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Payment for Environmental Services (psa) as Capital Driver and Promoter of Environmental Conservation: the Case of Brazilian Livestock

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ABTRACT

This article aims to discuss the power of finance capital as environmental conservation promoter by building Payment for Environmental Services mechanisms, specifically livestock chain Brazilian court, listing the barriers to its full operation.

The creation of cattle, started and accompanied the colonization and development of Brazil at first predominated by an extensive model, with animals coming from Portugal and Spain, with low performance in the tropics and without a systematic work of selection and breeding. It is now one of the main value chains of Brazilian agribusiness, with a herd of more than 200 million head and total export around US $ 7.4 billion in 2014.

However, the period in years of livestock development in Brazil, it was often linked to pressure on the deforestation of native forests, mainly in the Amazon and Cerrado biomes.

While groups linked to the productive sector argue that deforestation was linked to the Forest Code of 1973 and the national sovereignty of policies in food production from the Federal Government, groups linked to civil society organizations claim that the effect of this expansion is due to market interest and it is funded by national and international financial capital.

Financial capital and agricultural production, as theoretical objects of research have generally been treated separately in the context of the economy and even the social sciences in general.

In the Amazon, the expansion of the agricultural frontier created in March geo-graphic "Arc of Deforestation", which advances the replacement of natural forests for agricultural production. An expensive process that requires huge sums of financing, mostly coming from public financial institutions.

In 2012, with the aprovoção the new version of the Brazilian Forest Code, replacing the version 1973, the Federal Government authorized the creation of support programs and incentives for conservation of the environment, as well as adoption of technologies and best practices that reconcile agriculture and forest productivity.

Provided through a literature review, it was identified barriers to building an economic arrangement for structuring a permanent mechanism for Payment for Environmental Services, which would meet the demand created by the new federal law.

Interviews with actors and significant entities financially and politically to the livestock sector, were held at the beginning and end of the research to understand the barriers and potentials in the use of Payments for Environmental Services - PSA in the targeting and use of finance capital.

It was identified that the most frequently cited beneficiaries are owners and land owners, farmers and traditional communities and indigenous peoples. Still, few laws indicate which eligible land supportable categories for projects and actions of PSA. Furthermore, the legal uncertainty caused by the lack of a specific law for paying agents, agent receiver and inspection agent of PSA prevents actions to migrate the level of models and projects on a national scale.

Keywords: beef cattle; payment for environmental services; deforestation; sustainability, payment for environmental services; sustainability; livestock; deforestation

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Introduction

Livestock history in Brazil began during the colonization process and accompanied all Brazilian development.. Since the beginning (1534) livestock predominated as an extensive system, which began with animals coming from Portugal and Spain, with low performance in the tropics and without a systematic work of selection and breeding.

For centuries, the livestock in Brazil was not a priority. Mostly using animals for traction, meat production, leather and other products, but the main objective was design a animal traction to support the core activities in the farm, as was historically linked to commodities production to export commodities such as sugarcane in the Northeast region. (SCHLESINGER, 2010, 6p.)

Around 1950s, zebus from India were imported by breeders, especially Nelore cattle breed, which had a perfect adaptation to brazilian conditions. Another marked change from early 1970s was the introduction of forage species, especially grasses from Africa, mainly from the genera *Brachiaria spp*. and *Panicum spp*. These have replaced much of the native pastures and facilitated new grazing areas, which represented a substantially increase in terms of production. However the efficiency of production systems still remained low, especially under the influence of rustic features of the animals, and a poor dietary conditions compared to temperate grasslands.

The Brazilian agribusiness, livestock had in the first half of the 1970s the status of one of the most important activities of the sector, despite the country being meat importer (TIRADO et al, 2008). Seeking to change this scenario, joint efforts of government and the private sector contributed to the past two decades the country to become a major producer, reaching the world's largest beef exporter.

However, in the livestock development period in Brazil cited above, it was often linked to pressure on the deforestation of native forests, mainly in Amazon and Cerrado biomes.

While linked groups to the productive sector argue that deforestation was related to the Forest Code of 1973 and the national sovereignty of policies in food production from the Federal Government, groups linked to society entities claim that the effect of this expansion is due to market interest and It is funded by national and international capital.

In this way, the debate here proposed theme aims to discuss the barriers and bottlenecks for the Payment for Environmental Services (PES) is implemented by the Brazilian cattle industry, generating better use of natural resources.

Literature review

In 2013, the Gross Domestic Product (GDP) exceeds the mark of R$ 4.8 trillion reais (around US$ 1,2 trillion, by current dollar exchange rate), according to the Brazilian Institute of Geography and Statistics (IBGE), the agribusiness sector represents the largest share, about 22 % total, equivalent to over R$ 1 trillion, according to the Center for Advanced Studies in Applied Economics (CEPEA). Among the various products which compound this sector, livestock production accounted about 12 % of the total agribusiness in 2013.

In terms of the flock distribution at the national level, the most important states of beef production are also those with the largest herds, according to IBGE. In 2010, the Brazilian Midwest accounted for 27 % of the national production composed by Mato Grosso do Sul, Goias and Mato Grosso. The second most important region of meat production is the Southeast, with 24 % of the total production of the country, especially in the states of Minas Gerais and São Paulo. The North, South and Northeast regions, correspond respectively by 16.8 %, 15.8 % and 15.7 % of the Brazilian meat production.

