botany	–	1
Botany – Applied Botany	4	3
Pharmacology – Ethnopharmacology	4	1
Ecology	6	2
Ecology – Ecosystem Ecology	5	–
Ecology – Applied Ecology	10	2
Ecology – Theoretical Ecology	1	–
Genetics	1	–
Genetics – Plant Genetics	2	–
Zoology – Taxonomy of Recent Groups	1	–
Humanities	29	1
Anthropology	3	–
Anthropology – Rural Anthropology	3	–
Anthropology – Indigenous Ethnology	10	–
Anthropology – Anthropological Theory	2	1
Archeology	1	–
Archeology – Prehistoric Archeology	3	–
Sociology – Other Specific Sociologies	2	–
Sociology – Rural Sociology	1	–
Geography – Human Geography	2	–
Psychology – Social Psychology	1	–
Health Sciences	7	5
Medicine	–	1
Pharmacy – Pharmacognosy	6	4
Nursing – Public Health Nursing	1	–
Agricultural Sciences	2	–
Agronomy – Phytotechnics	1	–
Fishery Resources and Fishery	1	–
Engineering – Marine Fishery Resources	–	–
Exact and Earth Sciences	1	1
Geosciences – Geology	1	–
Chemistry	–	1
Applied Social Sciences	–	1
Museology	–	1
Interdisciplinary	2	2

¹For a 1985 event, there are no data on the area.

1. Before the 1990s: The beginnings of Ethnoecology in Brazil

Although only one project was approved by FAPESP before 1990 related to the theme of ethnoecology, it is important to highlight the relevance of the work of Antônio Carlos Diegues from USP before and after this date, supporting important concepts in this area of knowledge.

References include the books “Fishermen, peasants and sea workers” (1983) and “The Modern Myth of Untouched Nature” (1994). In addition, he published a series of books on the subject, including the “Extractive Reserve of the Mandira Neighborhood (Cananéia, São Paulo): The Viability of an Uncertainty” (1999), whose publication was supported by FAPESP. The themes of his works touch on a delicate subject within ethnoecology: the rights of traditional populations.

Another researcher who greatly contributed to the advancement of knowledge in the area under analysis before 1990 was Mauro William Barbosa de Almeida from UNICAMP, who participated in the creation of the Alto Juruá Extractive Reserve in 1990 – the first of its kind in Brazil – and the planning of the University of the Forest (Universidade Federal do Acre – Acre Federal University – Campus Floresta). Among his most relevant works published in the following decades are “Indigenous people, traditional people, and conservation in the Amazon” (2000) and “The Forest Encyclopedia. The Upper Juruá: Practice and knowledge of the populations” (2002), both in coauthorship with Manuela Carneiro da Cunha.

2. The 1990s: “Human ecology and the use of natural resources”

In this decade, based on the objectives of the various projects, we found that FAPESP supported studies whose focus was mainly on four questions. Below, we present the questions as well as the main areas and subareas of research:

Question 1: What biotic and abiotic elements are used in the various practices involving traditional knowledge: fishing, body painting, food production and medicine? [Ethnoichthyology/Ethnozology, Ethnobotany, Evolutionary Human Ecology, Ethnopharmacology, and Ethnoarcheology];

Question 2: What are the processes of elaboration and transmission of traditional knowledge? [Ethnotaxonomy and Cosmology];

Question 3: How can traditional knowledge about biotic and abiotic elements help in local management proposals? [Conservation and Management]; and

Question 4: What are the impacts of implementing a protected area on the life of local communities? [Evolutionary Human Ecology, Conservation and Management].

Question 1 addresses everything from records, the valuation and preservation of traditional knowledge, and support for ecological analyses to the development of bioactive potentials. We identified comparative studies from traditional communities of two or more regions of Brazil. Most studies in this decade focus on questions 1 and/or 2, i.e. understanding and recording of the uses of biotic and abiotic elements, whether as use strategies or cosmology. Only three of the 20 projects in this decade address questions 3 and/or 4, i.e., management and conservation aspects. In this phase, the focus on conservation and management appears discretely; however, these scopes are strengthened in the projects that occur during the next decade.

