

ENVIRONMENTAL PROTECTION AND ECONOMIC POLICY

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ABSTRACT

This article aims to present a reflection on environmental protection and on sustainable economic policy, considering some essential elements of game theory applied to environmental refugees, as well as their procedural rationality analyzed in relation to sustainable development. In addition, recent environmental disasters highlight the economic impacts and risks faced by global society. Such impacts are not limited to economic aspects, but also reflect on social, health, health security, labor and financial markets. Through a scientific synthesis, this article uses the deductive and exploratory research method, based on the analysis of references of articles and bibliographic studies.

Keywords: environmental economic policy; environmental protection; environmental refugee; game theory; sustainable development.

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A PROTEÇÃO E A POLÍTICA ECONÔMICA AMBIENTAIS

RESUMO

Este artigo visa apresentar uma reflexão acerca da proteção ambiental e da política econômica sustentável, considerando alguns elementos essenciais da teoria dos jogos aplicada aos refugiados ambientais, bem como sua racionalidade processual analisada à luz do desenvolvimento sustentável. Além disso, os recentes desastres ambientais destacam os impactos econômicos e os riscos enfrentados pela sociedade global. Tais impactos não se limitam aos aspectos econômicos, refletindo também sob os mercados sociais, de saúde, da segurança sanitária, do trabalho e financeiros. Por meio de uma síntese científica, este artigo utiliza o método da pesquisa dedutiva e exploratória, com base na análise de referências de artigos e estudos bibliográficos.

Palavras-chave: desenvolvimento sustentável; política econômica ambiental; proteção ambiental; refugiado ambiental; teoria dos jogos.

INTRODUCTION

Heat waves and climate change, right of asylum and globalization, isolated issues? We are not so sure. In addition to political instability and populational growth, every year more people flee the hostile conditions of their environment.

This opinion is informed by a continuous media flow of climate disasters that affect the rest of the world: typhoons, cyclones, large-scale droughts, floods. On the other hand, it is dangerous that the public perception concerning the physical consequences of climate change is distorted: the nature of the effects of climate change, whose impacts are far from being limited to the above phenomena, varies according to the magnitude of the increase in temperatures and affects the entire planet very unevenly. Thus, it is necessary to be aware that its consequences are not immediately noticeable, nor immediately describable. Other phenomena will develop – the arrival of invasive species, the creation of more favorable environments for viral spread – and will have profound consequences on our lifestyles.

The historical gap between the last quarter of 2019 and the first quarter of 2020 has deserved special attention worldwide, particularly due to the emergence of situations that are almost completely beyond the control of normality, without effective responses or means of containment. Environmental disasters such as major forest fires in the Amazon and Australia, or the devastating coronavirus epidemic – whose likely source would have been human consumption of wild animals – which has spread from China to the rest of the world, causing losses of lives and priceless losses to national economies, have led affected countries to take desperate emergency measures, many of which drastic, with no sure prospect of return to normality in the short term. Such situations have led to the resumption of discussions on transnational policies aimed at balancing the “environment/economy” equation, with problems to be solved by States, as members of an international community.

If the risk is not immediately noticeable, if its magnitude is not yet quantifiable, we can at least say that it is certain. It would be a mistake to forget that, on the temporal scale, the temperate climate that enabled the rise of Europe is only a rarity amid geological periods characterized by a great drought. It is all the temperate climate on the planet that is at stake.

Climate change can affect the biodiversity of temperate, tropical, or other regions through the invasion of certain plant and animal species, thus

inducing populational migration. The article also aims to present a scientific field in a complete and clear manner, based on deductive and exploratory research based on the analysis of references of scientific articles and bibliographic studies. We will now focus on the case of environmental refugees.

1 ANALYSIS OF ENVIRONMENTAL REFUGEES' DECISION-MAKING CONSIDERING GAME THEORY

In theory, climate refugees do not exist. In any case, we do not recognize them as “refugees,” a designation reserved, according to the 1951 Geneva Convention, to those who are forced to leave their country due to persecution because of their race, religion, nationality or political opinions. Without that recognition, they cannot expect the international community to accept or take responsibility.

Disasters³ caused by nature's reaction to human behavior establish a situation of displacement of human beings: they leave their homes or their countries. This migration leads to imbalances both in places of departure and arrival: the relationships between man/nature, society/space, resources/population.

If many persons flee the precarious conditions of their environment, it is because they have no choice. As precisely pointed out by Gallais (1994, p. 7), “man is always the victim of a catastrophe whose risk he will most often have, directly or indirectly, increased.”

However, population displacement is not a recent phenomenon. The novelty is the risk associated with the scale of the population movement. This is created by the combination of several factors: depletion of resources, irreversible destruction of the environment and demographic growth, etc.

It is necessary to underline the difference between refugees and emigrants. The differentiating criterion is linked to freedom. An emigrant chose this situation, the refugee did not. In the future, we could suggest the conditioning of these refugees, limiting their number through quotas of refugees from one country to another.

Thus, an emigrant's decision-making must be analyzed differently than a climate refugee's decision-making. The first is autonomous and

³ For example, the radioactive cloud of Chernobyl, the floods near the Three Gorges Dam in China, the announced submergence of the Tuvalu archipelago in Polynesia, etc.

unconditioned, while the other is forced and conditioned.

