"BIODIVERSITY CONSERVATION" IN BRAZILIAN SOCIAL SCIENCES: A SYSTEMATIC REVIEW FROM 1992 TO 2010

LAILA THOMAZ SANDRONI[1]
MARIA JOSÉ TEIXEIRA CARNEIRO[2]

Introduction

This article[i] presents a cross-sectional analysis of the scientific production on biodiversity conservation in the social sciences in order to identify the main issues in the debate. We have carried out a sistematic review of the social sciences literature between the years of 1992 and 2010 looking at contexts where "biodiversity conservation"[ii] emerges as an important element in the social configuration under analysis. The intention is to identify key concerns observed by the authors whose work focused on biodiversity conservation in articles published in Brazilian journals in the areas of sociology, anthropology and political sciences, whilst acknowledging particularities of this specific discursive unit in the broader debate on environmental conservation.

The "environmental question" is so common place in daily affairs of contemporary industrial societies that we sometimes fail to realize how recent this discussion actually is. The construction of the environmental agenda, including the preservation of natural resources, climate change, river and mangrove pollution, to mention only a few topics within the subject area, started in the 1960s in the USA and Europe. In the 1970s, the debate spread to Australia and Canada. But it was not until the 1980s that it reached countries in the Soviet Union, Asia and Latin America (HANNIGAN, 2009). As related debates started to spread, this thematic area gained dimension.

One of the core features in this debate is that, in the process of elaborating the environmental question, the relation between science and politics became noteworthy. This surfaced in the way themes were being discussed and solutions were being proposed (BECK, 2010), especially when it came to "conservation and biodiversity". Researchers, activists and other political actors were constantly interacting with each other (and at times they were one and the same person) throughout the process of construction and consolidation of the theme as a social problem. However, the profile of researchers and

1. Master and PhD student at the Post-Graduation Program of Social Sciences in Development, Agriculture and Society (Programa de Pós-Graduação de Ciências Sociais em Desenvolvimento Agricultura e Sociedade) in the Federal Rural University of Rio de Janeiro (lailasandroni@hotmail.com).

2. PhD in Social Anthropology; Professor at the Post-Graduation Program of Social Sciences in Development, Agriculture and Society in the Federal Rural University of Rio de Janeiro (mjtcarneiro@gmail.com).

scholars involved in the discussion changed over time. Nowadays, scientific research on the environmental theme is characterized by a wide range of fields of knowledge. It was not always so. The environmental agenda was first elaborated by researchers from the natural sciences, specially biologists, and botany specialists in particular (DRUMMOND, 2006). It was only after a long period when both knowledge and practices were dictated by natural scientists that environmental issues started to penetrate other fields of knowledge such as geography, sociology, economy, political sciences and philosophy (LEIS, 2001).

At first, the social sciences, namely anthropology and sociology, did not show great interest in the so-called "environmental crisis", and sociology was a latecomer regarding interest in this area, following behind anthropology, and human and economic ecology (PORTILHO & LIMA, 2001). It was not until the 1970s in the USA, and not until the 1980s in Europe, that those discipline areas started to show significant interest in environmental issues, which intensified worldwide in the 1990s (GIULIANNI, 1998). In Brazil, the debate became more impassioned at the time that the 1988 Constitution was being drafted, and gained considerable strength after the first United Nations Conference on Environment and Development (RIO 92).

The process of institutionalization of the "environmental social sciences" was not homogeneous and concentrated on specific research centres, according to different contexts nationally. Buttel ([1986] 1992), one of the pioneers in the area of environmental studies in the USA, the country where environmental sociology first became institutionalized, gives a detailed description of the birth and consolidation of the discipline. The author highlights the role of counterculture (here understood as a radical critique of industrialism and of the arms race) in that country, and the way it sparked off studies about environmental impacts. Other events that took place in the 1970s, such as the oil crisis and the creation of the Club of Rome in 1972, led to social movements and public debates about population growth and its relation to environmental degradation. American environmental sociology was the main international producer in the area up until the end of the 1980s. In its formation period, the interaction between some sub-areas in the discipline of sociology contributed towards filling existing theoretical and epistemological gaps, due to their own traditional concerns. For example, in the American case, rural sociology was very active and played an important role in the broader environmental debate.

In Brazil, the institutionalization of the discipline followed a rather distinct path: rural sociology at first resisted joining the debate and it was the formation and consolidation of environmental sociology itself that paved the way for the inclusion of the environmental theme in rural sociology (GUIVANT, 2010). The creation of research centres and work groups dedicated to this theme, as well as journals focusing on nature and society, played a vital role in the consolidation of this study area in Brazil. In particular, it is worth mentioning the creation of the Work Group "Ecology, Politics and Society" in 1987 at the National Association for Post-Graduation and Research in Social Sciences (ANPOCS), which gave rise to the National Association for Post-Graduation and Research in Environment and Society (ANPPAS). However, this Work Group struggled to keep its association with ANPOCS because of the lack of interest in the environmental debate by the Social Sciences at that time. Later, two important journals on this subject

were created and consolidated in this new context: "Ambiente & Sociedade"[iii] ("Environment and Society") and "Desenvolvimento & Meio Ambiente"[iv] ("Development and Environment").

There is no consensus between authors regarding the time the social sciences took to become involved with the environmental theme in Brazil. Some believe that related disciplines failed to acknowledge the importance of the theme (DRUMMOND, 2006). Others blame it on the epistemological contentions between the social and the natural sciences (FERREIRA, 2004). The construction of the environment as a research topic could only occur supported by the epistemology of the natural sciences, which was based on projections. Following that reasoning, it would be fair to say that the social sciences did not in fact have a "late" arrival on the scene, but that it actually arrived at a time when the conditions of possibility were ripe, given that at first its concerns were with analyzing the processes of social construction of the "environmental crisis". The notion of risk and the distinct manners of evaluating it become the foundation stone for arguments and decision-making in the context of reflexive modernity. The projections elaborated by technical-scientific knowledge are a direct interference with what is considered as a "problem" since risk levels regarding how much impact a given activity will have on society are calculated through scientific models, which in turn determines the spectrum of potential "solutions" (BECK, 2010).