The projects that occurred in this decade primarily employ observational and descriptive-exploratory methods. From a qualitative

point of view, the studies are based on ethnographic research techniques (unstructured, semistructured and structured interviews; participant observation; field diaries; and life histories). From a quantitative point of view, ecological models (territoriality, optimal foraging, and diversity indexes) and archeological methods are observed. Many studies involved the collection of biodiversity specimens for scientific records, and some used comparative methods to contrast different communities/regions of Brazil.

In general, the science practiced in this decade was ‘extractive science’, where the focus was documenting traditional knowledge (still very incipient in Brazil) and understanding the human-nature relationship, without an explicit concern for the empowerment of traditional peoples and communities through their knowledge and rights (e.g., with the development of outreach activities).

3. *The 2000s: From human ecology to the local management of natural resources*

In this decade, some of the questions that guided the research in the previous decade continued to be explored (questions 1, 2 and 3), and new approaches emerged (questions 5 and 6, below, and their respective areas and subareas). There are also a large number of studies related to Question 1 that contribute to anthropological and ecological analyses, such as food taboos and natural resource abundance. New elements, especially regarding the aspects of conservation and management, emerge in an expressive manner and constitute the majority of the projects conducted in this decade, focusing mainly on questions 3, 5 and 6. As in the previous decade, some projects establish comparisons between communities.

Question 5: How does a given human group appropriate the environment and its resources and relate to it? [Ethnoarcheology and Human Ecology]; and

Question 6: What are the praxis of local management of biotic resources? [Management and Conservation].

In this decade, however, there were three projects that sought documentation of indigenous knowledge through the collection and curation of objects and research on indigenous languages. Another project addressed the issue of access to traditional knowledge and associated genetic resources, in light of Provisional Measure no. 2.186-16 of August 23, 2001, and its negative impacts on research in the field of ethnoecology. The effects of this Provisional Measure lasted for more than a decade, but for traditional communities, its replacement by Law 13.125/2015 has been even more harmful (Guetta and Bensusan 2018), especially with regard to agrobiodiversity (Carneiro da Cunha 2009). In this decade, the creation of the Center for Ethnobotanical and Ethnopharmacological Studies (Centro de Estudos Etnobotânicos e Etnofarmacológicos – CEE) at the Federal University of São Paulo was supported by FAPESP.

Regarding research methods, in addition to those mentioned in the previous decade, other methods emerged in this new decade, among which are the use of GPS and participatory mapping; the classification of satellite images; the inclusion of documentary and bibliographic research; and the performance of focus groups. In this period, although still incipient, there was more active engagement with and participation

by research subjects in the generation of scientific knowledge, as in the case of participatory mapping. It is also explicitly mentioned in the summary of one of the projects that a “*commitment will be made with the informant regarding the disclosure and use of information.*” At that time, it was not yet common practice in Brazilian academies for ethics committees to approve projects with human beings, except in the area of Health Sciences, or even to require a free and informed consent form for the research participants.

4. *The 2010s: From local management to participatory management*

In this decade, we observed a large number of studies related to question 1, contributing to analyses on the use of natural resources, such as lists of plants with various ethnobotanical uses and with bioactive potential, already found in previous decades. We also observed studies related to how human groups appropriate the environment and manage its resources (questions 3, 5 and 6). However, new questions arise, focusing on the self-organization of peoples and communities for resource management, the inclusion of knowledge from traditional communities in the shared management of the areas they occupy and of protected areas and the promotion of the autonomy of the communities to document their own knowledge (questions 7, 8 and 9, below, respectively). Question 7 concerns the local institutional arrangements (including partnerships with external actors) that allow such groups to manage local resources. Question 8 addresses a new paradigm for management by environmental agencies by recognizing and valuing the local management practiced by traditional communities, integrating them into protected areas’ management plans and acknowledging the presence of these communities in no-take protected areas. This theme is connected to the precepts of ethnoconservation (Diegues 2000).