The cattle system in Brazil is a complex value chain, consisting of several agents in addition to the farmer, are divided in: industrial inputs, slaughterhouse, retailers, feed suppliers and many others. In

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addition, the variation of products and by-products are consumed and exported, beyond the meat, milk and leather.

In recent years the Brazilian beef cattle industry are facing its major changes and have contributed to the industry reached this level of competitiveness, especially relating to the implementation of more efficient production techniques, such as development of forage adapted to local conditions, food supplementation, selection and systematic breeding and reproductive technologies such as artificial insemination in fixed time and embryo transfer. These technologies have enabled the sector extraordinary gains of volume and productivity determinants to place Brazil in a prominent status as a major producer and main exporter of beef in the international market.

On the whole, weather conditions, territorial extension, the programs for animal health and food safety, made it possible for Brazil to reach its current leading position in the global agribusiness beef with conditions to meet the requirements of various markets consumers.

According to the Brazilian Beef Industry and Exporters Association - Brazilian Beef in recent decades has progressed its traceability system in the production chain, from purchase to the slaughter of animals, through processing, storage and shipment of products. Slaughterhouses invested in new technologies and have implemented programs focused on product quality, such as Good Manufacturing Practices programs (GMP), Operating Procedures Health (POS), Operational Health Standard Procedures (SSOP), and Hazard Analysis and Critical Control Point (HACCP).

Most of the Brazilian herd is raised in pasture, the rains is a critical factor of production that directly affects the quality of pastures and consequently in supply and product prices, which vary in different regions of the country. This characteristic of the production system makes the Brazilian livestock climatic variations is sensitive (and Euclides Filho, 2001). The sharp reduction in rainfall volume occurred in 2013, for example, has damaged not only the fattening of animals, but also to pregnant rate and development of calves and steers, who went through periods of low nutrition. The result may be noticed both in reducing the number of animals for slaughter offered as the weight of the carcasses. (CEPEA, 2014)

In terms of general outlook for Brazilian beef cattle, it is clear that a number of factors have led to the development of technologies and processes that provide improvements in productive and economic efficiency of national production systems. One of the latest examples is the use of integrated crop-livestock and crop-livestock-forest systems (iLPF) also called agroforestry systems, is a viable alternative to land reclamation, uniting grain and wood for meat production which in addition to producing more food, provide environmental services such as carbon sequestration.

In addition to generating new and more efficient production technology, society has demanded the validation of the same, especially with regard to its sustainability. This last aspect is even more important when it comes to the export of beef, whose demands of world markets operating with different prices go to the requirement for specific certifications for the social and environmental aspects.

It is expected for the industry in this decade, that besides the increase of production and productivity, there is a substantial improvement in both the intrinsic quality of the product and the quality of the production process. With preservation of natural resources, improving the quality of life of those involved in the process and ensuring that all this happens in practice.

Brazil has been protagonist in the international trade in agricultural commodities and currently among the major players in the livestock sector, is the only country able to double its production capacity without the need for opening new areas of production, based solely on application Existing technology developed for each country production environment. (EMBRAPA, 2015).

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Since the 2000s, when cases of "mad cow disease" spread across the European continent and in the United States, Brazil is presented as the main supplier able to meet the demand of these regions (COTA, 2001). Companies Brazil started to see it and in the 2008 year of the economic crisis a chance to increase their participation in the global market. (Greenpeace, 2009).

This trade liberalization is beneficial to Brazil, to the point that five years later, in 2008, one in three tons of meat sold in the world was from Brazil (GREENPEACE 2009).

To meet this expanding market, two factors were decisive, the first was high relative competitiveness achieved since 2001, resulting from the implementation of best cattle production practices (Rubin, 2008). The second factor was the investment coming mostly from public funds to finance major domestic slaughterhouses, about $ 2.65 million dollars coming from the National Bank for Economic and Social Development (BNDES), between 2007 and 2009 (GREENPEACE, 2009).

This scenario of expansion of the Brazilian livestock began to attract the attention of some entities on the externalities caused by this activity. In 2007, the United Nations for Food and Agriculture Organization (FAO) report entitled Livestock's Long Shadow, pointed out studies that the global livestock as responsible for issuing 18% Greenhouse Gases (GHG) that cause global warming. In Brazil, the situation had negative economic impacts only with the release of another report, entitled the "The Farra do Boi in the Amazon" written by the environmental group Greenpeace. The report directly pegged the three largest slaughterhouses at the time, Bertin, JBS and Minerva exploitation of cattle ranching in the region, giving rise to clearing the forest to open new areas of pasture for cattle.

From that point, to understanding the goals of research, discussion of two topics distinct principle is necessary, but they become complementary in the development of a new environmental preservation technology, presented here as Payment for Environmental Services. They are, finance capital and its externalities in Brazilian livestock and ecosystem services provided by the environment.

According to Gonçalves (2005), agriculture becomes a wealth of generation link multiplied by autonomous segments of ancient rural complex to form the strategic segments of the agricultural industry of goods and services, processing of agro-industries and agribusiness goods and apparels. The author pointed out that the new certification mechanisms, verification and monitoring, typical of the new production standard, give ballast to the need for an integrated analysis and integrating the production chain, essential for competitive entry in the new order of globalized agri markets. Societies have become and consequently their economies, surpassing the paradigm of the theory of economic development in its traditional formulation, redefining its concepts and scopes.