The systematic review here undertaken points in the direction of this "late arrival", and reveals an incipient production of articles on the environmental theme in the social sciences before the turn of last century, as well as a significant increase since the beginning of the 21st century. Out of 50 selected articles, only four were published before 2000; and out of the remaining 46, one third was published between 2008 and 2009, which coincides with a trend already noted by Hannigan (2009) in the international context. Something similar was identified in the report by Unesco about the social sciences, published in 2013. This document points to a sharp increase in the publication of articles in social sciences journals about climate and global environmental changes from 2005 onwards, which differs from a former tendency towards the publication of articles from other research areas (environmental sciences, economy and geography).

In any case, it is important to note that the arrival of the social sciences in the environmental debate, despite being "late", generated a reconfiguration of the topic with the introduction of new perspectives, hence the need to carry out a review of the key questions being raised in order to better evaluate the contributions made. With that purpose in mind, we shall first present the methodology used for the review of the material under analysis. Next, we will map the academic background of the authors included in the literature review, thus revealing the multi-disciplinary scope of the literature, also evidenced in the research. The next step will be to develop an analysis of the articles in order to identify the main themes in the debate and most common cross-sectional aspects. To conclude, we intend to point to some trends in the social sciences literature on this theme, and to some gaps that deserve further attention.

2) The methodological contribution of Evidence-Based Policymaking

We followed the methodological guidelines of the evidence-based policymaking. This approach has as a starting point the idea that available scientific evidences can assit the elaboration of public policies while helping them to meet their targets. We have adopted a segment of Evidence Based Methodology (EBM) that understands that science has a voice that needs to be heard by public managers, without however superimposing the former's framework over the latter's. The role of scientific discourse is not to dictate the paths to be taken in terms of governmental actions, but existing knowledge should be made available to better inform the decision making process (DAVIES & NUTLEY, 2002).

Considering the difficulties public managers face in the process of gaining access to academic databases in order to update their knowledge about a given theme, EBM proposes the elaboration of meta-analyses to facilitate access to available research. This procedure results from a systematic and rigorous literature review guided by a previously defined research question. The more specific the question, the more successful the literature review will be, as well as the subsequent production of meta-analysis on the subject matter (Sutherland *et al.*, 2004). First, it is a matter of formulating the question, which reconfigures the communication hurdles between the academic realm and public managers, given that frequently the latter's interest cannot be translated into a scientific subject matter. This can hinder the undertaking of systematic reviews and generate critical stances towards EBM, as observed by Nutley *et al* (2002) and Davies *et al* (2001). Following on from these initial considerations, our first step was to establish a core question to guide the selection of the journals and articles that would constitute the systematic review. Informed by the thematic interest of the Research Group[v], we decided on the following question: *how do the social sciences thematize the notion of "biodiversity conservation"?*

The second stage consisted of selecting the universe of the literature review, bearing in mind that every chosen framing would keep a certain degree of randomness. In the field of environmental sociology in particular, the framing can be a sensitive matter given that the production of knowledge is not restricted to university institutions. Researchers in governmental institutions, in NGOs, in consultancy companies and in social movements generate a large amount of knowledge, classed as technical-scientific data. In addition, they are becoming more and more involved and influential when it comes to planning and implementing socio-environmental projects (HANNIGAN, 2009). That said, the intent here was to address specifically the academic production made available in national scientific journals. To qualify our selection we took into consideration only the journals classified as "A" (any circulation) and "B"(international and national circulation)[vi] in the Qualis database at CAPES (Coordination for the Improvement of Higher Education Personnel), encompassing the three broad fields (according to the database designation): Anthropology/Archaeology; Political Science; Sociology, between 1992 and 2010. Journals whose thematic concerns did not include the environment were excluded. The final selection encompassed 50 journals, all with digital access through CAPES Journal Platform, through Scielo, or through the journals' main websites.

The next step was to search articles with the following key words: sustainability/ sustainable development (whether related to agriculture and/or environment), conservation units, biodiversity, nature/natural, environment/environmental, agriculture, rural development/rural[vii]. This initial selection generated a database with 303 abstracts which were read with great attention before selecting 50 articles that addressed in one way or another the question of biodiversity conservation, whether from a conceptual-theoretical perspective, or in the form of a case study. These 50 articles by 83 authors were then read in their entirety (see ANNEX). We also created a file with a summarized version of the articles where we included the main points and arguments made by the authors, with the purpose of identifying congruencies, common points and disputes between them. These points will be addressed further on, but for now suffice it to say that we identified two main positions: a smaller contingent supports the idea that biodiversity should be considered as a realm separate from society; a larger contingent argues that biodiversity is part of society.

3) Multidisciplinarity and the academic background of authors

Before mapping the main questions and arguments we will do a brief review of the academic background of selected authors. We identified great diversity regarding the academic background of authors, confirming the tendency already observed towards multidisciplinarity in this debate area (HANNIGAN, 2009). The analysis we present here may shed light on how difference and interaction between disciplines occur in fields such as biodiversity conservation, where boundaries are constantly merging[viii].

From the information available at Lattes Platform, we were able to classify the 83 authors into 3 groups according to post-graduate training: Humanities, Natural Sciences and Multidisciplinary. The largest contingent is that of social scientists (27), including those with a master's or doctoral degree in sociology, anthropology or political sciences. Included in this broad Humanities area, are also two historians, two specialists in Tourism, one psychologist and eight geographers, amounting to 40 authors. As for the group of Natural Sciences, there is a prevalence of biologists (10/17)[ix].

However, 22 out of 83 authors do not fall into these two broad classifications: the authors who have a background which crosses more than one knowledge area. The presence of authors with a multidisciplinary background emerges as a trend in this research area. Besides these, there were other four authors who were not registered on the Lattes[x] database, as is the case of an attorney and a corporate executive. Considering that this is a review of articles published in journals that according to the ranking by CAPES could be found in the first two categories, the presence of these four authors signals that the field is open to the participation of professionals from other areas. Despite being a low number, this openness is however significant. There are two possible explanations for this: on the one hand, it could be the result of the recent institutionalization of the field, "still" permeated with non-scientists, on the other hand, we could recognize this finding as evidence that when it comes to environmental issues research, knowledge production, politics, and other forms of engagement are intertwined.