Conversely, question 9 addresses the possibility of traditional community protagonism regarding the registration of their own culture and knowledge, based on technical-scientific training, offering alternatives to the globally controversial topic on the right to intellectual property of such cultures. The idea of this approach is that the active participation of traditional communities in recording their own knowledge can increase their empowerment in decision-making regarding the use and management of available resources in their territory, thus increasing the chance of success in promoting conservation and local development. In this decade, we highlight the cooperation agreement between FAPESP and the Secretariat of Infrastructure and Environment – Forestry Foundation (SIMA – FF), which contributed to the advancement of ethnoecology because one of the pillars of this agreement is the promotion of shared management of protected areas among residents and protected areas’ managers as well as researchers from institutes and universities; however, this does not hold true for all protected areas (Andriolli et al. 2016, Castro 2017).

Regarding the protagonism of traditional peoples and communities, a project that aimed to promote dialog between scholars and indigenous people in an innovative way – bringing holders of traditional knowledge to ‘talk’ within the academy – is noteworthy.

Question 7: How are traditional populations organized to manage their own resources? [Ethnoconservation, Conservation and Management; Self-organization; and Shared Management]

Question 8: How can local management practices be used as a basis for the promotion of participatory management policies and plans? [Ethnoconservation, Conservation and Management; and Shared Management] and

Question 9: How can traditional peoples and communities be protagonists in the documentation of their own knowledge and guarantee the right to their intellectual property? [Training/Empowerment]

In this decade, in addition to the previously used research methods, there is more frequent use of technological resources for field research (e.g., photographic trapping) and more participatory (i.e., less 'extractive') and transdisciplinary research approaches focusing on socioecological systems.

5. *The beginning of the 2020s: Towards greater autonomy of traditional peoples and communities and to local development?*

Of the three projects funded in the beginning of the decade, one focuses on the construction of knowledge about a biological species (question 2) and another on the use of traditional knowledge and geotechnologies for environmental monitoring (questions 3 and 8). A third project that also addresses question 3 employs an innovative approach when compared with those used in previous decades: the generation of income for traditional communities from their knowledge (question 10, below). The project focuses on the development of phytocosmetics and handicrafts, based on traditional knowledge, to be sold in stores within a protected area or at the end of a trail with other medicinal and aromatic plants for tourists – that is, income generation occurs either by residents serving as guides on the trail or by selling phytochemicals and handicrafts made from the plants on trails and from participatory management plans.

Question 10: How can the knowledge of traditional peoples and communities (e.g., ethnobotanical) be transformed into local income generation? [Local Development].

In 2021, the BIOTA-FAPESP Program released an announcement in cooperation with the Global Environmental Facility and SIMA/FF to support “Component 1 of the Atlantic Forest Connection Project: Strengthening of the institutional capacity for management and monitoring of carbon stocks and biodiversity”. In item “2.3 Transforming public policies: landscape, environment and people”, the announcement makes clear the importance of exploring investment options that generate income for local communities [considering their knowledge] and the co-conception of public policies involving the government, the public and private sectors, and local communities. Public notices such as this set the tone for possible research approaches that will be funded by FAPESP in the coming years provided that they are evaluated by an interdisciplinary panel of reviewers, and not by a disciplinary committee as has happened.

Notably, the coproduction of knowledge between scientists and traditional peoples and communities is currently the subject of several funding agencies around the world. Increasingly, we will see research with multicultural teams, including indigenous and local community

members in these teams, not only as informants or field assistants but also as team members who contribute from project development to developing the research questions and hypotheses. An excellent example is the Arramat project, which received 24 million Canadian dollars in January 2022 from the Canada Tri-Council Agencies³ to support research with and by indigenous peoples and traditional communities (i.e., led and conducted by them) around the world to “examine the links between the loss of biodiversity and the decline in Indigenous health” with the premise that “indigenous resource management practices are key to ending environmental degradation and loss of cultures while improving health”. The project will last 6 years, involving indigenous people from more than 20 countries and more than 30 languages (<https://arramatproject.org>).