The persistence of the strategic importance of agriculture, particularly developed continental economies, required the construction of a new paradigm. (Gonçalves, 2005). Increasingly, capital assumes its capital status in general, leaving submerged nomenclatures such as: productive capital, agrarian capital and industrial capital to take the form of interest of this study, its form of financial capital (Goncalves, 2005).

For Delgado (1986), financial capital and agricultural production, as theoretical objects of research have generally been treated separately in the context of the economy and even the social sciences in general. According to the author, roughly, finance capital is the most developed social relations of economic recovery in modern capitalist societies, and involves, in general, increasing concentration and centralization of capital. This concentration process is controlled usually by institutional owners of liquidity in the economy, together with the companies responsible for the issuance and circulation of equity securities, managed by financial institutions and submitted to recovery logic.

A simpler expression of this concept is abstract and general social relation of capital to itself, manifested by the monopolistic organization of markets under the command of the controlling institutions of

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money capital. From that point, based on empirical observations that motivated the development of this work, it is necessary to understand the next steps, the need for regulation and direction of this financial capital as agriculture's prime mover in the late twentieth century to the present day the twenty-first century.

Mueller (1992) reports in his work the process of agricultural expansion used by the federal government, the so-called new agricultural frontier era in Brazil, in the regions of Cerrado and Amazon. The impact of policies adopted at that time, exerted strong pressure on these ecosystems under the justification of increasing production and ensuring national sovereignty. Meirelles (2014) shows in more detail the issue of national sovereignty presenting an overview of the expansion in the Amazon between the years 1964 and 1985, when the country was going through a period of military dictatorship. In order to ensure national security, public policies were developed for the economic development in the border regions.

> *"In this view, the construction of this process had the prevalence of developmental state which acts not only as a direct producer, especially the elimination of basic constraints represented by raw materials, energy and transport, but also in development financing based on public funds normally applied favored rates. (Gonçalves, 2005, p. 17) "*

The advance of the agricultural frontier in Brazil has a feature that directly influence the expansion of deforestation, while this progress is associated with a narrowing of relations and interdependencies of the productive chain. Thus, the use of land for livestock is faced, in part, to the use of land for ecosystem services, as the change in the development model directly affect the different economic agents that interact directly or indirectly, in the livestock market. The membership of the PSA mechanism is, in this model of economic relations, a barrier to its application as it proposes a structural change, which will be understood throughout the article.

In recent decades, the Brazilian agricultural development model was based on a model of uninterrupted gains productivity, called for the "treadmill". The model is based on the progressive shift of the supply curve to the right, which implies the reduction in the price of agricultural products if the demand curve does not move to the right proportion (COCHRANE, 1991 *apud* MARTHA and ALVES, 2015).

The discussion of the livestock externalities of economic development in Brazil is one of the central points of the issue of deforestation and land use. According to Martha and Alves (2015), the increase in the Brazilian livestock productivity between 1950 and 2006, occurred mainly by the improved technology package adopted by the different agents of the livestock market.

In the Amazon, the expansion of the agricultural frontier created the geographical framework of the "Arc of Deforestation", which advances the replacement of natural forests for agricultural production. An expensive process that requires huge sums of financing, mostly coming from public financial institutions. (Imazon, 2011)

According to Delgado (1986, p. 15), "the issue of capital construction in natural resources not produced by the capital simultaneously placed concrete problems on the movement of capital, issues relevant to what is conceptualized as modern financial circulation".

This pattern of state intervention is being replaced by state action adjustment, where the institutional policy of government actions not only establish rules and procedures governing the parameters of economic activity as mainly structure the development of resource mobilization mechanisms for funding production based on the financial market.

The inclusion of the discussion on the environmental issue in politics occurred with the realization of the First Conference on the Human Environment in Stockholm, 1972. Due to exogenous and endogenous

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factors driving the expansion of government action, Brazil began to implement public policies focused on question, which converged on the establishment of institutions to environmental issues. These public policy, within this context, come to occupy a central position to be strategic in collective decision-making, and directly influence the behavior of society. These public policies in the environmental field also create reaffirm and alter institutions, both objective and formal (constitutions, laws and property rights) as of subjective and informal (customs, traditions and codes of conduct), which together they alter the behavior of actors (CHIODI, PUGA and Sarcinelli, 2013).

According Chiodi, Puga and Sarcinelli (2013), in Brazil, public policies implemented to address the environmental issue had a decentralized basis, with the objective of delegation of responsibilities to states and municipalities, together with the prioritization of instrument control and command , supported by direct regulation, accompanied by supervision and sanction for failure to comply with established norms and standards. There are also new environmental policies that prioritize instruments that are based on economic incentives. Decentralized and believing that the economic incentive has a way more effective than command and control instruments to stimulate the actors for the protection of forests and waters, arise PES schemes.

The role of the state was important in the inauguration of comprehensive legislation and the establishment of command and control instruments to discuss usability issues and regulation of natural resources (MAGRINI, 2001). However, the Forest Code (BRAZIL, 1965) is a clear example of the effectiveness of this instrument problem. For 47 years it was the main formal institution established to articulate the conservation farms and natural resources.