Multidisciplinarity is also evident in the co-authorship of articles, encompassing researchers from different areas of knowledge. For example, there are 5 articles written in partnerships between biologists and sociologists. With a science that thrives on the interconnection between different scientific cultures, the boundaries between the research by social and natural scientists become blurred in the eyes of the reader.

It is not within the scope of this article to identify the discrepancies in epistemological terms resulting from the diversity of scientific cultures[xi], nor to list the practical difficulties of undertaking research grounded in distinct disciplinary perspectives. This present article may point to possible avenues to explore the matter for those interested in this complex discussion, but we do not intend to pursue this debate any further. Our objective here was to map the arguments and themes used in the research/articles that make up our literature review, in order to create a broad framework about the biodiversity conservation theme in the social sciences between 1992 and 2010. We realize that there are discontinuities between the different forms that knowledge is constructed in this context. For example, we have found that the majority of articles (32/50) refer in some way or another to polyphonies in relation to the use of some terms. We also noticed a discrepancy between social scientists and the other authors with regards to how these polyphonies are addressed. Social scientists tend to incorporate polyphonies in the debate: the different versions of a single term or expression do not represent only a methodological problem to be solved prior to the argument, but actually constitute an intrinsic part of the research insofar as the different conceptions of a single idea interfere with the social relations described. As for natural scientists, and for those with a multidisciplinary background, they recognize the existence of a wide range of meanings regarding some terms, but take the approach of making their perspective explicit prior to the elaboration of the argument.

The aspects of the debate elaborated in the next section are permeated by these different perspectives, although that of the social sciences will be the prevalent one. As we shall see, some of the central issues being discussed refer to the polysemy regarding a given category and to the sociological and political implications of the dispute. However, we would like to emphasize that our intent is not to discuss the consequences of this epistemological diversity, but to present the themes discussed in the articles against the backdrop of discipline heterogeneity.

4) Questions being debated

Amongst the many different themes addressed in the articles, we decided to focus on the recurring ones, which reveal the concerns around which the arguments on biodiversity conservation in the Brazilian social sciences are developed. In brief, it is worth noting that the multidisciplinarity of authors, especially with regards to the presence of researchers from the natural sciences, does not translate into an absence of interest in social concerns. The social sciences approach when selecting the journals was reflected much more on the situations analyzed in the articles than on the academic background of authors, as we shall see in the next section. All of the articles address, in one way or another, social concerns related to biodiversity conservation, and the majority of them

focus on the populations that live in the internal perimeter of Conservation Units (UCs) or in surrounding areas.

The social dimension

It is fair to say that the main issue that mobilizes the debate is a critique against the "restrictive approach" by governmental bodies, amongst other social actors, and the way biodiversity conservation is practiced without taking into account the welfare of populations residing in conservation areas or in their immediate surroundings. It is argued that the emphasis on the exclusion of local populations from the policies of environmental conservation jeopardizes its efficacy. Such restrictions are attributed to the "untouched nature" paradigm and supported by the opposition between nature and society, a paradigm that informs the preference for the model of "integral protection" of nature. The concept of "humanity" as an undifferentiated unit is also criticized. It is argued that such an approach, which undermines the social, economic and cultural heterogeneity of populations, may place, for example, a small family farmer and a big landowner side by side. This flaw could only be corrected with more in-depth analyses of the different relations between social groups and their surroundings, and by stressing the importance of participation by certain social groups – especially the so-called "traditional populations"- in the development of sustainable practices[xii]. This critique is heavily influenced by the work of Antonio Carlos Diegues[xiii], O Mito Moderno da Natureza Intocada (1996). For Diegues, the populations that inhabit the different biomes perceive them as living spaces and transform these spaces without necessarily harming the ecosystems. The author understands that human action, depending on the population's social and cultural organization, may actually contribute towards the integrity of ecosystems, and can even help to boost biodiversity.

To a certain extent, this question permeates all the articles, pointing to the relevant role of the social sciences in introducing the social dimension, which was marginal before their arrival on the scene. As noted in the literature, up until the 1980s, the debate in Brazil was between those who advocated the free use of natural resources as if they were endless, and those who supported the conservation of ecosystems based on the principle of excluding human populations from protected areas (MIRAGLIA & MURRIETA, 2005). Thus, the focus on the social appears as the main reconfiguration promoted by the social sciences in the academic debate, based on research undertaken with local populations and on interaction with social movements denouncing injustices derived from conservation policies.

In the 1990s, influenced by the First Earth Summit, the critiques to this model intensified, paving the way to alternative proposals as a response to the mobilization by Brazilian society. The debate was also reframed in the international context, placing greater emphasis on the need to include the population in processes of environmental conservation (ARRUDA, 1999; TEIXEIRA, 2004). If before there was a consensus that the best strategy was to create isolated islands of biodiversity, protected from the "predatory human action", from the year 2000 onwards the consensus started to include the social dynamics in the interior and immediate outskirts of protected areas. A new ("bioregional")

paradigm emerged thereafter with the objective of creating and maintaining a network of protected areas interlinked by ecological corridors forming a conservation "mosaic" (FERREIRA, 2004; VIVACQUA et al, 2009).

The reiterated claim regarding the need for populations to participate in environmental conservation points to an exchange between the sociological *latu senso* approach and the hegemonic stance grounded in the natural sciences and which supported the integral conservation model as the best solution. While this latter approach does appear in the literature review, it represents the opinion of a minority. In brief, we have observed that regardless of the fact that the articles selected have different core concerns, the majority of works do share an underlying argument: most set off from the premise that the population needs to be included in the process of conservation, and then they proceed to develop a (variable) demonstration. Thus, the authors arrive at the conclusion that the preservation of cultural diversity is as important as the biological diversity, thus taking a stance for "bio-social-diversity preservation".

Public Policies and the State in Biodiversity Conservation

The concern with the populations affected by environmental policies leads to a critique of the role of the State in "biodiversity conservation". Authors such as Pedlowski et al. (1999) and Mello (2004), see the State as an ambiguous agent which sometimes acts in support of conservation, while at others, accepts, albeit indirectly, environmental degradation, as though it was the necessary price to pay for development. The limitations of environmental policies when it comes to the need for "development" is a concern by many authors who have called attention to the incoherence in the activities by governmental bodies at different levels (federal, state and municipal). It is worth highlighting some studies about the APA (Area of Environmental Protection) of Guaraqueçaba, which analyse related issues (DUMORA, 2006; TEIXEIRA, 2006).