Ecological assistance is a principle of International Environmental Law (IEL), it is cooperation. Assistance is associated with human rights, it is a duty of the international community. However, the IEL is insufficient to protect refugees. It requires the recognition and proclamation of an international status for climate refugees that guarantees the protection of this category of refugees with full rights. Moreover, it requires preventive measures against the various causes of situations of climate refugee: catastrophes, poor management and planning of natural resources, climate change, etc. Furthermore, it requires the development of long-term policies that favor the protection of climate refugees.

In addition to the phenomenon of environmental refugees, we observe the implementation of a procedural rationality that assumes a rationality anchored in intermediate objectives.

2 THE IMPLEMENTATION OF PROCEDURAL RATIONALITY AND GAME THEORY

The articulation of energy indicators and the theory of capital leads us to the dynamic sustainability tree: any political choice regarding sustainable development is confronted with the uncertainty, irreversibility and complexity or multidimensionality of ecological, economic and social criteria. As explained by Faucheux and Noel (1995, p. 311), “it is the interaction between these elements that constitutes an explosive mixture for decision-making. This presupposes a paradigm of economic rationality that is broader than that of orthodox economics, which is called procedural rationality.”

An economic-ecological interpretation of sustainable development: according to Ruth (1994), the integration of the central concepts of economics, ecology and thermodynamics is fundamental to “develop an extension of economic models that can explicitly account for a number of economic/environmental interactions that occur in the form of an exchange of material and energy between the two (economic and ecological) systems” (FAUCHEUX; NOËL, 1995, p. 310). According to these authors, knowing the limits imposed on economic processes by the ecosystem in which the economic system is included is of vital interest for present and future generations.

The central concepts of economics are: opportunity cost, substitution,

time preference. The central concepts of thermodynamics are: the definition of the system and its limits, the evaluation of matter and energy flows through their limits by means of the laws of thermodynamics, the distinction of systems with different levels of order. The central concepts of ecology are: the cycles of matter, energy flows, the complexity of system/environment interactions that are expressed in the feedback processes between the components of ecosystems.

The implementation of a procedural rationality may imply the replacement of a global nonmeasurable objective with intermediate objectives, or even intermediate sub-objectives, whose accomplishment can be observed and measured. In a procedural rationality scheme, it is possible – based on the global objective of development sustainability, which is not directly measurable – to determine intermediate objectives for this sustainability.

The intermediate objectives can be identified in the three filters: ecological, social and economic. Each of these intermediate objectives can be divided into several sub-intermediate objectives, in the form of standards to be met. Thus, a first step is to determine multiple sub-intermediate objectives that are irreducible and must be considered simultaneously.

The Kyoto Protocol established global environmental targets considering economic and social developments based on intermediate targets (regional targets, in the case of the European Union, and local targets, by country) regarding the level of reduction of GHG emissions to the level of 1990. Each region or country established sub-targets. During the discussions on the protocol, the EU negotiated a provision – the European revenue – that allows its States to jointly meet the global target of 8% of GHG emissions of countries in Annex B.

This target was then divided into the different Member States, depending on national situations. France, especially because its electrical production is largely carried out by nuclear and hydraulic plants, which emit little GHG, received the target of stabilizing its emissions at the 1990 level. However, given the trend observed in 2002 (a “laissez-faire” policy would lead to an increase of approximately 10% in GHG emissions between 1990 and 2010), achieving this target would require GHG emissions to be reduced by 54 million tons of CO₂ equivalent (Mtéq CO₂) per year by 2010. In other words, the equivalent of 13% of GHG emissions estimated in 2003 (FRANCE, 2020).

There is the method that defines satisfactory choices instead of ideal choices: in the context of procedural rationality, the decision maker does not select the ideal solution, but chooses the solution that seems

most satisfactory considering the different imperatives, be they ecological, economic, social or other. The use of this principle demonstrates that the requirement of sustainability does not necessarily represent inclusion in an optimization approach, but must correspond to a minimum standard of satisfaction (FAUCHEUX; NOEL, 1995, p. 312)⁴. The ideal point established for France by the protocol had been to constantly maintain its GHG emissions at the 1990 level, but France established for itself a reduction of 54 million tons of CO₂ equivalent.

Here, we present a decision-making instrument, based on this principle, to test a nation's "sustainability" trajectories. From a dynamic perspective of sustainable development, it is necessary to introduce the compensations provided by the external balance, by technical progress and by the possibilities of substitution between natural capital and manufactured capital. These elements are introduced in a "sustainability" tree and a sequential and iterative decision-making process is obtained, articulating energy indicators and indicators resulting from the theory of capital.

Some energy indicators allow the partial execution of two of the sub-objectives of sustainable development, namely, economic and ecological "sustainability." The first, the emergy surplus, represents an intermediate sub-objective for the reproduction of natural resources.

It is a matter of standardizing the set of natural resources based on their solar transformation and measuring the contribution of environmental resources across the economy-environment interface. The National EMERGY surplus (NES) is provided by the difference between the amount of emergy produced with a country's internal natural resources and the amount of emergy consumed by it. The Available EMERGY Surplus (AES) is defined as the difference between the available emergy surplus and the amount of emergy consumed by an open economy (FAUCHEUX; NOEL, 1995, p. 312).