Thus, it is necessary to understand the motives of the Forest Code have not reached their goals. First, it can be considered that in countries with new democratic institutions, such as Brazil, the performance of the actors is not entirely restricted to institutional interests, this level depends on the strengthening of the institutional tools in question. Socio-economic and political specificities of developing societies give rise to a multiplicity and inconsistency of unconstitutional arrangements, the political chain and positions and ideological behaviors that hinder the effectiveness of the rules established by state spheres (CHIODI, PUGA and Sarcinelli, 2013).

Explanations like these, maintain that some formal institutions are not accepted and complied with by the actors. While explaining the cause of probable non-effectiveness of state institutions for environmental conservation in developing countries, this finding also explains the limitations of the strictly institutional analysis to understand the lack of effectiveness. For this reason, and also due to the weakening of state institutions in new democracies, increased emphasis on governance design. The governance agenda in a model of government more cooperative among different social actors, where construction policy is not restricted to the hierarchical authority of state and governments. The concept of governance in the environmental field, is linked to the establishment process, reaffirmation or change the institutions to resolve differences related to natural resources. Thus, groups, individuals or organizations who perform some role in the political arena are actors empowered to act in these processes. (CHIODI, PUGA and Sarcinelli, 2013).

All the worry about the pressure of capital under the environment only makes sense if we look at natural resources as generators of ecosystem services, and its importance as a generator of raw materials to the productive sector and positive externalities for the population.

For Farley (2004 *apud* SIMÕES, ANDRADE. 2013), ecosystem services are essential to all economic activities, since the entire range of economic product is originated from transformation of raw materials from nature.

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The relationship of the business sector, in turn, with ecosystems occurs in two ways: i) use ecosystem services, which includes the provision of raw materials, and: ii) contribute to ecosystem change. The interactions of the business sector affect not only the ecosystems in which they interact, but also those that relate directly to society, ensuring their wellbeing. (Monzoni, 2013).

The ecosystem service of climate regulation has taken a leading role in the context of climate change and is considered one of the most relevant issues in the debate on quantification and economic valuation. The intrinsic relationship between the concentration of carbon dioxide in the atmospheric global warming and climate change, ensures this service leadership in the discussion.

Forests maintain essential ecological systems to maintain life. The cultural survival of many coastal communities depends on the health of their forests. Also play a key role in preserving biodiversity - nearly half of all terrestrial species of fauna and flora is found there. (Greenpeace, 2009)

Once elucidated both concepts presented, the financial capital of livestock and ecosystem services provided by the environment, all interconnected by economic development actions, it is now proposed a discussion of the usefulness of a mechanism to make relevant the perspective of capital preservation environment.

In 2012, with the approval of the new version of the Brazilian Forest Code, replacing the version 1973, the Federal Government exemplifies the model proposed by Gonçalves, to legislate in its text the PSA.

The federal executive branch authorized the creation of support programs and incentives for conservation of the environment, as well as adoption of technologies and best practices that combine agriculture and forest productivity, reducing environmental impacts, in order to promote environmentally sustainable development always in compliance with the criteria of progression. (Brazil, 2012)

Law 12,651/2012, defines as Payment for Environmental Services, the essential functions provided by natural ecosystems for the maintenance, refurbishment or improvement of environmental conditions suitable for life, including human. In addition, for purposes of this law is considered payment for environmental services to contractual transaction between a payer and environmental services provider, under the specified terms.

Against the increased pressure on the various ecosystems, various institutions and governments have sought to create incentives to improve the management of environmental assets. In this sense, policies Payments for Environmental Services (PES) have been identified around the world as a viable option to achieve this goal, complementing command and control actions (MMA). However, the feasibility and applicability of these policies in Brazil, presents some considerations as shown in the search results.

In Brazil, several states have adopted laws PSA and there is a progressive discussion for adoption of a national law on the subject. Overall, there is a predominance of public institutional arrangements, with the exception of Amazonas and Acre, which provide the private institution of participation for management and fundraising for the PSA program.

In many cases there is shared management between different public institutions through committees, which may or may not count on participation of civil society (Imazon, 2011).

The most frequently cited in the laws beneficiaries are owners and land holders, family and settled farmers and traditional communities and indigenous peoples. Still, few laws indicate which eligible land supportable categories for projects and actions of PSA.

In the context of the Water Conservative Project, for example, the actors fall into two categories: a) central actors, which are segmented into public and private; and b) partners actors. The central actors are the core of the policy; without these, it does not exist. The agents of the municipal authorities are defined as public actors and can be divided in: political actors, the executive and legislative power,

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actors and technicians, managers project staff. It is important subdivision because the political actors have decision-making authority on regulations, technical actors, in turn, have the power to make determinations, and it was the sum of these skills that made possible the existence and development of the project. Responsibility for administrative, financial and technical design, as well as well as all technical assistance, is in charge of public actors. Private actors are the owners of farms, described as the environmental service-recipients providers (PAGIOLA, von Glehn and Taffarello, 2013).

In practice, PSA in Extrema work this way, the local political balance made possible interactions between central actors, which can be considered as positive for elucidating the life of the project. In the space of their own public actors (political and technical) is the first interaction, which came to prioritize environmental actions in the municipality. The political party affinities that lined this approach, allowed the project to be structured and have the assurance of the budget and structural support resources. The second interaction is seen in the relationship between public actor (technical) and private. The relationship established between the staff of the municipality and neighborhood associations, representatives of the owners, established a channel of participation prior to the project itself, which was substantial for their practicality. (PAGIOLA, von Glehn and Taffarello, 2013).