Under another perspective, the State appears as a less flexible entity, or an "apparatus run by the dominant class" and is seen as an advocate of the interests by big investors, in detriment of both the aims of environmental conservationists, and the rights by subaltern segments of society. This line of reasoning is often expressed in the form of denunciations about how biased environmental organs are, which tend to be much more strict when monitoring poorer populations than when watching over activities carried out by corporations (GIULIANI, 2007; VIVACQUA et al, 2009). Another recurring theme is that amongst authors who register complaints related to the efficacy of the environmental legislation regarding conservationist targets and the promotion of sustainable development, pointing to the need of improving the norms of access to natural resources to guarantee conservation and sustainable use (CHAVES & NOGUEIRA, 2008)

Still regarding actions by the state, another polemic subject is the National System for Conservation Units (Sistema Nacional de Unidades de Conservação - SNUC), a legislation that came into force in 2000 with the purpose of systematizing and unifying the already existing legislations on biodiversity conservation in Brazil. SNUC was considered a great step forward in terms of incorporating the bioregional paradigm. The positive

changes brought about by the new legislation are widely recognized by most authors, yet criticisms are also recurring. While it brought about advancements by facilitating the process that gave rise to Conservation Units and enabled the creation of mosaics, the SNUCs are criticized for having worsened the gap between Conservation Units and other protected areas not included in the above mentioned document, such as the Permanent Protection Areas (APPs), Legal Reservations (RLs)[xiv] and, above all, Indigenous Territories (TIs). Venticinque et al (2005), Lauriola (2003), Miraglia & Murrieta (2004) and Medeiros (2006), for example, advocate the inclusion of TIs in the SNUC, based on the principle that they are an actual instrument of conservation.

In that sense, the discussion on the role of the State once again reveals the polarization between restrictive versus inclusive approaches regarding conservation. As for the subject matter in this research, this discussion is tangential to the debate about the most appropriate type of conservation unit (mentioned in 12 out of 50 articles). Barros (2009), Loureiro& Cunha (2008) and Almudi & Kalikoski (2009) support the proliferation of sustainable use UCs in detriment of integral protection UCs, since the former model is more likely to achieve the objectives of conservation by supporting local populations and including them as agents in the process. Extractive Reserves (RESEX, in its acronym in Portuguese) and Sustainable Development Reserves (RDS, in its acronym in Portuguese) are important instruments in the sense of achieving these objectives (QUEIROZ, 2005).

But even the sustainable use Conservation Units are considered too restrictive by some authors (HOEFFEL et al., 2008; DUMORA, 2006), when taking into account the practices by the populations[xv]. Even though they permit human occupation, the creation of a new conservation unit always comes with restrictions that frequently interfere with historically situated ways of life and disrupt the social organization of the community affecting its sustainability. Researches that focus on the life of populations in the internal perimeter of sustainable use UCs, have highlighted the implicit contradiction in the interdictions imposed on certain practices by local populations given that the areas inhabited by them often have the highest levels of biodiversity conservation, which is why they were turned into Conservation Units in the first place. This contradiction adds fuel to criticisms of policies based on monitoring and repression, rather than on environmental education and social incentives to foster conservationist activities.

The most common example of restriction of traditional practices is the prohibition of *pousio*, a technique to boost soil fertility inherited from indigenous agricultural practices which uses agricultural land on a rotating basis, followed by slash and burn of the vegetation at the end of the "resting" period (LEONEL, 2000). The environmental legislation prohibits the cut of the "regenerating vegetation", which means that farmers can only use land that is already clear from vegetation. As a consequence, there is a drastic decrease of soil fertility which in turn boosts the use of pesticides, a much more aggressive solution (HOEFFEL et al, 2008). The general take on this is that with the participation of social groups in the conservation effort, ecological sustainability becomes a variable dependent on social sustainability, here understood as a broad concept encompassing the economic sustainability of the populations residing in a Conservation Unit of sustainable use (RODRIGUES et al, 2003).

The debate became increasingly dense and intense, culminating with the idea that local populations should not only be contemplated in the elaboration and implementation process of environmental policies, but that they should also be a necessary participant in that process. The participation of local populations in the management of natural resources is increasingly becoming an international consensus, as evident in the articles under analysis. Similarly, the consensus is that "top-down" elaboration of inclusive conservation projects should be avoided. Instead, the way local populations think about and understand the "environment" should be taken into account. Small to middle-sized projects of environmental compensation are more likely to be successful if local populations could manage them. Still, the role of academia (and especially of the social sciences) in giving voice to the demands of local populations who are commonly ignored is also noted (LEONEL, 2000; LAURIOLA, 2003; GIRARD & VARGAS, 2008).

However, participation in and of itself is not sufficient. Some call attention to the limitations of the liberal model of representative democracy based on the mediation by residents' associations and suggest instead a non-formalist perspective of democracy based on "actual" participation, and the creation of mechanisms that could grant direct access to decisions that guarantee an effective popular participation (LOUREIRO & CUNHA, 2008). Formally, the main participative space in the context of UCs is the local Committee (*Conselho* in Portuguese). This is an instrument for popular participation contemplated in the SNUC for all the UCs. In sustainable use UCs (for example the "APAs": Areas of Environmental Protection), the Committee may have management powers, while in integral protection UCs, it is only for consultation. The difficulty, however, is to make the Committee actually participative, rather than having it just as a formality. The overall inertia and lack of motivation by the population is explained by a perceived failure to realize that they have power over the territory where they live, and that they are sovereign subjects in the process. Thus, the analyses point to those Committees as ineffective instruments, only serving the purpose of legitimizing decisions made by the governing body (GIULIANI, 1997; LASCHEFSKI & COSTA, 2008).