Sustainable ecological development requires that the NES be equal to or greater than zero. To meet this condition, the natural resource extraction rates must never be higher than their renewal and reconstitution rates. The NES then measures the margin available for potential development in resource extraction and enables the coherent physical measurement of two traditional ecological constraints from the perspective of strong "sustainability." If the NES is equal to or less than zero, it means that the

⁴ It should be added that the satisfaction principle is sequential, and must specify the following mechanisms: a mechanism for comparison between the actions and the desired level, which guarantees a sequential classification between satisfactory actions and unsatisfactory actions; a mechanism for partial endogenization of the desired level, which self-adjusts when the previous comparison mechanism does not immediately generate the satisfactory solution.

consumption of natural resources is higher than their renewal rate and that the economy is no longer ecologically sustainable.

On the other hand, AES equal to or greater than zero is a minor criterion of ecological sustainability, since the development of an economy depends on others (if a country exports natural resources to the national economy, it may have NES equal to or greater than zero and AES equal to or less than zero, making it unsustainable).

The second, the energy surplus, the intermediate sub-objective of energy efficiency of the economic system, are indicators of the energy efficiency of an economic system. The evaluation process measures energy according to its capacity to generate mechanical work, which is the most interesting measure of energy quality from an economic point of view. This evaluation can be used to quantify what is qualitatively understood as energy deterioration, that is, the thermodynamic degradation of a given system. The goal of sustainability implies that the economic system can experience extensive reproduction. The continuation of economic development on a broader basis imposes, from the perspective of energy, a permanent energy surplus.

The National Exergy Surplus (NES) represents the energy value in a given period, as the difference between the energy value (free content) of the inputs available for production and the quantity of energy dissipated in a process of consumption or production.

The Available Exergy Surplus (AES) is identified as the difference between the energy value of the inputs available for production (stocks within the economy, imported stocks, and free energy flow within the economy) and the quantity of energy dissipated in the economic process (production, consumption, or export).

The NES indicator shows whether economic development can continue on an expanded basis or not⁵.

In the intermediate proposal of sub-objectives defined by the energy evaluation processes, the interface between the economy and the environment has been reduced to one movement: the extraction of natural resources and the emission of pollutants in the biosphere. Although it is clear that

5 If $NES < 0$, it means that there is not sufficient mechanical energy in the country to allow economic reproduction. If $NES = 0$, everything depends on the initial state of the economy in question. If it has already reached a high degree of maturity and if $NES > 0$, $NES = 0$ indicates a stationary situation where only simple reproduction without accumulation (growth) seems possible. If $NES > 0$, the economic system produces a surplus that can be used to undertake "expanded reproduction," so that development is sustainable. FAUCHEUX, Sylvie; NOËL, Jean-François. *Economie des ressources naturelles et de l'environnement*. Armand Colin, Paris. 1995. p. 314.

most relations between the economy and the environment involve these two dimensions, it is necessary to remember that there are other dimensions of ecological sustainability, such as space or biodiversity. For such aspects of ecological sustainability, there is in fact a problem of lack of homogeneous physical measures that prevents aggregation at the macro-economic level.

To understand the sustainability tree, all possibilities that a country has of following a path of potential sustainability must be analyzed. These elements provide significance to the concept of decision-making process.

In fact, the decision maker can test different sustainable development policies, as several sustainable development paths are now possible thanks to the introduction of the possibilities of compensation offered by the external balance, by technical progress and, in part, by the elasticities of substitution (FAUCHEUX; NOËL, 1995, pp. 315-316).

Thus, other indicators can be defined, such as the Emergy External Balance (EME), the difference between exports and imports of natural capital, expressed in emergy; the Exergy External Balance (EXEB), the difference between exports and imports of natural capital, expressed in exergy.

A country can meet its emergy and exercise needs and obtain emergy surplus, as well as energy surplus through international trade, possibly at the expense of another country. For the latter, the value of both indicators will decrease correlatively and may become negative.

Thus, we proceed to the analysis of the internal and external economic elements, aiming at a more in-depth approach to this theme towards sustainable development.

3 INTERNAL AND EXTERNAL ECONOMIC ELEMENTS FOR SUSTAINABLE DEVELOPMENT

“The conditions and the measurement of ‘sustainability’ are not without significant difficulties, but by using existing lessons, we can make real progress in this direction” (FAUCHEUX; NOEL, 1995, p. 328).

We can say that there is not one, but rather several economic conceptions of the environment and natural resources and so many different approaches to sustainable development. It is true that their respective supporters tend to present them as independent from each other. However, the “ecological economy” proves, by its approach, that a certain complementarity is possible. For example, based on the joint use of lessons on the

management of natural systems derived from neoclassical analyses and the from the “*conservative*” conception that defend the maintenance of critical natural capital, a true integrated synthesis can be developed beyond the conventional economic and ecological disciplines. With regard to ethics, ecological economics can be opened to different conceptions of the human being and to different approaches to social solidarity and justice. This is a question, then, of abandoning the idea of building an economy of natural resources and the environment, in order to rebuild an economy for natural resources and the environment, while proposing means to achieve this goal.