People and Communities Investigated with Support from FAPESP

In the last three decades, FAPESP has supported research both with populations of the state of São Paulo, such as *caiçaras*, *quilombolas*, small farmers, *caboclos*, artisanal fishers and traditional communities in protected areas, as well as with traditional populations and indigenous peoples in other states of Brazil and from other countries. However, efforts were concentrated in only three of the six terrestrial biomes of the country – Atlantic Forest, Amazon Forest and Cerrado – in addition to the Marine-Coastal biome (Table 3). From the description of the projects in abstracts, there were no studies conducted in the Pampa, Pantanal and Caatinga biomes. Furthermore, there were no studies with any indigenous population in the state of São Paulo or with indigenous populations in urban areas (usually expropriated from their lands). Another issue that stands out is that in the abstracts, there is no mention of gender analyses within the populations studied; however, some publications from these projects distinctly present the traditional ecological knowledge of women, men, and youth.

In the 1990s, research focused mainly on more isolated communities and/or protected areas; research with the urban population began to occur only in the 2000s through projects with urban drug and medicinal plant merchants, urban artisanal fishers and sport fishers. Research on ethnoarcheology initiated in previous decades was intensified and expanded in the 2010s, focusing on pre-Colombian peoples, through ethnobiological and paleoecological research and on the interface between archeology and ecology in archeological sites in the Amazon and the Cerrado.

The Unfolding of Ethnocoological Research for the Conservation and Sustainable Use of Biodiversity

The findings of the Intergovernmental Platform for Biodiversity and Ecosystem Services, such as from the Global Assessment (IPBES 2019), the report of the IPBES-IPCC workshop (Portner et al. 2021) and the report of the Brazilian Panel on Climate Change and the Brazilian Platform for Biodiversity and Ecosystem Services (PBMC/BPBES 2018), clarify the intrinsic relationship between biodiversity loss and climate change, highlighting that indigenous peoples and traditional communities are among the most affected and vulnerable by both

³ 2020 New Frontiers in Research Fund (NFRF) – Transformation Stream.

Table 3. Peoples investigated and/or involved in the 75 Projects and biomes where they are located.

Decade	Groups investigated and/or involved (states)	Biomes
1990–1999	Indigenous peoples: <ul style="list-style-type: none"> • Kayapó-Xikrin (PA) • Waiápi (AP) • Katukina (AC) • Xavante (MT) • Guarani (languages: Apapokuva, Kaiwá and Mbyá) Traditional populations and local communities: <ul style="list-style-type: none"> • Caiçaras (SP, RJ); • Artisanal fishers from Araguaia (TO); • Cabocla communities of Santarém (PA); • Farmer communities (MT); • Residents of EE Juréia-Itatins and PETAR* (SP); • Residents of the RDS* of Mamirauá (AM); • Rural residents of Horto Floreal Itatinga (USP) and the Experimental Farm (UNESP Botucatu) (SP) 	<ul style="list-style-type: none"> • Atlantic Forest • Amazon Forest • Cerrado • Marine-coastal
2000–2009	Indigenous peoples: <ul style="list-style-type: none"> • Asuriní do Xingu (PA) • Kayapó-Xikrin (PA) • Wajãpi (AP) • Karipuna (AP) • Galibi-Marworno (AP) • Palikur (AP) • Galibi-Kalinã (AP) Traditional populations and local communities: <ul style="list-style-type: none"> • Residents of Jaú National Park (AM) • Ribeirinhos of Rio Negro (AM) • Coastal artisanal fishers (SP, RJ, BA, AL) • Quilombolas of the Ribeira Valley (SP) • Traditional farmers of the Ribeira Valley (SP). • Traditional communities in PETAR (SP) • Local communities of Cananéia and Iguape (SP) • Small rural farmers of the Baixada Cuiabana (MT) • Rural communities in the cerrado (CE, TO, MG) • Merchants of medicinal plants (SP) 	<ul style="list-style-type: none"> • Atlantic Forest • Amazon Forest • Cerrado • Marine-coastal
2010–2019	Indigenous peoples: <ul style="list-style-type: none"> • Waiapi • Kaiowá • Apalay • Ethnic groups of the Upper Rio Negro and Vale do Javari (AM) • Indigenous peoples of the pre-Colombian Amazon • Paleoamericans of Lagoa Santa (MG) Traditional populations and local communities: <ul style="list-style-type: none"> • Communities of Rio Negro and Purus River (AM, AC) • Caboclos of the Unini River Extractive Reserve (AM) and Amanã Reserve (AM) • Caboclos of the Ribeira Valley (SP) • Quilombolas in the Ribeira Valley (SP) • Quilombo in the municipality of Alcântara (MA) • Coastal artisanal fishers (RJ, BA, other states) • Small farmers/farmers (PA, SP) • Traditional Population of Guyana and Mozambique 	<ul style="list-style-type: none"> • Atlantic Forest • Amazon Forest • Cerrado • Marine-coastal