On the other hand, the Committees are also seen as spaces of participation where people can question actions by the State that appear to be reflecting the interests of the dominant classes. In another view, despite facing many difficulties, the Committees are a relevant experience. Amongst the hurdles that need to be overcome, there is first, the operating problems, given that the population is not "used to" participating in decision making. Secondly, there is a communication problem in many of the UCs that failed to involve and mobilize the population when they were first created, creating a lack of trust in the Committee as a participatory arena (LOUREIRO & CUNHA, 2008). As a result, some authors suggest actions to improve the management of Committees in order to mobilize and motivate different segments of society, in particular the populations traditionally excluded, and to implement an active form of qualitative joint representation. It has been noted that environmental education plays a vital role.

A minor contingent of authors, represented by Araripe et al. (2006), argues in favour of the creation of economic activities, even if of lower impact, within UCs. As long as regulations are respected when setting up the necessary structure for the enterprise,

such initiatives can bring beneficial results for economic development. An example of this is shrimp farming, seen as a good option for the local development of an APA in the Northeast of the country. This perspective, based on economic rationality, attempts to bring together environmental and market interests. The perspective is that of the entrepreneur and his or her possibilities of action in places where there are legal environmental obstacles that block the production of commodities. Despite representing a minor contingent in the broader scale of the literature analysed, their stance is relevant, considering the marginality of approaches focusing on market rationality in the biodiversity debate within the Social Sciences.

Conversely, another perspective intended to demonstrate the negative impact that the production of commodities inside and in the outskirts of UCs can have on biodiversity conservation, and on the sustainability of the populations in that environment. Giuliani (2007), for example, discusses the impact of the construction of large textile enterprises on a particular group of UCs, in a social context dominated by the logic of economic growth, within the metropolitan region of Rio de Janeiro. The author argues that different development logics are circumvented by the "social and environmental responsibility" corporate motto.

Conflict as a guiding category

The conflict between "traditional populations" and organizations of environmental conservation is a mobilizing theme in studies that focus on the social dimension of the environmental theme. It is approached by two distinct lines of enquiry: one that sees it as something harmful to society, and against which mitigating measures should be taken; and another that sees conflicts as inherent to society and to conservation policies, and as something that could be an instrument of change[xvi].

Loureiro and Cunha (2008), amongst the authors who study conflict with the purpose of finding solutions, highlight the importance of environmental education and social participation in the management of UCs, as means to construct consensual agreements between different social actors. Taking into account the difficulties inherent to this process, Lauriola (2003) and Hoeffel et al (2008) suggest some strategies to mitigate contentions, as for example, a more effective participation of the populations in management committees where conflicts could be resolved by means of dialogue. It is interesting to note that such approach is promoted by authors with a natural sciences background and who started to explore a more sociological reading after engaging with the environmental theme. It is possible to hypothesize that the scientific culture of the biological sciences, which historically gives little attention to the notion of conflict, may explain a position that favours mitigation and the pursuit of equilibrium between different views.

As for the authors that see conflict as inherent to social processes, they are those with a social sciences background. Setting off from the premise that conflicts are presupposed in the implementation of conservation policies, these authors proceed by describing the conflicts resulting from the implementation of UCs, without necessarily pointing to possible mitigating strategies. In these cases, they acknowledge the different solutions

proposed by the social actors themselves, instead of presenting ways to resolve the conflicts (FERREIRA, 2004; DUMORA, 2006; TEIXEIRA, 2006; VIVAQCUA et al, 2009).

"Traditional population": a controversial category

As already observed, the concern with populations residing inside Conservation Units is addressed in the vast majority of researches and reflections in the period under study. In addition, the "traditional population" category is commonly used in a number of legislations, such as the National Policy for Sustainable Development of Traditional Peoples and Communities (Política Nacional para o Desenvolvimento Sustentável de Povos e Comunidades Tradicionais), which corresponds to Decree 6,040/2007. The definition of this segment serves as a guideline in the implementation of policies with direct consequences on the lives of these populations. This is a rather controversial theme, especially considering the great social diversity encompassed within UCs. SNUC does not define it despite using the classification (GIULIANI, 2007; CREADO et al, 2008).

The polysemy contained in the term prompts authors to define their use prior to their argumentation. In this current debate we identified three distinct approaches. The first one stresses that these populations are culturally prone towards biodiversity conservation. In this group, Paiola & Tomanik (2002) and Almudi & Kalikoski (2002) argue that "non modern" social groups are natural allies of biodiversity conservation since their "cultures" and values do not condone the depletion of their surrounding environment. Following that reasoning, the key to sustainability would be to empower those "traditional communities" in order to grant them a more prominent role in the maintenance of biological diversity.

Another cluster, of which Creado et al (2008) and Cunha (2004) are examples, follows a more reflexive approach. While they agree that "traditional populations" should be given more agency in the conservation process, they call attention to both positive and negative aspects in the forms of social organization of these populations. This group consciously avoid an idealized representation of these populations, and criticizes romanticized readings that portray "traditional populations" as a panacea to resolve the dilemma between "social development" and "biodiversity conservation". Also criticized is the use of the term "traditional" which may be interpreted as the opposite of "modern", thus confining those social groups to a past time associated with backwardness and limited abilities regarding adaptation and transformation. The term, therefore, would not allow for aspirations in terms of "development" on the part of the populations thus classified. Rather than simply arguing for the presence of "traditional populations" in UCs, this approach proposes a reflection upon the category in a relational manner, as a potential political resource in the environmental arena.

The third approach is minor and argues for the potential role of "non-traditional" populations in biodiversity conservation. A comparative study between new settlements and older occupation sites shows that, for example, recently settled populations may have stronger sustainability potential than traditional populations because they are more used to adopting new practices. The authors show how in an older settlement, farmers resisted

changes to familiar environmentally unsustainable practices, while in the more recent settlement the urban mindset of adopting new subjectivities was more willing to adapt to new sustainable practices (CAVALCANTI & BARROS, 2006).