Those that contributed somewhere in the project's path were partners actors; they are part of a constellation around the central agents. These did not play individually an essential role in the project, however, they injected a large amount of resource and enabled its rapid expansion. The proposal was already finished and the search for partners was the aim of achievement and to meet and strengthen relevant components of its scope.

The city personally controls the basic links of the process, negotiating with owners, the conversation with the partner actors and budget management. Vatn (2010 *apud* SIMÕES, ANDRADE. 2013) indicates that this is the usual design in PSA schemes, the difficulty in determining the environmental services as a product and describe who their suppliers and their beneficial owners, so the system agent has the power to establish which environmental service will be reimbursed, determine who will be the buyer and the recipient and what will be paid.

Project design gives a degree of flexibility and restricted participation. There are no formal channels of participation in the relationship between key players and partners actors, resolutions are judged centrally. The relationship between technical group and owners there is flexibility with regard to the recommended management practice, owners can decide, through negotiation, which environmental adaptation actions will be admitted. As a result, that provision is still far from the idea that flexibility in design processes and institutional adaptation is central to ensure the long-term effectiveness of new institutions for conservation, due to route errors repair facilities (CORBERA, GONZALES and BROW, 2009 *apud* SIMÕES, ANDRADE. 2013). Partner agents derived from different sectors of society - state, private sector and civil society.

The PSA arises for livestock as a tool for the management of ecosystem resources as a result of environmental concerns. Environmental services include the actions benefiting the conditions and processes by which ecosystems maintain their functions and supply the life and produce raw materials. The PSA model can be seen as a means of resources between social and economic actors, aiming to create incentives that align individual or collective purposes of land use with the social interest in the management of natural resources.

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Methodology and Data Source

Here will be presented the methods used to achieve the objectives of this research, relating the theoretical concepts presented in the literature review as opposed to data collected in interviews.

This research is an analysis of the potential use of the mechanism of Payment for Environmental Services - PSA's in promoting environmental conservation forward the expansion of the productive areas of animal husbandry in the Brazilian biomes. The peculiarities of the pressure of expansion of new production areas in the Brazilian biomes are not relevant to this work and the frequent reference to the Amazon biome is due to great pressure interactional front of the supposed capacity to regulate the climate and biodiversity bank that owns this ecosystem.

The research is qualitative and exploratory profile, since it can be treated in several scopes, be they environmental, legislative, economic, social, among others. The design of the research model followed the Hypothetical-Deductive method Bungue presented by Marconi and Lakatos (2003, p 99.), Which consists of the steps: placing a problem, construction of a theoretical model, deduction particular impact test assumptions and addition or introduction of the conclusions in theory. In addition, the lack of jobs in a particular point of view, is presented by Neves (1996) as a justification for this kind of research.

According to Marconi and Lakatos (2003 apud Costa, 2014) research that resemble this study structure that meet the exploratory objective, originate in a problem, the goal in question, the relationship between the PSA's and cattle ranching in Brazil and they are understood as research issues and formulations of a problem.

Completed the first stage of literature review was conducted a series of interviews with members of the Working Group on Sustainable Livestock - GTPS, Brazilian roundtable that brings together companies and institutions that make up the agro-industrial system of cattle raising.

The GTPS was created in late 2007 and legally constituted in June 2009, just covering the period between releases of FAO and Greenpeace reports. It consists of representatives from different segments that are part of bovine livestock value chain in Brazil. Includes representatives of industry and sector organizations, producers and their associations, retailers, input suppliers, banks, civil society organizations, research centers and universities. In 2013 the institution released a report on control mechanisms and reducing deforestation in the Brazilian Amazon biome, however, with applicability in other biomes as well.

To these respondents received a questionnaire containing structured and semi-structured questions as guidelines obtained in Markoni and Lakatos (2003). The structured questions that make up the first part of the questionnaire, seek to allocate the agents of bovine livestock value chain in possible financial arrangement for the PSA system proposed by SIMÕES and ANDRADE. (2013).

The second part of the questionnaire, consisting of semi-structured essay questions, aimed to verify the concepts, attributes and characteristics of the PSA's were adherents raised in the literature review. The second goal contest or not this arrangement model and identify bottlenecks for the full operation of the same in the institution and to the livestock sector.

Of the seventy-five members that make up the GTPS the above mentioned categories, was interviewed at least one representative of each category, a total of six interviews. This process constitutes a non-probabilistic analysis. This type of survey is often used when the researchers did not have limited resources or when targeted, selects its representative interviewed by (Oliveira, 2012).

Results

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Definition of PSA

The literature review showed that PSA is a recent mechanism and practiced so far only in projects and tests, most of them recognized the Water Producer Program in Extreme municipality in Minas Gerais.

This fact has the first explanation the lack of knowledge in the relevant legislation regulating the PSA, that is, those involved with making proposals for implementation of these mechanisms, unaware of the basic requirements for the same is not perennial but can turn into a model constant and that play alone.

In the interviews it became clear that the productive sector, characterized by cattle producers do not have knowledge of the potential to generate positive externalities of environmental resources, thus the PSA becomes something difficult to perform for them.

For representatives of civil society organizations, research centers and universities, the concept is clear, however, the metrics for evaluation of the positive impacts of environmental systems still need further research and discussion object.

