ECONOMIC DEVELOPMENT, AGRICULTURE AND ENVIRONMENT IN BRAZIL: INSTRUMENTS AND POSSIBILITIES OF RECONCILIATION

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APRESENTAÇÃO ORAL

AGROPECUÁRIA, MEIO-AMBIENTE, E DESENVOLVIMENTO SUSTENTÁVEL

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Grupo de Pesquisa: Agropecuária, Meio-Ambiente, e Desenvolvimento Sustentável.

ABSTRACT: The objective of this study is to discuss the possible solutions for the problem of environment conservation in Brazil. For this purpose, we initially approached the main instruments of environment management, emphasising the main guidelines and the Brazilian environmental policy structure. Next, in a summarised way, are presented, the main aspects of the Clean Development Mechanism (CDM) and two promising agricultural enterprises in Brazil that reconcile economic development and the environment in Brazil.

KEY WORDS: Economic development, environmental management instruments and clean development mechanisms.

RESUMO:

O objetivo deste estudo é discutir as possíveis soluções para o problema de conservação do meio ambiente no Brasil. Para isto, inicialmente abordamos os principais instrumentos de gestão do meio ambiente, enfatizando as principais diretrizes e a estrutura política ambiental brasileira. Na segunda parte, são apresentados, de forma resumida, os principais aspectos do Mecanismo de Desenvolvimento Limpo (MDL) e duas atividades agropecuárias promissoras no Brasil que permitem conciliar o desenvolvimento econômico e meio ambiente no Brasil.

PALAVRAS-CHAVES:

Desenvolvimento econômico, meio ambiente, instrumentos de gestão ambiental, mecanismos de desenvolvimento limpo.

1. INTRODUCTION

The activities developed by man have always been related to the transformation of the environment. Initially, these were just destined to the subsistence, so that the modification of the space occurred in a slow rhythm and for the specific purpose of supplying food to the population. As the centuries went by, the use of natural resources assumed a new character. Not anymore for the subsistence only but with the objective of accumulating wealth, through the production and trade of products. New technologies were developed and the earnings then resultants impelled the commercial expansion and the growing exploration of the environment.

The intense environmental transformations along the centuries, due to human action, contributed to the appearance of consequences still unknown by man. The Earth's warming is one of them. There are a lot of controversies concerning the impact of the productive activity on the increase of the global temperature, motivated by the fact that the Planet possesses natural cycles of heating and cooling. However, recent researches (STERN, 2006; WORLD BANK, 2006; ETHERIDGE et al, 1998), have been contributing to the formation of a consensus around the fact that the human activity is affecting the Earth's climate in a decisive way. The challenge, from that, has become to find administration instruments that guarantee the reduction of the impacts of the productive activity in the environment and that have legitimacy to be accepted and implemented by the group of players involved in the environmental issue.

As an answer to the problem of the global warming, the United Nations, in 1997, formulated the Kyoto Protocol, regarded as an instrument for the implementation of the Convention of the United Nations on Climatic Changes. In the Kyoto Protocol it was agreed

that signatory countries of Annex I[1] would reduce their emissions of greenhouse effect gases in 5,2%, taking into account emissions of 1990, in the period between 2008 and 2012. To take effect, the Kyoto Protocol had to be ratified by 55 developed countries, which took place in 2004, with Russia's signature.

In order to help reach the target, flexible mechanisms were set, which allow Annex I countries to acquire Emission Reduction Certificates from countries which have projects under the Clean Development Mechanism (CDM). Conceptually, CDM projects are those that allow greenhouse gas emissions to be reduced in a economically viable way. And they are the only way developing countries play a role in the activities stipulated by the Kyoto Protocol. Annex I countries have interest in investing in CDM projects which have a smaller marginal cost for emissions reduction than in their own territories.