Local knowledge

The debate about the specificity of traditional populations brings with it another theme, namely the role of "local knowledge" (or "traditional knowledge") when it comes to make biodiversity conservation policies more effective. "Traditional knowledge" in this instance is valued in opposition to "scientific knowledge", which is produced in an "objective" fashion. Thus, the universal legitimacy of the latter by comparison with other forms of knowledge is questioned (CASTELLI & WILKINSON, 2002). Alongside this type of analysis is the argument for making the concept of traditional knowledge more central in the debate about sustainable development, as an alternative to solutions formulated by scientific means. The contribution of knowledge by traditional populations in the formulation of public policies is considered one of the most important steps in the effort to establish a dialogue with the populations. Thus, a disagreement emerges with regards to the environmental policy currently in force, which is primarily based on monitoring and punishment of local populations. This group of authors advocates the use of this type of knowledge to elaborate a responsible management of natural resources. Furthermore, it is argued that traditional and scientific forms of knowledge should engage in dialogue so as to promote an interactive and participative construction of management plans for UCs (ALMUDI & KALIKOSKI, 2009; CUNHA, 2004; SILVA, 2009).

Family farmers

Differently from other articles that base their analyses on the "traditional populations" category, some authors opt for the sociological category of "family farming". The number of articles using this classification is rather small (7/50), perhaps resulting from a common understanding shared by environmentalists, even those from the social sciences, that agriculture and conservation are incompatible with each other (CARNEIRO & DANTON, 2011). Despite the small contingent of authors exploring this issue, the articles deserve attention since they reflect upon different themes from those found in researches on "traditional populations".

It is worth noting that four out of seven articles that use the "family farming" category were produced at the same research centre where the environmental question is approached as part of a dialogue with rural sociology[xvii], perhaps due to the researchers' background. In addition, those articles share their empirical universe – the Guaraqueçaba APA on the coast of Paraná – and address distinct dimensions of the same reality[xviii]. They discuss the changes and conflicts brought about by the implementation of the APA, and aggravated by the overlap of social and environmental policies, which were at times beneficial for the farmers, and at other times harmful.

As for the other three articles, they address rural settlements rather than protected areas, as in the majority of articles under analysis. Those three articles focus on land redistribution policies and on the possibility of environmental conservation in such contexts. Cavalcante & Barros (2006) support the adoption of sustainable practices in recently settled areas, while Cunha & Nunes (2010) argue that the breakdown of relations with the environment resulting from the changes to property systems (creation of settlements) and to the access of natural resources can radically transform the forms of social organization, which can in turn give way to the adoption of environmental conservational practices. Costa & Futemma (2006) suggest that the adoption of the new technology of Agro-Forest Systems (Sistemas Agro-Florestais - SAFs) could be a solution in the effort to bring together agricultural production and the conservation project in the context of settlements for landless people.

Genetically modified products and other technologies

One cannot fail to mention the impact of genetically modified cultivars and other agricultural technologies on biodiversity. The research by Paterniani (2001) is an elaborated argument for GM crops in "developing" countries. This practice is perceived as eminently sustainable, as evidenced in the title of the paper: "sustainable agriculture in the tropics". The author argues that technology is crucial in the effort to produce sufficient food for the growing world population, and that modern agricultural technologies have managed to combine productive efficiency, and low or inexistent environmental impact. The conclusion is that discoveries in the realm of biology and biogenetics are responsible for greater efficiency in agriculture worldwide, thus contributing towards preservation, since there would be less need for agricultural land.

Contrary to that position is one whereby authors endeavour to show the problems resulting from the adoption of genetically modified cultivars. According to this view, the green revolution and its technological implications are responsible for a number of negative effects concerning human life and biodiversity (LEONEL, 2000; SANTOS, 2007; GIULIANI, 2000). This view is shared by a wider range of authors in our review then the first one. Responsible for the licensing of agriculture-related technologies, such as genetically modified cultivars, the National Technical Commitee on Biosafety (CNTBio[xix]) is praised by Paterniani (2001), who claims that the committee offers a guarantee that genetically modified products are safe. Conversely, Giuliani (2000) and Leonel (2000) are extremely critical of it. According to them, the national law of biosafety should guarantee the precautionary principle, which did not happen. They blame the political lobby of big landowners who, supported by scientists in that committee, managed to get the licensing to produce a number of varieties of genetically modified products in Brazil, including the RoundupReady soybean (RR) belonging to the multinational Monsanto (SANTOS, 2007). The authors denounce the underlying motive of such decision, which favours a particular segment of society, supported by the alleged neutrality of scientific knowledge. Furthermore, they argue that, inversely, when science is used to support other sectors, such as environmental NGOs, its representatives are accused by members of

the committee of being biased. This illustrates the political use of scientific knowledge. Considering that every argument is, up to a certain point, biased, it is suggested that decisions concerning technologies to be adopted should be assessed by the population, who in turn should have been fully informed about potential consequences in the use of such technologies. By demonstrating that the criteria used for licensing GM products are informed by political and economic interests, rather than scientific grounding, the authors suggest that science at times sides with those who have more voice and power (SANTOS, 2007; GIULIANI, 2000).

The precautionary principle is an argument pushed forward by those against the use of GM products. Giuliani (2000) endeavours to identify and combat those positioning themselves in favour of GM products. The arguments questioned by Giuliani are the same used by Paterniani (2001). But the latter is not as committed to engage in dialogue with his opponents. The only moment when that appears, is when he mentions that criticisms towards GM products lack "scientific grounding". That said, he does not actually retort critiques such as the non-adoption of the precautionary principle.

5) Final considerations

An overview of the findings presented here enables us to identify two outstanding characteristics: on the one hand, the large heterogeneity of the themes being debated and respective stances; and on the other, the relative consensus around the need to include local populations in conservation policies, and the objection against the restrictive approach to preservation based on integral protection policies. By following the Evidence Based Methodology, rather than undertaking a comprehensive analysis of the articles we constructed a set of meta-data based on the most recurring and/or relevant themes. It is important, however, to highlight the great variety of questions in the review, which demonstrates a tendency towards diversification in the way the theme is addressed by the social sciences.