According to Costanza (1991), “in order to achieve global ‘sustainability,’ we must stop thinking of economic and ecological objectives as conflicting [...]. We need to develop an ecological economy that goes beyond conventional economic and ecological distinctions to progress towards a truly integrated synthesis (FAUCHEUX; NOEL, 1995, p. 330).

3.1 Environmental economic policy

Trade development, often associated with the growth and improvement of productivity, generally appears to pay little attention to environmental protection. Art. 2, of the consolidated version of 2002, referring to the Treaty of Rome, of March 25, 1957, establishing the European Community (EC), provides:

The Union’s objectives are: to promote economic and social progress, as well as a high level of employment, and to achieve balanced and sustainable development, notably by creating an area without internal borders, by strengthening economic and social cohesion and by establishing an economic and monetary union, possibly including a single currency, as per the provisions of this Treaty.

This article could be interpreted as meaning that freedom of movement is a means, while protection of the environment is an objective, which would lead to the affirmation, contrary to common sense, of the superiority of the latter over free movement.

Lamarque (1973, p. XI) wrote:

[...] Water and air pollution are not irremediable; noise can be contained; the degradation of natural sites, the reduction of green or forest areas, the disappearance of animal or plant species have no character of inevitability: everything depends on man.

According to Boutillier (2003), if it still seems possible, more than thirty years later, to show a certain optimism and consider that it is not too late to preserve or even improve the quality of the environment, it is difficult to ignore the sometimes irreversible character of the damage caused by economic development.

Trade development is not necessarily contrary to environmental protection. However, it should be noted that trade development is more often seen as an obstacle to preserving the environment than as a factor that contributes to the achievement of this objective. In fact, the prohibition of violating the free trade rule for environmental reasons is equivalent to forcing States that are signatories to trade treaties to lower their protection standards in favor of the reduction of tariff barriers and of restrictions generated by (non-tariff) conventions. The internal approaches of each country lead us to impose certain restrictions at the global level. It is enough to observe that, due to the harmfulness of certain production methods, the dangerousness of many products (according to the new European regulation on chemical substances called REACH – Registration, Evaluation, Authorization and Restriction of Chemicals), the free movement of goods is increasingly more overshadowed by environmental considerations.

It is difficult to outline the contours of the notion of the environment. Thus, there is not one, but several meanings of the environment, so it is generally accepted that this is a “chameleon concept” (PRIEUR, 2004, p. 1), varying according to the texts in which it is defined. We will now move on to economic analysis at the internal level of the environmental policy.

3.1.1. At the internal level

While it is not easy to decide to act on climate change, to do nothing now, while waiting for new scientific advances, or an unlikely miracle, is to gamble that no major catastrophe will happen in the future. It is obviously a terrible gamble, whose winners or losers are not necessarily us, but our children or grandchildren, who currently have no active voice, and who will only be able to witness helplessly, in the wake of a very serious disturbance, the consequences of our current actions.

Despite the use of the term “law,” economics, that is, the system that represents our exchanges and their monetary value, is not the same as physics or chemistry, governed by rules that we discover but have not decided: with or without man, the law of universal attraction or the value of the carbon atom remain the same. On the

other hand, neither the financial market nor an economic rule exist outside of our presence: they were born and will disappear with us (JANCOVICI, 2002, p. 122).

The first of the price conventions indicates that the economy takes into account only what is exchanged by the hand of man. What is not the object of any commercial exchange, and therefore has no price, does not belong in the field of economics. The air we breathe, the rain, the sun, the wind, all of this is given to us without human intervention, and these goods, in the first sense of that expression, are therefore priceless. We can already understand that this can make any attempt to monetize the consequences of climate change a little risky: this is equivalent to deciding to attribute a price to things that cannot be sold or bought.

The second important convention that we have adopted, in most countries in the world, is commonly referred to as “market economy.” The price of the same good, made in the same way, by the same individuals, can vary according to supply and demand. Therefore, a price reflects not only the intrinsic value of producing a good, but also the number of people who wish to have it and the supply of the moment.

The third convention stipulates that economic theory knows only perfectly reversible phenomena. If I exchange my money for bread, since I sell my bread for the same amount of money, in the economic world I return to the initial state. This is not the case in the real world: in the meantime, I lost time, in addition to the energy used to travel to the place of sale and place of purchase, etc. This principle of reversibility of commercial trade could, in itself, justify that the economy is a limited approximation to the real world, to be treated with the utmost caution: the economy is based entirely on the violation of the second law of thermodynamics (it indicates that natural processes are fundamentally irreversible).

Finally, the last important convention establishes that it is cheaper to have a good in the future than to have it right away.

Economy is a word that includes the idea of reduction, in the sense of saving, to avoid excessive consumption. A second meaning, which is even commonly accepted, refers to the players responsible for human productive activities. Companies that produce goods and services, hypermarket chains or farmers are part of this economy.

We will now move on to a more in-depth analysis of environmental protection and of certain economic approaches related to our daily lives as consumers.