*EE: Ecological Station; SDR: Sustainable Development Reserve, PETAR: Alto do Ribeira Turistic State Park.

environmental crises. Moreover, they emphasize that the solutions to these crises need to include traditional knowledge in local, regional and global planning to avoid maladaptation (Box 1). All this context

makes clear the importance of research in ethnoecology and related areas on indigenous and traditional knowledge, in particular related to biodiversity and ecosystem services and the “nature’s contributions to

Box 1. Excerpts from the Summary for Policy-Makers of IPCC Climate Change 2022: Impacts, Adaptation and Vulnerability (IPCC 2022).

“Loss of ecosystems and their services has cascading and long-term impacts on people globally, especially for Indigenous peoples and local communities who are directly dependent on ecosystems to meet basic needs (high confidence).”

“Adaptation for natural forests includes conservation, protection and restoration measures. In managed forests, adaptation options include sustainable forest management, diversifying and adjusting tree species compositions to build resilience, managing increased risks from pests and diseases and wildfires, restoring natural forests and drained peatlands and improving the sustainability of managed forests, generally enhancing the resilience of carbon stocks and sinks. Cooperation and even decision-making with local communities and Indigenous peoples as well as recognition of the inherent rights of Indigenous peoples are integral to successful forest adaptation in many areas. (high confidence)”

“Inclusive planning initiatives informed by cultural values, Indigenous knowledge, local knowledge, and scientific knowledge can help prevent maladaptation. (high confidence)”

“Evidence shows that climate resilient development processes link scientific, Indigenous, local, practitioner and other forms of knowledge and are more effective and sustainable because they are locally appropriate and lead to more legitimate, relevant and effective actions (high confidence).”

people” (Diaz et al. 2018), considering that many of these contributions that generate well-being for society in general are coproduced by indigenous peoples and traditional communities.

Notably, however, research in the area should advance in relation to problematizing its approaches, methodologies and results, recognizing that science is constituted by a series of practices that do not occur in a political or social vacuum, as pointed out by Bruno Latour (2000a,b) and Carneiro da Cunha (2009). The utilitarian nature that still characterizes many projects contrasts with new approaches employed by anthropology (Oliveira et al. 2020), with which ethnoecology needs to dialog.

Future Perspectives: From Interdisciplinarity to Transdisciplinarity

From the assessment and analysis conducted, there is no doubt that the field of ethnoecology has been building its space within FAPESP, especially since the 1990s, when important social advances brought by the 1988 Constitution in the field of environmental and human rights were reverberated and important events such as the United Nations Conference on the Environment and Development (UNCED, Rio-92) were held. The Convention on Biological Diversity (CBD), signed at the UNCED, recognized, for the first time, the importance of the knowledge, innovations and practices of indigenous peoples and traditional communities for biodiversity conservation.