The active share of a CDM in emissions reduction is measured through the issue of Certified Emission Reductions (CERs), or simply, Carbon Credits. These can be traded directly amongst countries which have signed the Kyoto Protocol or in spot markets and future contracts. Each credit is equivalent to a metric ton of captured or reduced carbon dioxide, calculated taking into account the global warming potentials.

With this background, the main objective of this work consists in putting into perspective some solutions to the dilemma of preserving the environment while also achieving economical development in countries which have not reached economical maturity, such as Brazil. The Brazilian relationship with the increasing current demands due to the environmental crisis is particularly different from that observed in other countries, like the United States, the European Union and China. While in those countries, the largest environmental concerns are linked to the energy sources in which their economical activities are based, in Brazil the focus is on issued related to the deforestation, forest fires and agricultural activities. Because the current Brazilian energy sources mix is already considered satisfactory to the point of view of its environmental impact.

Some agricultural activities with strong presence in rural Brazil, such as cattle and pig farming and irrigated rice cultivation rice, have great economical importance, but at the same time, are considered critical due its impact on the environment. Agriculture answer for 75% of the total of Brazilian carbon dioxide emissions.

For this reason, it was opted to present some management instruments applicable to Brazil, with emphasis on the Clean Development Mechanism, an instrument that can make possible the reconciliation between the necessary development of agriculture and the preservation of the environment. Due to its features, CDM can guarantee sustainable development as well as being able to obtain Certified Emissions Reductions, representing an economical gain with an environmental asset already negotiated in the stock market.

Therefore, in the second part of this essay, a brief review is undertaken of the creation of management instruments of the environment in Brazil, emphasising the main guidelines

[1] The Parties of Annex I are countries that have targets in relation to the Kyoto Protocol. They are divided in two sub-groups: those countries that need to reduce their emissions and, therefore, can become buyers of credits from CDM; and countries that are in economical transition and thus can be hosts to Joint Implementation (KYOTO, 1997).

and structures of Brazilian environmental policy. It allows us to understand some of the implications and possibilities that economic instruments of environmental management (such as CDMs) may have in Brazil. Finally, in the third part, it is presented two successful CDM examples applied in the Brazilian farming and agricultural sector, with the intention of showing its viability.

2. MANAGEMENT INSTRUMENTS OF THE ENVIRONMENT IN BRAZIL

It is known that environmental policy consists in a group of instruments that try to minimise the impact of man's action on the environment. It is widening in scope with the increase of the debate and the sharpening of the environmental crisis. The world consensus on the impact of the economical activities has been stimulating the creation of systems and protections for the environment and it demands from governments new ways for development and environmental protection. In this context, putting into categories the instruments of environmental management is always a simplification, given the number of possibilities available now.

Nevertheless, the structure of the Brazilian environmental policy allows to identify three groups of management instruments. The first of them, Command and Control (CAC) Instruments, is clearly inspired by Arthur Pigou's work (1920). The second group, made up by Economic Instruments (EI), has as its main forerunner Ronald Coase (1960). The third group are Communication Instruments (CI).

CAC instruments include the controls or prohibition of products, process controls, prohibition or restriction of activities, technological specifications, the control of the use of the natural resources, the pollution patterns, amongst others. EIs include taxes and tariffs, subsidies, Certified Emissions Reductions, the systems of devolution of deposits, amongst others. COs have instruments liked to providing information, setting agreements, creating networks, building environmental management systems, environmental stamps and environmental marketing. (LUSTOSA, CÂNEPA and YOUNG, 2003). In Brazil, in spite of the use of instruments belonging to the three groups, the emphasis still lay with CACs. The reason for this may be found with the own origins of the environmental movement and with the Brazilian environmental legislation.

In spite of the establishment of the Brazilian Foundation for the Conservation of the Nature in 1958, not until the 1970s the environmental issue did configure as an political priority in Brazil and there was no specific government agency police of manage the environment with a significant profile in the state sector. Thus, the development of Brazilian environmentalism can be associated to the 1970s, because it is the period when proposals both by the State and the Civil Society (VIOLA and LEIS, 1995).