3.1.2 The environmental protection and free trade approach

The preservation of the environment is closely related to consumer protection, which constitutes an imperative requirement of general interest. Consumers are interested in a healthy environment, as this provides them with a certain quality of life that they have the right to claim. The consumers' environmental awareness has developed in recent years, which explains the increasing use of tax instruments that protect the environment, encouraging consumers to change their behavior. However, keep in mind that the consumer society is responsible for many environmental problems, with consumers wanting a wide range of products at competitive prices, without necessarily caring as to how they are made. In addition, it is generally accepted that the increase in waste is mainly due to consumption habits, which demonstrates that consumer interests often differ from those that must be defended to protect the environment.

Ultimately, it seems to us that the concept of the environment includes elements such as air, water and soil, which must be protected against the depletion of natural resources or degradation associated with production methods and consumption habits, as well as the biotic elements, that is, the species of living beings, whose protection requires the conservation of biodiversity and the preservation of natural habitats.

National protection regulations differ widely from one state to another, which explains the difficulties faced by economic operators when it comes to accessing a foreign market.

Environmental protection measures can take many forms, with enthusiasm for conventional regulation generally leading to the adoption of measures that prohibit or restrict the production, marketing or use of certain products with a negative environmental impact. In addition to this type of regulation, economic instruments, especially fiscal instruments, have been increasingly used to encourage producers and consumers to favor environmentally friendly production methods and products.

Goods can be defined, according to the decision of December 10, 1968, referring to process 7/68, of the Commission of the European Communities *v. Italian Republic*, by the Court of Justice of the European Communities (CJEC, 1968, p. 626) as "products with monetary value and, as such, can be the object of commercial transactions," which implies that most objects and substances harmful to the environment are subject to compliance with the prohibition of trade barriers.

It seems to be extremely difficult to reconcile the free movement of

goods with the freedom of consumers and the conservation of the environment. Thus, the search for a satisfactory compromise is “a social issue that is all the more delicate the more it opposes the interests of the common heritage, which will be bequeathed to future generations, to immediate economic considerations” still very much present in the European Community (THIEFFRY, 1998, p. 244).

Trade liberalization, far from having an original character, is constantly affirmed as an objective that States must imperatively achieve both nationally and internationally.

The prohibition of trade barriers and the establishment of an internal market are, ultimately, two community objectives that complement and enrich each other. Although free movement is a fundamental condition for the existence of a single European market, the accomplishment of this space without internal borders has the necessary consequence of facilitating trade in goods between Member States, and economic operators end up behaving as in an internal market where the principle of free trade and industry is evident.

When presenting its dedicated white paper to the European Council, the Commission of the European Communities (1985, p. 2) defined the concept of a “single integrated internal market” as a market “free of restrictions on the movement of goods; the abolition of obstacles to the free movement of persons, services and capital; the institution of a system ensuring that competition in the common market is not distorted; the approximation of laws as required for the proper functioning of the common market; and the approximation of indirect taxation in the interest of the common market.”

Although commercial freedom is a fundamental objective, its implementation requires the elimination of commercial difficulties as completely as possible and the consideration of other non-economic interests that deserve to be taken into account. Although the defense of certain interests that are superior to the elimination of trade barriers is legitimate, their consideration must not, however, lead to a weakening of the principle of free movement of goods. The fundamental nature of this principle therefore implies that the exemptions that can be agreed in certain cases are interpreted strictly, both in terms of their delimitation and of the application of the conditions to which they are subject.

Art. 30⁶ of the EC Treaty lists the protected interests. Its art. 95, § 4⁷, allows States, under certain conditions, to maintain national provisions on grounds of major needs, even if a harmonization measure is adopted.

These different non-economic objectives, which have gained marked importance since the beginning of community building, are, therefore, susceptible to overlap with the free movement of goods. This is the case of environmental protection. The confrontation between the objectives of environmental protection and free movement of goods is inevitable in systems that go beyond the national level.

The provision provided in arts. 95, §§ 4 to 9 of the Treaty, aims to preserve the environment in the most effective way possible, without compromising the free movement of goods.

The Amsterdam Treaty⁸ came to confirm its duty of reasoning, stating that it is up to the Member State to explain “the reasons” why it considers it necessary to apply more restrictive environmental measures than those provided in the Community legislation, with the notification having to present “any scientific argument that may justify the merit of the protection level” provided. Art. 95 of the Treaty is silent on the consequences of the lack of adequate reasoning for notification.

6 Old art. 36 of the Treaty: “The provisions of Articles. 34 to 35 shall not preclude prohibitions or restrictions on imports, exports or goods in transit justified on grounds of public morality, public policy or public security; the protection of health and life of humans, animals or plants; the protection of national treasures possessing artistic, historic or archaeological value; or the protection of industrial and commercial property. Such prohibitions or restrictions shall not, however, constitute a means of arbitrary discrimination or a disguised restriction on trade between Member States.”

7 Old art. 92: “1. Save as otherwise provided in this Treaty, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, insofar as it affects trade between Member States, be incompatible with the common market. 2. The following shall be compatible with the common market: (a) aid having a social character, granted to individual consumers, provided that such aid is granted without discrimination related to the origin of the products concerned; (b) aid to make good the damage caused by natural disasters or exceptional occurrences; (c) aid granted to the economy of certain areas of the Federal Republic of Germany affected by the division of Germany, insofar as such aid is required in order to compensate for the economic disadvantages caused by that division. 3. The following may be considered to be compatible with the common market: (a) aid to promote the economic development of areas where the standard of living is abnormally low or where there is serious underemployment; (b) aid to promote the execution of an important project of common European interest or to remedy a serious disturbance in the economy of a Member State; (c) aid to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest; However, aid to shipbuilding existing on January 1, 1957, provided that it only serves to compensate for the absence of customs protection, will be progressively reduced under the same conditions as those applicable to the elimination of customs duties, without prejudice to the provisions of this Treaty concerning the common commercial policy towards third countries; (d) such other categories of aid as may be specified by decision of the Council acting by a qualified majority on a proposal from the Commission.”