Structure of a pattern of PSA model

The model proposed by Simões and Andrade was adjusted taking into account the literature review and tested with the associated GTPS. The tested model predicted that for the PSA's migrate from pilot projects to permanent programs the role of agents in the composition thereof should be well defined. Thus, the cattle raising industry would be stratified into different roles in maintaining this scheme.

The first agent to compose this systemic model of PSA would be the receiving agent composed of ranchers. As holders of the production factor is land and environmental resources inserted in it, the farmer's agent capable of promoting the conservation or environmental degradation through its activity. However, their action is the result and not supportive of this decision.

It is at the discretion of the regulator to direct the farmer in making decision and have identified the role of this agent by both the government and the private sector. In a Keynesian approach to the PSA, the government using legal instruments have the ability to direct the capital to promote the conservation of natural resources, it is through the creation of laws that make it easier or financially beneficial, the allocation of project resources, actions and practices that promote this mechanism. A practical example of this type of initiative is the use of the Ecological VAT, the practice is to pass on to states and municipalities of the revenues derived thereof based on the areas of environmental conservation.

But in a classic liberal approach where the market is self-regulated, it is the same legislate and direct resources to promote environmental conservation in balance with economic development. The latter approach is controversial from the point of view of civil society represented by NGOs.

To keep "the forest standing," using a term often used both by environmental groups as large farmers, it is necessary that it be economically more viable than the activity produced in the same area, ie as found both in the review literature and in the interviews, the hectare of forest should be more profitable than hectare of productive activity.

The role of the paying agent was identified in interviews as being of any entity involved in the process of processing, marketing or financing activity in the case of members of GTPS represented by slaughterhouses, retail and restaurants or banks.

The discussion on the role of supervisory agent again refers the dispute between Keynesians and liberals cited above. While for some members of GTPS the watchdog role as the PSA practices solely for the government to own the other market institutions and individual consumers located at the end of this agribusiness system can act as enforcers.

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Finally, the role of intermediary agent was in charge of civil society organizations, since the same stand as representatives of the main beneficiaries for the maintenance of ecosystem services is the population.

Barriers to adoption of PSA

The sum of the barriers that each agent agribusiness system of cattle breeding attributes for non-inclusion in a PSA system, resulting in determining factor for this system is not fully operational in Brazil, and this factor comes down to legal uncertainty.

For the farmers of the main producing areas, located in the Amazon and Cerrado biomes, land tenure is the main bottleneck for the noncompliance PSA programs. Producers in those regions with skilled environmental asset for PSA mostly have no property ownership document exploring, which is the main document needed, for example, crediting and financing.

For the financial sector, represented in this case by banks that work with agricultural credit, legal uncertainty is the lack of regulation by the Central Bank of Brazil for trading of ecosystem services, and providing credit to farmers in land conflict regions, mainly in the Amazon biome.

Finally, methodologies for valuation of ecosystem services, whether the mitigation gases by forests, water absorption by the soil, among others, are not yet consensus among researchers of the subject, the civil society organizations and research centers working the development of systems for valuation of it, expressed in the interview that the value of something intangible can be discussed both in a macro when micro sphere of the population, generating many search features.

Final considerations

The Payment for Environmental Services projects are still a tricky area to be demystified the value chains of Brazilian agribusiness, and especially by livestock which is still entering your technological package of best practices towards sustainable practices.

These projects see every day growing in frequency and size, gaining more space and bringing the understanding that ecosystem services provided by nature should be remunerated.

This understanding is based on the logic that the "standing forest" should be worth more than the "forest floor" because without it being possible to see in a small cutout of time, it provides services to the population, such as purification air by plants, production and protection of water resources as water sources and groundwater, biodiversity maintenance, climate control, among others.

Although recent, this market has consolidated some experiments and in practice has already answered many questions and many of these questions has been answered thanks to the growing number of participating institutions. Both private and public, favoring the creation of a variety of institutional arrangements fundamental to the construction process of payment for environmental services and markets for modeling a solid and reproducible basis for its growth.

The example of Water Producer project originating in Extrema - Minas Gerais, which became a national program through the National Water Agency - ANA, is proof it is possible to reconcile production, increased productivity and awareness, creating a project template adaptable the various regions of Brazil.

Environmental disasters like in the Gulf of Mexico in the United States in 2010, where the explosion on an oil platform spilled thousands of gallons of oil into the sea, and the breaking of a dam mining waste in

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Bento Goncalves district of Minas general, the amount warning about the importance of the environment in the productive activity and the generation of wealth for the community.

The path is undoubtedly the validation of ecosystem services, and when institutions that preach be representative as GTPS are committed to zero deforestation, conditional on the creation of conditions and forms of economic compensation to make it viable, makes this position if confirm.

Bibliography

ABIEC- Associação Brasileira das Indústrias Exportadoras de Carnes. Pecuária: Pecuária Brasileira. Disponível em: <http://www.abiec.com.br/3_pecuaria.asp.> Acessado em 9 abril de 2014.

ANUALPEC 2010. Anuário da Pecuária Brasileira: FNP Consultoria & Comércio, p.53 2010.

ARRUDA, Z.J. DE; CORREA, E.S. Avaliação técnico-econômica de sistemas de produção de gado de corte: o sistema físico de produção do CNPGC. EMBRAPA-CNPGC. Campo Grande. (Comunicado Técnico, 42. 10p), 1992.