Within this heterogeneity, there is a shared concern at the core of the articles: the analysis of people affected by the changes, often accompanied by denunciations of the injustices faced by these populations. We could hypothesize that the prevalence of this argumentation in the social sciences emerged alongside the strengthening of approaches favouring the inclusion of social segments in conservation policymaking, part of the political-environmental debate from the 1990s onwards. Concomitantly to the process of making the public debate more inclusive and of adopting new approaches in the legislation, we can perceive an increase in the production of academic papers and intensification of the debate. The promulgation of SNUC in 2000, after many decades of discussion, motivated researches and actions by interest groups (NGOs, residents' associations and scholars), who were committed to the environmental cause and rights of populations in areas of environmental interest. These actions occurred with more intensity after that moment, corroborating the thesis that the increase in number of studies from 2000 onwards mirrored the intensification of the debate in society. Transformations in the sphere of knowledge often occur alongside social transformations in a process where

they motivate one another. Changes in society have fostered scientific reflection as well as academic production in the social sciences, on the environmental theme. Conversely, more in-depth reflections also affect the ways one perceives biodiversity conservation, which in turn may trigger changes in law, in policies and in conservation practices.

SNUC officially introduced the social question in the debate on environmental public policies, thereby expanding the focus of the impact on the "natural" environment caused by economic development, to the welfare of social groups deeply embedded in that environment, issues that before then were seen as "peripheral". This process demanded the need for new theoretical tools capable of encompassing social questions that had been included in the environmental debate. The inclusion of the environmental theme in the field of social sciences meant that phenomena that could not be analysed from a homogenizing perspective of "culture" or "society" also had to be addressed. To attribute to "man" – a generic and universalizing category – the role of environmental degradation agent[xx] was no longer seen as a sufficient explanation for the enormous variety of relations between society and nature in a mega-diverse country such as Brazil, both in ecological and cultural terms.

However, the literature review here presented sheds light on the failure to grasp the complexity of the problem, as when researchers opt for the use of equally broad and generic analytical lenses, such as "traditional population", which assumes the status of a universal and homogenous category to designate a variety of social segments involved in processes of environmental conservation. In that sense, the construction of the concept of biodiversity conservation in the social sciences still lacks the conceptual precision with regards to the classifications of social groups about which, and on behalf of which, the research speaks. More proximity between sociology and rural anthropology could be useful, as suggested in the articles by researchers from Paraná.

The notion of "family farming", for example, which was introduced in the debates between (rural) social movements and public policies was included in the sociological universe and remained there after being redefined as a concept. Despite displaying some theoretical hurdles, the term is associated with a set of other notions and concepts that in some ways inform the analyses and strengthen its potential and analytical precision. As for the notion of "traditional populations", also an offshoot from (environmental) social movements, after it was incorporated in the sociological debate alongside a process of consolidation of the biodiversity conservation issue in the social sciences, it is still being discussed and elaborated. The big challenge is to allow for the diversity of these populations and the analytical and political needs of the generalization. This process is essential given that the use of a more well-established category would change not only the form and content of the approach, but also the problems associated with the research.

The notion of "sustainable development" follows a similar process. Different understandings of the term appear in the papers, reflecting the difficulties already observed in both the national and international literature. With regards to our analytical context, we have noticed a predominance of the approach that associates sustainability with the need to avoid or mitigate environmental impacts resulting from "development" in order to protect the reserves of "natural resources". This perspective, however, is complemented

by the idea that environmental conservation is not justified purely on the basis of the need to guarantee the welfare of future generations. Thus, the attention is predominantly on the living conditions of social segments that reside in areas of current conservationist interest. As we have seen, the arrival of the social sciences in the debate brought a new perspective to the biodiversity issue, which then engaged in dialogue with the approaches on conservation that had been originally elaborated by the natural sciences. In addition, the social sciences were interested in securing a space in a field that until then was dominated by the natural sciences. The adoption of a multidisciplinary or interdisciplinary perspective was repeatedly pointed as a way to overcome the barriers that prevented researchers from understanding complex socio-ecological questions (Cf. FERNANDES & SAMPAIO 2008; BRANCO 1995; VIEIRA et al 2005).

However, it is worth noting that the dialogue between different scientific disciplines appears as a possible solution for problems resulting from this reflection, even if it still lacks a more thorough elaboration in theoretical and methodological terms. Despite the incidence of articles co-authored by scholars from different disciplines, as well as a big proportion of authors with an interdisciplinary background, we did not come across a more in-depth elaboration concerning the advantages and disadvantages of such an endeavour. This suggests, in our opinion, that multidisciplinarity in and of itself does not necessarily lead to an interdisciplinary approach, and should not be seen as a panacea to deal with the epistemological problems faced by environmental sociology.

This imbroglio is even more complex when we consider the inclusion of this knowledge in the collection of evidences that need to be assessed during the policymaking process and its implementation stage, as attested by the evidence-based methodology. These notes highlight the need to broaden the discussion regarding the dialogue between public policies and scientific knowledge in a less technical manner, given that this is a two-way track shared by the theoretical production in social sciences and the political context in the ambit of environmental conservation. In this scenario, science and politics co-produce each other (JASANOFF, 2004)

The dialogue between society and the social sciences spawned a profound transformation in the field of debates about "biodiversity conservation", which before was limited to the need to expand legal barriers to restrict human action in spaces of conservation. As a result of having to counter such view, the debate in the social sciences in this thematic area is not limited to reiterate the need to "conserve the environment", something that was in the previous agenda, but to discuss how to do it taking into account the welfare of less privileged populations, as well as those affected by the environmental legislation. The core question for contemporary social sciences analyzing this thematic issue is that of how to combine human development and environmental conservation, while conserving or expanding the remaining biodiversity in the planet. This latter point could be seen as a starting point that needs to be elaborated in the light of the demands by social movements and of the injustices resulting from the restrictive conservation model based on monitoring, and on the integral protection model.

In the process of carrying out a cross-sectional analysis of the scientific production on biodiversity conservation in the social sciences, we have acknowledged the above as

the core issue in the debate. It was by engaging in arguments around the participation of populations that the discursive unit here understood as Social Sciences produced a shift in the themes being discussed in the field of biodiversity conservation, in the period between 1992 and 2010. We hope this present paper will pave the way for new researches and for subsequent updates of this mapping endeavour, which can serve as an instrument to both public managers and researchers alike.