8 The Amsterdam Treaty, amending the Treaty on the European Union, the Treaties establishing the European Communities and certain acts, signed on October 2, 1997, entered into force on May 1, 1999.

Having conducted the analysis on environmental protection in relation to free trade, we will now move on to organizational approaches to environmental protection.

3.1.3 Organizational approaches

The environmental commitment of organizations can be understood as a proactive response to external pressures. The organizations' environmental efforts to reduce their GHG emissions can also be interpreted as more or less voluntary consideration of the issue of climate change. This consideration is related to the perception of economic opportunities or risks associated with the Kyoto Protocol and to the measures in this area.

Thus, if GHG emission reduction is understood as a source of savings and productivity, it can be assumed that the leaders will have greater incentive to adopt a committed policy and to plan significant investments to reduce their emissions. If such approach is understood as a source of costs and competitive disadvantages, the leaders will be more likely to resist this type of policy and to adopt a more passive or reactive response to the emergence of restrictions in this area.

A second important axis to define the organizations' response to climate change is the intensity of external pressures for reduction in GHG emissions.

According to Boiral (2006), these pressures are mainly focused on large industrial emitters, which concentrate a significant proportion of global emissions related to human activity. However, the issue of climate change does not concern solely large industrial emitters. On the one hand, other organizations are cumulatively responsible for a significant proportion of the total GHG emissions. On the other hand, many of these organizations can be affected to different extents by this issue, even in the absence of external pressures: sale of equipment for measuring or controlling emissions, environmental consultancy, forestry activities that contribute to the storage of GHG, companies that wish to give themselves an ecological image, etc.

By cross-analyzing the two dimensions previously described, namely, the strategy more or less committed to the issues of climate change and the intensity of external pressures on this issue, it is possible to distinguish four main types of organizational response: the passive response, the defensive response, the proactive response, and the promoter response.

The passive response corresponds to a *status quo* in relation to climate

change issues by organizations that are not under significant pressure from these changes. Most of these organizations are not considered major industrial emitters. From this perspective, GHG emissions and the signing of the Kyoto Protocol do not appear as immediate and significant threats or opportunities. Therefore, these issues are not truly recognized and taken into account in business strategy, as long as they do not directly threaten normal activities. Organizations that adopt a passive response generally have not implemented environmental management systems or have not incorporated GHG reduction into that system. The main reason for this type of response is the “business as usual – BAU” policy. In fact, if the organizations are not subject to external pressure and are not perceived as major emitters, then questioning habits may seem superfluous. This passive approach, which seems as legitimate as the belief that reducing GHG emissions entails significant costs, is widely shared.

In this context, many organizations tend to maintain the *status quo* and respond to this issue only if they are genuinely constrained. However, this passive response tends to ignore the growing international pressure for the reduction of GHG and the expected strengthening of regulations in this area. Although the pressures are currently focused on some large polluting companies, they will probably affect other organizations in the near future as well. In this condition, the intermediate distinction is incorporated into the business strategy, as long as it does not directly threaten normal activities.

Another situation results from the strong pressures exerted against the most polluting companies. These pressures do not necessarily translate into a defensive response. Instead of being more or less openly opposed to the Kyoto Protocol, some large GHG emitters recognize the need to reduce their emissions and have made significant commitments in this regard, anticipating the establishment of external restrictions. Thus, the proactive response is better suited to strong external pressures and to active support of measures to reduce GHG emissions.

Unlike companies that take a more defensive stance, proactive institutions often emphasize the economic benefits of GHG reduction measures. These environmental commitments reflect a long-term strategy to distance the company from competitors that adopt a more defensive position and to anticipate growing pressures against large industrial emitters.

The last type of attitude, the promoter response, corresponds to a proactive approach by organizations that are not subject to strong external

pressure to reduce their GHG emissions. As they are not generally considered to be major industrial emitters, these organizations rarely seek to respond to clearly defined external threats. On the contrary, their motivations are of a commercial, strategic, socioeconomic or ethical nature. These motivations show, therefore, an approach that is more of voluntary promotion than of anticipating restrictions that are considered more or less imminent. The first aspect that may encourage these organizations to take this approach is related to the emergence of new markets. For example, by developing unique knowledge in the field of wind energy in the domestic market, Danish organizations in this sector, such as *Vestas*, have become world leaders in this growing industry. The implementation of an international CO₂ exchange market has also fostered the development of organizations specializing in these types of transactions, such as *EcoSecurities* or *NatSource*. Similarly, the inclusion of “carbon sequestration” in the Kyoto Protocol encourages reforestation activities to offset GHG emissions. The British company Future Forest, for example, specializes in this activity and offers services to organizations to assess their carbon emissions and offset them by financing various projects in the forest sector. For other organizations, promoting GHG reduction projects represents a way to differentiate themselves from the competition, giving themselves an ecological or ethical image and vocation.