In general, what existed until the 1970s was a legislation that dealt basically with some natural resources, for instance, the forest and waters laws (1934) and the Superintendence for the Development of Fishing (1967). In spite of the wealth in the country's bio-diversity and of the widespread acknowledgement of the importance of the preserving its natural heritage, only in 1973 it was established the Special Office for the Environment, following the recommendation from the United Nations Conference on the Environment.

Inspired in the North American model, with high decentralisation and a regulatory bias, moreover thoroughly based on command and control instruments, the Brazilian environmental policy demanded a high level of human and financial resources (LUSTOSA, CÂNEPA and YOUNG, 2003). This situation didn't change much whit the establishment of the Environment National Policy (PNMA), in 1981.

The complexity and the width of the Brazilian environmental legislation put it as one of the most thorough legislation in the world. However, some structure particularities hinder its effectiveness. Amongst them, deserve notability the institutional setting and the responsibility problems, the complexity and the rigidity of the legislation and the high demand of human and financial resources which is beyond the enforcement agencies means.

The institutional setting for environmental policy in Brazil is composed basically by three federal regulatory agencies, besides a vast range of state and municipal offices or authorities. In the federal level, the basic structure is the following:

the)

a) The Ministry for the Environment (MMA), which is in charge of planning of national policies;

b) National Council for the Environment (CONAMA), which is the advisory and deliberative agency of the National Environment System (SISNAMA). CONAMA has a board composed by Government officials and representatives and of the public who have involvement with the environmental issue. This agency is responsible of advising, studying and drawing up guidelines for policy regarding the environment and natural resources. Composed by permanent and temporary technical councils and stage to frequent debates, it is the agency which sets environmental quality standards in the country;

c) The Brazilian Institute of the Environment and of the Renewable Natural Resources (IBAMA),which it is the responsible for the control and the inspection of activities that may cause environmental degradation.

It is appropriate to point out that in the state and municipal levels, the responsibility for control and inspection of activities that may have negative impact on the environment is an incumbency of the respective institutional apparatuses. There is no hierarchy between the different spheres and their independence makes possible, for instance, the creation of units of conservation in federal, state, municipal level.

This structure creates a series of practical problems. There is great heterogeneity amongst the different state and municipal agencies, be it of technical order, be it of financial order and of personnel (LUSTOSA, CÂNEPA and YOUNG, 2003). Besides, that diversity of administrative spheres can lead to a lack of integrity in drawing up policy and responsibility conflicts.

In relation to the instruments of the Brazilian environmental policy, we already emphasised that they are based, above all, in command and control instruments. The basic instruments foreseen by PNMA, according to Almeida, Bastos, Malheiros and Marcondes Silva (2004) are:

a) The Environmental mapping (Ecological-economical);

b) The evaluation of environmental impact (CHAPERON);

c) The Studies of Environmental Impact (EIA);

d) The environmental licensing of potentially pollutant activities.

In general, the field of the environmental policy is controversial in the country for a number of reasons. The first of them is result of its own structure, with high demand for personnel and equipment to function. Due to its fragility and own operation logic, environment agencies action has been much more reactive than preventive. The second reason involves planning studies for environmental impact. In these studies, the criteria is not always clear, the effected range considered for the impact is very narrow and the wisdom which allows the project applicant to appoint the team which will carry out the impact study is quite questionable. And, last, the inflexibility of the system of norms and the definitions of responsibilities that hinder the effectiveness of the policy.

The suggested solution to increase of the efficiency and the effectiveness of the environmental protection policy in Brazil is usually associated with incorporating economical instruments, based on the polluter pays principle. This is the case of Clean Development Mechanisms (CDMs) and of the Certified Emission Reductions (CERs) which open interesting economic opportunities in the Brazilian case for possible use of these instruments in agricultural activities, as it is shown in the next section.