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Notes

i This article is a revised version of a chapter in the Master's dissertation by Laila Thomaz Sandroni, titled "Conservação da biodiversidade nas ciências sociais brasileiras: um campo em construção" ("Biodiversity conservation in the Brazilian social sciences: a field under construction") under the supervision of Dr Maria Jose Carneiro, and defended in 2012 at the Post-Graduation Program of Social Sciences in Development, Agriculture and Society. The theme was developed as part of the Research Project "Sustainable development and family farming: antagonisms and confluences in the realm of knowledge and practices", coordinated by Dr Maria Jose Carneiro and funded by CNPq.

ii The articles under analysis show different perspectives regarding the term. Some authors see it as the object of dispute while others see it as a research question within clearly delineated boundaries. That said, most authors do not engage in a discussion about the term, the meaning of which is implicitly given. Thus, we shall use quotation marks so as to avoid reifying the concept, whilst recognizing the possibility of a wide range of meanings, and being aware that disputes concerning these take place both within and outside academia.

iii The journal was founded in 1997. The Center for Environmental Studies (NEPAM- UNICAMP) and the Post-Graduation program in Environmental Sciences (PROCAM-USP) played a vital role in its consolidation. Today, the journal is edited by ANPPAS.

iv The first issue of the journal came out in 2000. The Post-Graduation Program in Environment and Development (MADE-UFPR) is now in charge of its publication.

v Here we are referring to the Research Group called CINAIS (Science, Nature, Information and Knowledge) coordinated by Maria José Carneiro, associated with the present paper.

vi This was the classification in force in 2007 when we started the literature review. The review was updated in 2010 with the same selection of journals, in order to give the review some degree of continuity.

vii The original research question included the relationship between biodiversity conservation and agriculture. However, as the research unfolded, we decided to focus on conservation in order to restrict the scope of the research to the environmental theme. For that reason, the terms agriculture, rural development and rural appear as key words in the literature review. Because we restricted the research question, the articles that dealt specifically with the rural theme without connecting it with biodiversity conservation were excluded from the present analysis, while those that focused on conservation alone, without linking it to agriculture, were included.

viii About this topic, see: Jacobi (1999) and Abramovay (2002), both published through the Post-Graduation Program in Environmental Sciences at USP.

ix We noticed a tendency towards using data produced in the Natural Sciences to support environmental decision making and policymaking in a research undertaken with public managers in the environmental realm (Cf. Carneiro e Rosa, 2011).

x This platform is connected to the CNPq (National Research Council) website, which hosts the curricula vitae of all Brazilian researchers.

xi This objective was accomplished in another chapter of the same dissertation that provided the material for this present article (Cf: Sandroni, 2012).

xii Similarly, Carneiro and Danton (2010) observe that the discussion about how sustainability is intrinsic to the agricultural techniques used by traditional populations, polarizes the debate in the Brazilian Social Sciences regarding the

role of agriculture in biodiversity conservation.

xiii Despite not being in our selection, Diegues is widely referenced by the authors in the articles under analysis.

xiv These two categories had already been contemplated in the Forest Code in the 1960s (Law 4,771/1965) and were recently redesigned through a redrafting of the legislation (Law 12,651/2012)

xv Studies on the Guaraqueçaba APA are an important reference regarding this question (DUMORA, 2006; TEIXEIRA, 2006).

xvi This research complements the mapping undertaken by Ferreira (2004) of the analyses in environmental sociology studying traditional populations that reside inside or in the outskirts of UCs. The author only acknowledges the first group as a trend in the sociological literature. In the present research, however, this strand appears to have a minor role, which could result from a temporal gap between the two researches.

xvii This is a Post-Graduation Program in Environment and Development (MADE-UFPR)).

xviii Cf. Dumora (2006); Rodrigues et al. (2003); Teixeira (2005) and Teixeira (2006)

xix National Technical Committee on Biosafety (Comissão Técnica Nacional de Biossegurança), part of the Ministry for Science and Technology.

xx There is only one article in the review that elaborates an argument compatible with this view. Cf Paterniani (2001)

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"BIODIVERSITY CONSERVATION" IN BRAZILIAN SOCIAL SCIENCES: A SYSTEMATIC REVIEW FROM 1992 TO 2010

LAILA THOMAZ SANDRONI
MARIA JOSÉ TEIXEIRA CARNEIRO

***Resumo*:** O objetivo deste artigo é realizar um "estado da arte" da produção em ciências sociais que trata de ambientes onde a conservação da biodiversidade aparece como elemento central. A partir de um levantamento bibliográfico criterioso, identificamos as questões chaves trabalhadas pelos autores que tematizam a conservação da biodiversidade em artigos publicados em periódicos brasileiros de sociologia, antropologia e ciências políticas, tendo em vista a especificidade desta unidade discursiva no campo do debate sobre a conservação ambiental. Com base neste panorama, apontamos algumas tendências nessa bibliografia, bem como reconhecemos algumas lacunas de conhecimento que poderiam ser mais exploradas.

***Palavras-Chave*:** Ciências Sociais; Conservação da Biodiversidade; Produção Científica.

***Resumen*:** El propósito de este artículo es hacer un "estado del arte" de la producción de las ciencias sociales que se ocupa de los ambientes donde la conservación de la biodiversidad aparece como un elemento central. A partir de una cuidadosa revisión bibliográfica, identificamos los temas clave estudiados por los autores que analizan la conservación de la biodiversidad en los artículos publicados en revistas brasileñas de sociología, antropología y ciencia política, dada la especificidad de esta unidad discursiva en el campo del debate sobre la conservación ambiental. Sobre la base de esta visión general, señalamos algunas de las tendencias en la producción, así como reconocemos ciertas lagunas que podrían ser mejor exploradas.

***Palabras clave*:** Ciencias Sociales, Conservación de la Biodiversidad, la Producción Científica.

***Abstract*:** This article carries out a "state of the art" review of the scientific production

in the ambit of social sciences, by focusing on works where the subject of biodiversity conservation takes centre stage. Having as a starting point a detailed literature review, we have identified some key concerns raised by authors in Brazilian journals in the areas of sociology, anthropology and political sciences, whilst acknowledging particularities of this discursive unit in the broader debate of environmental conservation. Against this backdrop, we have identified some trends in the bibliography, as well as gaps that deserve a more in-depth analysis.

***Key words*:** Social Sciences; Biodiversity Conservation; Scientific Production.