BRASIL. Lei n. 4.771, de 15 de setembro de 1965. Institui o Novo Código Florestal.

BRASIL. LEI n. 12.651, de 25 de maio de 2012. Dispõe sobre a proteção da vegetação nativa; altera as Leis nos 6.938, de 31 de agosto de 1981, 9.393, de 19 de dezembro de 1996, e 11.428, de 22 de dezembro de 2006; revoga as Leis nos 4.771, de 15 de setembro de 1965, e 7.754, de 14 de abril de 1989, e a Medida Provisória no 2.166-67, de 24 de agosto de 2001; e dá outras providências.

BUAINAIN A.M; BATALHA M.O. Cadeia Produtiva da Carne Bovina. Série Agronegócios, v8, p.33-43, 2007.

BUNGENSTAB, D.J. Environmental Impacts of Beef Production in Central Brazil: The Effect of Intensification on Area Appropriation. Verlag Dr. Hut, Muenchen/Germany, 2005.

CENTRO DE ESTUDOS EM SUSTENTABILIDADE, GVCES. Diretrizes Empresariais para a Valoração Econômica de Serviços ecossistêmicos, versão 1.0, p. 8-36, 2013.

CEPEA - CENTRO DE ESTUDOS AVANÇADOS EM ECONOMIA APLICADA. CEPEA Estima Crescimento de 2,8% do Agronegócio em 2015, 2014, Piracicaba. Disponível em <http://www.cepea.esalq.usp.br/comunicacao/Cepea_Perspectivas%20Agroneg2015_relatorio.pdf >. Acessado em 05 dez. 2015

CHIODI, R. E.; PUGA, B. P.; SARCINELLI, O. Análise institucional do mecanismo de pagamento por serviços ambientais: o projeto conservador das águas em Extrema – MG. São Paulo, 2013. Revista Políticas Públicas. São Luís, v. 17, n. 1, p. 37-47, jan./jun. 2013

COCHRANE, W. W. *apud* Martha Jr., G.B., Alves, E. Dimensão socioeconômica e oportunidades para pagamentos por serviços ambientais na pecuária. EMBRAPA. Brasília, 2015. No prelo.

CORBERA, E., SOBERANIS, C.G., BROWN, K. *apud* SIMÕES, M.; Andrade, D. C. Limitações da abordagem coaseana à definição do instrumento de Pagamento por Serviços Ambientais (PSA). Sustentabilidade em Debate - Brasília, v. 4, n. 1, p. 59-78, jan/jun 2013.

COSTA, F.P. Pecuária de corte no Brasil Central: o produtor, os recursos produtivos e o manejo das pastagens. EMPRAPA-CNPGC. Campo Grande. (Circular Técnica 26. 46p), 2000.

COSTA, R. S. Análise dos stakeholders do GTPS (Grupo de Trabalho da Pecuária Sustentável): Problemas enfrentados para implantação da pecuária sustentável. 2014. 116f. Tese de Mestrado em Agronegócios. Faculdade de Agronomia e Medicina Veterinária, Universidade de Brasília. Brasília, 2014.

DOI 2016: pfsd.2016.1636

COTA, P.S. de M. Vaca louca, seca e exportações. Revista Conjuntura Econômica. São Paulo, maio. 2001. Disponível em < http://bibliotecadigital.fgv.br/ojs/index.php/rce/article/view/31667/30456>. Acesso em: 04 jan. 2015.

DELGADO, G. C. Constituição e Desenvolvimento do Capital Financeiro na Agricultura. Cad. Dif. Tecnol., Brasília, p. 11-76, jan./abril. 1986.

DELGADO, G. C. Capital Financeiro e Agricultura no Brasil. São Paulo; Ícone, 1985.

EUCLIDES V.P.B; FILHO K.E. O Sistema de Produção e a Cadeia de Carne Bovina. Embrapa Gado de Corte. Anais do 18º Simpósio sobre Manejo da Pastagem Piracicaba, São Paulo, 06 de setembro de 2001.

EMBRAPA - Empresa Brasileira de Pesquisa Agropecuária. Embrapa Contribui para Agropecuária Gerar Ativos Ambientais. Disponível em:< https://www.embrapa.br/busca-de-noticias/-/noticia/3293164/embrapa-contribui-para-agropecuaria-gerar-ativos-ambientais> 17 jun. 2015

FAO – Food and Agriculture Organization of the United Nations. Livestock long shadow. Roma, 2006.

FILHO, J. C. de S. Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas. Belém, v. 9, n. 1, p. 219-241, jan.-abr. 2014.

GIORDANO, S.R.; VITA, C.L.R. de; Diretrizes para o planejamento e diagnóstico na pecuária sustentável. PENSA, São Paulo, fevereiro de 2014.

GREENPEACE. A Farra do Boi na Amazônia. 2009, São Paulo. Disponível em: < http://www.greenpeace.org/brasil/Global/brasil/report/2009/6/FARRAweb-alterada.pdf>. Acesso em: 05 out. 2015.

GONÇALVES, J. S. Agricultura sob a égide do capital financeiro: passo rumo ao aprofundamento do desenvolvimento dos agronegócios. Informações Econômicas, São Paulo, v. 35, nº 04, abr. 2005.