As it is clear in the distribution of projects funded by major area, area and subarea of submission (Table 2), the field of ethnoecology and related areas within FAPESP is still under construction, reflecting its theoretical and epistemological position in relation to more consolidated scientific

areas (such as ecology and anthropology, with which it dialogs) and the different scientific traditions of its researchers. Despite the importance of FAPESP valuing nonconsolidated areas, it is necessary to admit that researchers working in interdisciplinary areas with ethnoecology face greater difficulties than do their disciplinary colleagues in the process of submitting projects for funding. The imprecision of the boundaries between disciplines and subdisciplines and the relative lack of credibility for research that investigates other forms of knowledge often leads to a long peer review process due to the difficulty in finding suitable reviewers. Another factor poorly understood in peer evaluations is the fact that the training of researchers in interdisciplinary areas takes longer than in single-discipline areas, affecting the evaluations of the *curricula vitae* of researchers. Moreover, it is necessary to consider different criteria on the basis of each researcher’s area to evaluate their production (e.g., articles for those in biological sciences and books for those in humanities), instead of pre-established metrics; an integrated and more balanced view is necessary.

Once the projects in ethnoecology and related areas are approved, researchers face other difficulties, such as challenges associated with remunerating local community members to participate in meetings and research workshops – because to be present at the meetings, they are failing to perform the activities that generate income for them (unlike researchers and other public servants who earn money for the work they are doing there). Moreover, in Brazil, it is not yet possible to offer scholarships or honorarium for traditional knowledge holders to those who do not have an education or even pay an interview informant for their privileged knowledge, something that has become the policy of funding agencies in other countries, such as the Tri-Council Agencies of Canada mentioned above. In Brazil, in 2011, the Ministry of Science, Technology and Innovation (MCTI) welcomed and put into a multiannual plan a proposal to test an innovative program to support cross-cultural research, bringing together scientists and indigenous peoples, *quilombolas* and members of traditional local communities around topics of mutual interest, and to strengthen independent research undertaken by traditional peoples. One of the projects, inspired by the reports released by the IPBES Platform, gave rise to Traditional People and Biodiversity in Brazil (Carneiro da Cunha et al. 2021–22), but the program was discontinued with the change in management in MCTI. It has already passed the time for us to cross the boundaries of interdisciplinarity to transdisciplinarity, where indigenous peoples and local communities have a fundamental role in the design and implementation of research.

Nevertheless, a point that cannot be left aside is the fact that research projects in this area of knowledge often also have an extensionist character. The dialog between the various forms of knowledge that is promoted in these projects can result in new paradigms for both sides in favor of environmental conservation: traditional communities and technical-academic staff. For example, while technical-academic staff can offer methods to “measure” the sustainability of a given plant management, certain traditional communities also have their own monitoring and management methods. In this sense, the combination of both types of knowledge to create a participatory management plan may generate scientific data on the management of a particular species; at the same time, it promotes the possibility of the legal extraction of the species by a traditional community occupying a protected area. This particularity should be considered as a positive point by the FAPESP review body and not, paradoxically, the reason for rejecting submitted projects, as is commonly observed.

To discuss these and other issues related to ethnoecology and related areas and to maintain the vanguard position of FAPESP vis-à-vis Brazilian funding agencies and even internationally, we recommend the creation of an area (i.e., a specific committee) within the Greater Interdisciplinary Area (which already exists) with a focus on the “human-nature relationship and its various knowledge systems”. The construction of this new area would take place through workshops that would include the participation of researchers from the areas and subareas surveyed here and representatives of indigenous peoples and traditional populations and communities to establish evaluation criteria for projects including the establishment of ethical spaces for the co-construction of knowledge. The BIOTA Program, considering its objectives and pillars, would have great potential to promote such workshops and have in its staff an advisor who addresses the human-nature interface.

Acknowledgments

The authors would like to thank the support given by Fapesp – Biota Program (process number 2019/ 19313-5) for the English review. We also thank anonymous referees for their helpful suggestions in improving this paper.

Conflicts of Interest

The authors declares that they have no conflict of interest related to the publication of this manuscript.

Ethics

This study did not involve human beings and/or clinical trials that should be approved by one Institutional Committee.