These four main types of responses to global warming challenges are not static and monolithic. In fact, the complexity and timeliness of these issues can rapidly change international pressures and policies in this field. These changes can, more or less directly, affect the national strategy of organizations and the relevance of one or another response to the issue of GHG emissions. Some organizations, for example, are reluctant to implement proactive measures that favor the Kyoto Protocol in the absence of clear public policies on this issue. One of the fears is that the efforts made will not be recognized at a later date and that the organizations will be forced to make additional investments without taking into account the progress already made. Uncertainties about public policies that promote the Kyoto Protocol can, therefore, favor a passive or defensive response by organizations and lead to a certain immobility. However, this immobilization is based on a “win-lose” logic, which assumes that the reduction of greenhouse gas emissions represents costs that are better avoided or delayed in the absence of clearly defined external pressures. In addition, this position disregards the competitive advantages that may result from

the introduction of stricter regulations or policies for reducing GHG emissions. In any case, the implementation of these regulations and policies leads to the questioning of the “wait and see” policy. In fact, there is evidence that the organizations, regardless of the sector, are increasingly being driven, more or less voluntarily, to modify their environmental policies and to make more significant commitments to reduce GHG. For several organizations, these commitments involve the transition from a defensive or passive response to a proactive or promoter response. This transition to a proactive strategy, that is, based on a voluntary and significant commitment to the reduction of GHG and support for the Kyoto Protocol, is justified by three interrelated aspects: the increase in institutional pressures, the impacts on competitive advantage of organizations, and the economic benefits of such approach.

The growing institutional pressure for the reduction of GHG emissions represents one of the reasons to justify the implementation of a proactive strategy in this field. In fact, as neo-institutional approaches have demonstrated, the search for social legitimacy is a fundamental element of organizational change, especially in the field of environmental management. This search tends to promote the development of similar practices and policies, leading organizations to become more isomorphic, in order to respond to the expectations of society. This concern with compliance and legitimacy often surpasses concerns with economic efficiency.

In this context, organizations that adopt a defensive or passive response to the Kyoto protocol, citing, among other things, economic arguments, are increasingly exposed to criticisms and questions that may compromise their legitimacy or even their sustainability. Currently, these positions seem to be in a countercurrent, both in relation to social expectations and to the positions adopted by an increasing number of organizations. In fact, global warming and the Kyoto Protocol are no longer theoretical and hypothetical challenges that concern mainly environmentalists. The entry into force, especially in Europe, of measures such as the introduction of emission quotas and negotiable licenses, is already affecting many organizations, including foreign ones through subsidiaries located in the regions covered by these measures. In addition, the States’ environmental policies can change rapidly, and a country that has not ratified the Kyoto Protocol may decide to do so, as was the case of Russia in November 2004 and Australia in 2007. Finally, it is probable that these policies will expand and cease to concern only large emitters. It is reasonable, therefore, to expect a steep increase in environmental pressures against large and small GHG emitters, making defensive and passive responses decreasingly legitimate (BOIRAL, 2005, p. 1-9).

The application of the precautionary principle, currently accepted by many countries, especially in Europe, is a primary reason for undertaking a proactive strategy in favor of implementation. The second reason in favor of this strategy is related to the competitive advantages that such approach can provide. These benefits result, firstly, from the creation of environmental barriers that favor less polluting organizations. In fact, these organizations are in a better position to respond to the growing external pressures related to global warming than competitors who have adopted a more defensive or passive position and who will have greater difficulties in meeting the new environmental requirements. In addition, the adoption of a proactive strategy enables them to anticipate external pressures more flexibly and maintain the organization's leeway.

These benefits are in line with the social pressure life cycle theory, which shows that organizational autonomy tends to decrease as external pressures increase. This phenomenon may partially explain the formation of coalitions of companies that group to establish voluntary measures to self-control GHG emissions, in order to better control or avoid the emergence of excessively strict regulations in this area. In France, for example, the Movement of the Enterprises of France (Mouvement des entreprises de France – MEDEF) is the main organization of French companies that negotiates with the government on voluntary agreements for CO₂ quota management and emission licenses implemented in Europe from January 2005. According to Boiral (2004), this type of environmental agreement is not novel. It has developed rapidly since the 1980s, with the questioning of traditional regulatory approaches in the field of the environment. For organizations, voluntary agreements and the anticipation of environmental regulations enable not only better preparation or control of the changes underway. They also enable the imposition, on less proactive competitors, of rules that hinder entry into certain markets. Similarly, this type of proactive strategy can currently be observed in organizations that have made large investments to reduce their GHG emissions and that support public policies in favor of the Kyoto Protocol.

The ultimate motivation for implementing a proactive strategy is related to the economic benefits from such approach. These benefits do not stem only from the “win-win” logic, inherent in certain environmental actions. They also result from the consequences of the implementation of public policies in the context of the ratification of the Kyoto Protocol. In addition to direct aid in the form of subsidies or tax credits that are

gradually being implemented, the creation of a market for the trading of GHG emission licenses may have a significant economic impact, especially for large industrial emitters. In fact, this type of market makes it possible to apply the polluter pays principle. Thus, organizations that do not comply with their emission quotas must purchase emission licenses in international markets to compensate for their poor environmental performance. On the other hand, organizations that have managed to reduce their emissions below the established quotas may sell such licenses and obtain a significant economic benefit from them.