3. CLEAN DEVELOPMENT MECHANISMS IN BRAZIL: CASE-STUDIES AND PERSPECTIVES

In 1997, the United Nations drafted the Kyoto Protocol with the intention of consolidating an instrument for the implementation of the United Nations Framework Convention on Climate Change.2 In this document it was set that the signatory countries would adopt measures to reduce their emissions of the gases which increase the greenhouse effect.

To help annex I signatory countries reach their reduction targets by 5,2% of the amount of carbon dioxide emitted in the year of 1990, the Kyoto Protocol established three flexible mechanisms. The first was the joint implementation, that made possible the partnership amongst Annex I countries, with the purpose of reaching their targets of emission reductions. The second mechanism was the trading of emissions restricted to Annex I. And finally, the Clean Development Mechanism, which allowed the participation of the developing countries.

The Clean Development Mechanism (CDM) is the only means for developing countries take part in the Kyoto Protocol. And its main objective is sustainable development through activities less harmful to the environment. When they implement CDMs, these countries have their emission reductions of certified. As for Annex I countries, CDM

[2] The Protocol came into force on February 15, 2005, when it was ratified by Russia, in exchange for European support to join the World Trade Organization (WTO). Regarding the theoretical orientations of the instruments of environmental management see MOTTA'S works (2006) and CÂNEPA (2003).

facilitates the execution of their targets for emissions reduction mainly because they can these acquire the certified reduction of emissions granted to the other group of countries (KYOTO PROTOCOL, 1997). This process is the embryo of emissions trading, now made popular by carbon credit market.

CDM projects are those that, at the same time in which promote development, also let the capture of carbon or simply avoid it being released in the atmosphere. This is the only form for developing countries taking part in the activities stipulated by the Kyoto Protocol (1997).

The emission reductions of resulting from each CDM should be certified by operational entities designated by the Conference of the Parties. The criteria adopted for the approval are: in first place, the voluntary participation of the involved countries. In secondly, that there be real benefits, measurable and of long duration related with the mitigation of the climate. And finally, the emission reductions must be additional to those that would have occurred in the absence of the project. The certified emission reductions obtained from 2000 to the beginning of the first commitment period, 2008, can also be used to help reach the targets of the first commitment period (KYOTO PROTOCOL, 1997).

The implementation of a CDM project capable of obtaining a certified emission reduction is composed of seven steps: conceiving the project, followed by validation, approval, registration, monitoring, certification and finally, the issue Certified Carbon Credits.

3.1 CDM projects adaptable to Brazil

In May 2007, there were 1.964 CDM projects. Of these, 636 were already registered by CDM Executive Council and 1.328 were in other levels. Brazil occupied third place in number of projects, with 222 projects. India was in first place, followed by China, with 636 and 483 projects, respectively (MINISTÉRIO CIÊNCIAS E TECNOLOGIAS, 2007).

Experiences point that the cost of reducing a ton of CO2 in developed countries can vary between U$15.00 and U$100.00. However, the cost in countries in transition is far less: U $1.00 to U$4.00 per ton. Such variation involves, not only differences in the cost of technology and labour, but larger possibility for the set-up of reduction projects in these countries (WORLD BANK, 2007).

Now, considering the 222 projects to be found in Brazil, in May of 2007, 58% of these were of small scale. The projects of greatest interest were electricity generation and of pig farming, through the treatment of the residues and reduction of the methane emitted in the atmosphere. The sum of these represented 77.03% of the total of all projects. However, the capacity of emission reduction of these projects is relatively inferior, when compared to the others. The electric power generation contributes to reduce 28.53%, while the pig farming, 9.23%. The projects which have the larger emission reductions, taking into account the individual capacity of the scheme, are the ones related to N2O reduction, landfill and treating waste.

With these qualities, the following two successful examples of CDM are presented. They come from the most promising sectors for the set-up of CDM: biomass power and pig farming.