References

- ALCORN, J.B. 1993. Indigenous Peoples and Conservation. *Conservation Biology* 7(2): 424–26.
- ANDRIOLLI, C., LIMA, AS & PRADO, DM 2016. A produção de um plano de uso tradicional pelos caiçaras da Juréia: um estudo etnográfico de um experimento de cooperação entre conhecimento tradicional e pesquisa acadêmica. In: 30a Reunião Brasileira de Antropologia, 03 e 06 de agosto de 2016, João Pessoa/PB.
- ARMITAGE, D., BÉNÉ, C., CHARLES, AT, JOHNSON, D & ALLISON, EH. 2012. The interplay of well-being and resilience in applying a social-ecological perspective. *Ecology and Society* 17(4).
- BERKES, F. 1999. *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Taylor & Francis, 1st. ed. Nature, v. 209.
- BRONDIZIO, E., ADAMS, R.T. & FIORINI, S. 2016. History and scope of environmental anthropology. In: *Routledge Handbook of Environmental Anthropology* (eds. Helen Kopnina and Eleonor Shreman-Oumet). Routledge, Abingdon, p. 10–30.
- CARNEIRO DA CUNHA, M. 2009. Relações e dissensões entre saberes tradicionais e saber científico. In: *Cultura com Aspas e outros Ensaios* (Ubu Editora). Cosac Naify, São Paulo, p. 301–310.
- CARNEIRO DA CUNHA, M., MAGALHÃES, S.B. & ADAMS, C. 2021-22. Povos tradicionais e biodiversidade no Brasil – Contribuições dos povos indígenas, quilombolas e comunidades tradicionais para a biodiversidade, políticas e ameaças. SBPC, São Paulo. Available at <http://portal.sbpnet.org.br/publicacoes/povos-tradicionais-e-biodiversidade-no-brasil/> (last access on 03/03/2022)
- CASTRO, RR. 2017. Expulsão por cansaço e resistências: Etnografia das relações de poder no conflito territorial da Jureia (SP). Dissertação (Mestrado em Antropologia Social), Instituto de Filosofia e Ciências Humanas (IFCH), Universidade Estadual de Campinas (UNICAMP).
- DÍAZ, S., DEMISSEW, S., CARABIAS, J., JOLY, C., LONSDALE, M., ASH, N., LARIGAUDERIE, A., ADHIKARI, JR., ARICO, S., BÁLDI, A. & BARTUSKA, A. 2015. The IPBES Conceptual Framework – connecting nature and people. *Current opinion in environmental sustainability*, 14: 1–16.
- DÍAZ, S., PASCUAL, U., STENSEKE, M., MARTÍN-LÓPEZ, B., WATSON, RT., MOLNÁR, Z., HILL, R., CHAN, KM., BASTE, IA., BRAUMAN, KA. & POLASKY, S. 2018. Assessing nature’s contributions to people. *Science*, 359(6373): 270–272.
- DIEGUES, ACSA. 2001. *Ecologia humana e planejamento em áreas costeiras. Núcleo de Apoio à Pesquisa sobre Populações Humanas em Áreas Úmidas Brasileiras-NUPAUB/USP, São Paulo.*
- ELLEN, R & HARRIS, H. 2000. Introduction. In *Indigenous environmental knowledge and its transformations* (R. F. Ellen, P. Parkes & A. Bicker, eds). Harwood, Amsterdam, p. 253–292.
- GUETTA, M & BENSUSAN, N. 2018. Tutela dos Conhecimentos Tradicionais Face à sua Diversidade: A Emergência dos Protocolos Comunitários. In *Propriedades em Transformação: Abordagens Multidisciplinares sobre a Propriedade no Brasil* (eds. Débora Ungaretti, Marília Rolemberg, Diogo R. Coutinho, Flávio Marques Prol, Iagê Zendron Miola, Tomaso Ferrando). Blucher, São Paulo, p. 117–140.
- HUNN, ES. 2007. Ethnobiology in Four Phases. *Journal of Ethnobiology* 27(1): 1–10.
- IPBES. 2018. Summary for policymakers of the assessment report on land degradation and restoration of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (Scholes, R.J., Montanarella, L., Brainich, E., Barger, N., Ten Brink, B., Cantele, M., Erasmus, B., Fisher, J., Gardner, T., Holland, T.G. & Kohler, F. eds). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn.
- IPBES. 2019. Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (S. Díaz, J. Settele, E. S. Brondízio, H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis & C. N. Zayas, eds). IPBES secretariat, Bonn. IPCC, 2022. Summary for Policymakers (H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegria, M. Craig, S. Langsdorf, S. Lösschke, V. Möller & A. Okem, eds). Cambridge University Press. In Press.
- LATOUR, B. 2000a. *Ciência em Ação. Como seguir Cientistas e Engenheiros Sociedade Afóra.* Editora UNESP, São Paulo.
- LATOUR, B. 2000b. *Jamais fomos modernos.* Editora 34, Rio de Janeiro.
- LEWIS, MP. 2009. *Ethnologue: Languages of the world.* SIL international, Dallas.
- LOH, J & HARMON, D. 2014. *Biocultural Diversity. Threatened species, endangered languages.* WWF Netherlands, Zeist.
- MARQUES, JGW. 1995. *Pescando Pescadores: Etnoecologia Abrangente no Baixo São Francisco Alagoano.* 1. ed. EDUSP, São Paulo.
- NOLAN, JM & TURNER, NJ. 2011. Ethnobotany: The study of people–plant relationships. In: *Ethnobiology* (eds. E. N. Anderson, D. Pearsall, E. Hunn, N. Turner). Wiley-Blackwell, Hoboken, Nova Jersey, p. 133–147.
- OLIVEIRA, JC. et al. 2020. *Vozes vegetais. Diversidade, resistências e histórias da floresta.* Ubu Editora/IRD, São Paulo.
- PBMC/BPBES. 2018. *Potência Ambiental da Biodiversidade: um caminho inovador para o Brasil. Relatório Especial do Painel Brasileiro de Mudanças Climáticas e da Plataforma Brasileira de Biodiversidade e Serviços Ecossistêmicos* (F.R., Scarano & A.S. Santos, eds). PBMC, COPPE – UFRJ, Rio de Janeiro.