IBGE- Instituto Brasileiro de Geografia e Estatística. Banco de dados Agregados-SIDRA: Abate. Disponível: em <http://www.sidra.ibge.gov.br/> . Acesso em: 12 março de 2014.

IMAZON - Instituto do Homem e Meio Ambiente da Amazônia. O Crédito Desmatamento. Disponível em: <http://imazon.org.br/imprensa/o-credito-desmatamento/>. Acesso em 17 jun. 2015.

INTEGRAÇÃO Lavoura-Pecuária-Floresta. Empresa Brasileira de Pesquisa Agropecuária. Disponível em: <http://redeilpf.com.br/>. Acesso em: 20 nov. 2015.

MARCONI, M. de A.; Lakatos, E. M. Fundamentos de Metodologia Científica. 5 ed. São Paulo: Atlas, 2003. 309 p.

MARCONI, M. de A.; Lakatos, E. M. *apud* COSTA, R. S. Análise dos stakeholders do GTPS (Grupo de Trabalho da Pecuária Sustentável): Problemas enfrentados para implantação da pecuária sustentável. 2014. 116f. Tese de Mestrado em Agronegócios. Faculdade de Agronomia e Medicina Veterinária, Universidade de Brasília. Brasília, 2014.

MMA – Ministério do Meio Ambiente. Instrumentos Econômicos. Disponível em: <http://www.mma.gov.br/governanca-ambiental/economia-verde/instrumentos-econ%C3%B4micos>. Acesso em: 10 out. 2015

MMA - Ministério do Meio Ambiente. Incentivos Positivos de Controle do Desmatamento no Brasil. Brasília. 2012. 32p.

MONZONI, M. Diretrizes empresariais para a valoração econômica de serviços ecossistêmicos. Centro de Estudos em Sustentabilidade FGV/EAESP. São Paulo, 2014. Disponível em: <http://mediadrawer.gvces.com.br/tese/original/devese_2-0_final.pdf>. Acesso em: 13 nov. 2015.

DOI 2016: pfsd.2016.1636

MUELLER, C. C. Dinâmica, Condicionantes e Impactos Socioambientais da Evolução da Fronteira Agrícola no Brasil. Revista Administração Pública, número 26, 64-78p., jul./set. 1992.

NEVES, J. L. Pesquisa qualitativa – características, usos e possibilidades. Caderno de Pesquisas em Administração. São Paulo, v. 1, n. 03, 2º semestre 1996.

OLIVEIRA, K. D.; Almeida, K. L.; Barbosa, T. L. Amostragens probabilística e não probabilística: técnicas e aplicações na determinação de amostras. 2012. 28f. Centro de Ciências Agrárias, Universidade Federal do Espírito Santo, 2012.

PAGIOLA, S.; von Glehn, H. C.; Taffarello, D. (Org.). Experiências de pagamentos por serviços ambientais no Brasil. São Paulo: Secretaria do Meio Ambiente, 2013. 339p.

PIRES J.A.A. A Cadeia Produtiva de Carne Bovina no Brasil Mercado Internacional e Nacional. Emater MG.Anais do III Simpósio de Produção de Gado de Corte, junho de 2002.

PRADO JR., C. História Econômica do Brasil. São Paulo. Ed. Brasiliense. 1945. 26ª edição, 1976.

RUBIN, L. da S.; Ilha, A. da Silva.; Waquil, P. D. O Comércio potencial brasileiro de carne bovina no contexto de integração regional. Revista de Economia e Sociologia Rural, Piracicaba, v. 46, nº 04, p. 1067-1094, out/dez 2008.

SECRETARIA DA FAZENDA. ICMS. Disponível em: <http://www.fazenda.sp.gov.br/oquee/oq_icms.shtm>. Acesso em 05 jan. 2016.

SIMÕES, M.; Andrade, D. C. Limitações da abordagem coaseana à definição do instrumento de Pagamento por Serviços Ambientais (PSA). Sustentabilidade em Debate - Brasília, v. 4, n. 1, p. 59-78, jan/jun 2013.

SCHLESINGER, S. Onde Pastar? O Gado Bovino no Brasil. Rio de Janeiro: FASE, 2010, 116 p., ISBN 978-85-86471-55-1. Disponível em: < https://br.boell.org/sites/default/files/gado_brasil_sergio_schlesinger.pdf >. Acessado em: 5 mar. 2014.

TELLECHEA, F. Análise dos custos de transação no setor industrial da cadeia produtiva de carne bovina no Rio Grande do Sul. Porto Alegre RS. 2001. Tese (Mestrado em Economia Rural) Curso de Pós-graduação em Economia Rural da Universidade Federal do Rio Grande do Sul, 2001.

TIRADO, G. et al. Cadeia Produtiva da Carne Bovina no Brasil: Um Estudo dos Principais Fatores que Influenciam as Exportações. In: CONGRESSO DA SOCIEDADE BRASILEIRA DE ECONOMIA, ADMINISTRAÇÃO E SOCIOLOGIA RURAL, 2008, Rio Branco. Disponível em: < http://sober.org.br/palestra/9/468.pdf >.

VANT, A. *apud* SIMÕES, M.; Andrade, D. C. Limitações da abordagem coaseana à definição do instrumento de Pagamento por Serviços Ambientais (PSA). Sustentabilidade em Debate - Brasília, v. 4, n. 1, p. 59-78, jan/jun 2013.

DOI 2016: pfsd.2016.1636