3.1.1 Biomass power: the case of Camil rice mill processing plant

Brazil presents a wide range of alternatives for new investments. The energy sector is the most promising, mainly due to the renewable energy from biomass. Already in the 1970s, the country invested in research and incentives through Proálcool, a successful program of large scale to replace fossil fuels. The Program determined that an amount of anhydrous alcohol should be blend with gasoline used by cars. In the period from 1975 to 2000, the emission of 110 million tons of carbon dioxide was avoided (BIODIESELBR, 2007). In this way, Brazil possesses technologies and processes already in use, which favours the analysis of intended projects, either in its viability or in the monitoring of expected results (DENARDI, 2005).

In this context, an example of an interesting project is the case of Camil Rice Mill Company, the largest Brazilian company in the sector (ANUÁRIO BRASILEIRO DO ARROZ, 2005). The rice processing generates a substantial amount of rice chaff that are usually deposited in landfills. Its decomposition results in the release of methane gas, which has a global warming potential 23 times superior to the standard greenhouse gas, carbon dioxide. For this reason, the CDM project set by Camil consists in the combustion of the rice chaff avoiding its decomposition. And through the burning of the chaff, biomass energy is generated.

To take a decision to go ahead with the project which provided for the installation of a biomass power plant, a financial analysis was put together (table 1). This analysis indicated that the trade of Certified Emission Reductions (CER) increased considerably the project's return, making it an attractive investment for the company and for the financial agents.

Previously to the installation of the thermal plant, 81% of the rice chaff produced were deposited in landfills. After setting the project, 70% of the total production of rice chaff was used as fuel in the boiler, having a surplus of 30% which are deposited in licensed landfills away from where the project is located.

Table 1 - Result of the Financial analysis for projects with and without CERs (values in R$).

	With CERs	*Without CERs*
Net Current value	*1,155,482*	*393,701*
Internal rate of return	*38.04%*	*13.78%*
Discount rate	*13.48%*	*1.,48%*
Current value of sold CERs sold (2001-2008)		*2,753,541*

Source: Ministério de Ciência e Tecnologia, 2005.

The thermal plant generates 4.2 MW of installed potency. In 2005, the company

demanded around 3.5 MW. So, electric supply coming from the national grid was not necessary at all thanks to the biomass plant. Besides, the biomass plant has the capacity to produce a surplus of energy that can be sold through the Wholesale Energy Market to the national grid.

The final result of the project allowed the acquisition of Certified Emission Reductions due to the burning of residues from the company main activity and also avoiding carbon emissions related use of energy which previously came from the national grid. In the absence of the project, the carbon emissions produced by electricity generation based on fossil fuel would have happened. The state of Rio Grande do Sul, where Camil is located , and the state of Santa Catarina are the only Brazilian states that have coal power plants supplying energy of the Southern Brazil electric grid. By replacing energy from the national grid as well as supplying energy the grid, the carbon generated from the combustion of coal of the power plant was avoided.

There were still financial gains regarding the new energy self-sufficiency and the sale of the surplus power, moreover the reduction of the costs of transport of the final residues, now burned in the proportion of 93% of the total amount. In the monitored period, between the years 2001 and 2008, the carbon dioxide emission reductions were approximately 401,388 ton. In 2006, the company received €1.5 million for the sale of CERs regarding 207,000 t. of CO2.

3.1.2 Pig farming: the case of Master Agropecuária pig farm

To be more efficient Brazilian farms invested in technology breading, feeding, etc. Notwithstanding, the effluent treatment of modern farm operations in Brazil did not followed the technological improvements of production.

That is especially observed in pig farming, which can have a huge environmental impact. In general, the farming of pigs in Brazil is not sustainable. Emissions of greenhouse effect gases, mainly methane, odours, contamination of local hydrographic basins, soil contamination are some of the problems now faced by intensive farming.