- PÖRTNER, HO., SCHOLE, RJ., AGARD, J., ARCHER, E., ARNETH, A., BAI, X., BARNES, D., BURROWS, M., CHAN, L., CHEUNG, WL., DIAMOND, S., DONATTI, C., DUARTE, C., EISENHAUER, N., FODEN, W., GASALLA, MA., HANDA, C., HICKLER, T., HOEGH-GULDBERG, O., ICHII, K., JACOB, U., INSAROV, G., KIESSLING, W., LEADLEY, P., LEEMANS, R., LEVIN, L., LIM, M., MAHARAJ, S., MANAGI, S., MARQUET, PA., MCELWEE, P., MIDGLEY, G., OBERDORFF, T., OBURA, D., OSMAN, E., PANDIT, R., PASCUAL, U., PIRES, APF., POPP, A., REYES-GARCÍA, V., SANKARAN, M., SETTELE, J., SHIN, YJ., SINTAYEHU, DW., SMITH, P., STEINER, N., STRASSBURG, B., SUKUMAR, R., TRISOS, C., VAL, AL., WU, J., ALDRIAN, E., PARMESAN, C., PICHES-MADRUGA, R., ROBERTS, DC., ROGERS, AD., DÍAZ, S., FISCHER, M., HASHIMOTO, S., LAVOREL, S., WU, N. & NGO, HT. 2021. Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change; IPBES secretariat, Bonn. DOI:10.5281/zenodo.4659158.
- RODRIGUES, E & OLIVEIRA, DR. 2020. Ethnopharmacology: a laboratory science? *Rodriguesia* 71: 1.
- TOLEDO, VM. 1992. What is Ethnoecology? Origins, Scope, and Implications of a Rising Discipline. *Etnoecológica* 1(1): 5–21.
- TOLEDO, VM. 2001. Indigenous Peoples and Biodiversity. *Encyclopedia of Biodiversity* 3: 451–63.
- TOLEDO, VM & ALARCÓN-CHÁIRES, P. 2012. La Etnoecología hoy: Panorama, Avances, Desafíos. *Etnoecológica* 9(1): 1–16.

Received: 26/07/2022

Accepted: 28/07/2022

Published online: 09/09/2022