Thus, the CDM project set out by Master Agropecuária aims to change the treatment of effluents from the usual work practice, using an open main pond, which emits high concentration of gases intensifiers of the greenhouse effect for another method with fewer emissions, through the installation of an anaerobic biodigestor. It is appropriate to mention that Master is one of the largest independent producers of pigs in Brazil. In 2005, the company raised more than 250,000 pigs. In partnership with Master, more than 100 small farms grown pigs which are processed in the second largest food producer in Brazil, Perdigão (MINISTÉRIO DE CIÊNCIA E TECNOLOGIA, 2002).

The project is based on the replacement of the practice of handling of waste in uncovered ponds, which produces gases, with high concentrations of methane (50% to 80%) and carbon dioxide (20% to 50%), from the decomposition of the organic material. In substitution of the conventional method, it was used an anaerobic biodigestor. The equipment works as a generator that receives a daily load of effluents from the barns and maintains a stable population of methanogenic bacteria for degradation. These bacteria grow without oxygen to convert organic acids in biogas (MINISTÉRIO DE CIÊNCIA E TECNOLOGIA,

2002).

The anaerobic biodigestor technology includes a polyvinyl chloride (PVC) covering coat which covers the main pond. The system creates an anaerobic atmosphere which allows the decomposition of waste, resulting in production of biogas. The substitution of conventional source of energy for the bio-energy follows an energy equivalence, where 1 m3 of biogas is equal the: 0.32 litres of gasoline, 0.34 litres of kerosene oil, 0.36 litres of diesel oil, 0.39kg of kitchen gas and 1.45 firewood kg.

The biogas can be used for power generation or simply burned. Thus, the gain in the reduction of emissions is based on the transformation of methane in carbon dioxide (CO2) through combustion, avoiding the release methane gas, which has a greater global warming potential. In the total the project forecast is an emissions reduction of 486,285 t. of equivalent carbon in the period from 2002 to 2009.

In general terms, both projects illustrate the economical incentive that these instruments generate with the setting of CDMs. However, the potential size of this market in Brazil will depend of government incentives and investments in CDM projects, which can contribute to accelerate the process of environmental preservation.

4 CONCLUSIONS

Brazilian farming suffered intense modernisation drive starting from the 1970 decade. The use of inputs, machines and modern equipment were made possible by a policy of cheap and abundant agricultural credits. However, the fast development of this section and the expansion of the agricultural border were not matched with protecting and preserving the environment. In beginning, the agricultural policy was restricted to its productive element while the environmental aspect was relegated to a second place. From the 1990, there was an increase in concerns about the environmental impact of agricultural activities; the challenge was the reconciliation between production and preservation.

If, on one hand, Brazilian environmental policy is very complex and restrictive to rural activities, for other, the agricultural policy still hasn't moved forward in a satisfactory way to make possible more sustainable practices. Therefore, one can see a clear obstacle for dialogue and a conflict of interests in the production/preservation dilemma. The inclusion of economic instruments to the Brazilian environmental policy, as in the case of the emission reduction projects using CDMs, open good perspectives for the country, given that agriculture is key to its productive sector and the foreign trade.

The two projects presented in this essay are illustrative. Besides representing an economical incentive for producers to change practices, they also show the means to make possible the conciliation between the continuity of the production and the reduction of the impact on the environment, in the local and global spheres.

One of the difficulties to the setting of projects of this nature is their still high cost, as highlighted previously. Thus, both environmental and agricultural policy can be improved to created new practices. The environmental policy can take over more of that type of economic instrument, combining it with its informative and educational actions, instead of rely so much in command and control instruments, in norms and the definition of standards. The

agricultural policy has plenty of room to bring in a more effective way the environmental dimension to its instruments of action, giving up some of its production oriented bias. Both can be more proactive and innovative, which would make possible a dialogue between production and preservation, both increasing their efficiency and effectiveness.

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