The same applies at the level of States, which may also buy or sell GHG emission licenses. This type of market is not developing only in Europe.

The adoption of a proactive strategy favors, in a more or less long term, results in this type of market, regardless of the economic impacts directly resulting from the environmental remediation measures taken. This strategy also enables limiting certain financial risks. On the one hand, environmental performance is increasingly an evaluation criterion in the financial markets and contributes in the assessment of the good governance of the organization. On the other hand, the banking and insurance sectors increasingly emphasize these aspects.

Finally, implementing a proactive strategy can be a powerful manner to mobilize all personnel (national or international) around global challenges that transcend organizational boundaries. This commitment is essential to effectively reduce the environmental impacts of the activities of the organization. It also fosters the workers' pride, participation and engagement, key factors for improving productivity.

It also applies to strategic processes in general (nature of decisions and plans) for the adoption of a proactive strategy that depends on the sectors of activity and on the specifics of each organization. However, the organizations should consider the Kyoto Protocol more as an opportunity rather than as a threat or cost.

First, with the entry into force of the protocol, opportunities and threats are more immediate, although there are still many uncertainties as to future public policies and as to environmental pressures. Second, the organizations must prepare an inventory as accurate as possible of their GHG emissions. This inventory is necessary for two main reasons. The first is that the document enables better understanding the main sources of emissions and, thereby, better guiding the measures to be implemented. The second is that

it enables measuring performance in this field and, eventually, participating in emission license trading. Measuring and monitoring GHG emissions is also essential for implementing the “compliance system” provided by the 2001 Bonn Conference. Third, to be credible, the leaders must define clear policies and objectives in this area.

The implementation of bolder goals to reduce GHG emissions depends on the more or less proactive nature of the organization’s environmental strategy and on the opportunities or threats that may arise there. The implementation of performance measurement plans, policies and mechanisms can be integrated into an environmental management system such as ISO 14 001. The same applies to other measures, such as training personnel, identifying sources of GHG emissions, developing environmental procedures, and defining roles and responsibilities. This certification process improves the rigor of environmental programs, providing external recognition of the efforts made in this area. Finally, many organizations will have to invest more in environmental research and development programs. Given the costs that these programs can represent, partnerships with other organizations are likely to grow.

CONCLUSION

The recent environmental catastrophes show increasingly large economic impacts that can affect health, finances and the labor market, even in economically developed countries such as the United States. The application of game theory as a method of analysis, problematization and resolution of environmental problems, more than ever, shows to be relevant and appropriate to the current context, whose problems transcend national borders and cause disasters with great repercussions on national economies. The arbitrary possibilities of losses for all participants in the game at the global level show that only the adoption of a serious and cooperative policy among the national States, aimed at orienting economic sectors towards environmental sustainability, can contain or prevent (totally or partially), with greater efficiency, the recurrence of major disasters and cross-border consequences.

The substantially universal dimension of the idea of the environment makes it difficult to define its limits and its concrete content, which results in the difficulty of translating the claims for protection and related demands into legal terms.

This is a very complex issue, to which we must make only a brief reference here, which puts in crisis how legal systems are conceived based on the tradition of positive law (JONAS, 1979, p. 8): as we have seen in this respect, in fact, the issue of environmental refugees is difficult to define: which subjects should be considered as “holders” of the right to the environment, as it is something that affects everyone. Similarly, it is difficult to define, objectively, what should be understood as the “content” of the concept of environment, because “environment” represents everything around us and because we only become aware of the “value of the environment” when we realize a reduction or damage.

Precisely, these two features make it very difficult to translate the general interest in protecting the environment into a well-defined legal case, which can represent an effective reference for constituting a legally structured protection system, as having a normative reference case is always necessary in the context of contemporary positive law.

For these reasons, the development of environmental legal protection had to resort to a very particular figure, represented by the precautionary principle (STEEL, 2015): this allows access to the environment in the dimension of positive legal systems as a “legal asset,” making it possible to protect it and also compare it with other “legal benefits,” such as competition and economic exchanges, in order to enable balancing the protection of all these “legal benefits.”

The precautionary principle succeeds in doing so because it makes it possible, from a legal perspective, to give importance to the environment in relation to its possible damages and to try to anticipate them: if it is true that the “value of the environment” becomes materially appreciable when it loses a part of itself, it is also true that such losses, or damages, are often no longer recoverable.

At this stage, however, there arises the issue of assigning a defined content to the risk of damage to the environment, in order to define the object and the recipients of these protection rules (SUSTEIN, 2015, p. 1003): without establishing “who, when and what,” which is mandatory in legal terms, real legal rules cannot be provided, but only fragile declarations of intent valid as *quasi-law*.

Several of the provisions contained in the rules of international law relating to environmental protection do not surpass the level of mere declarations of guiding principles, without having a truly binding effectiveness.

The reason, in short, is that the exercise of a dispute resolution activity

on a case-by-case basis also allows to implement in practice rules that are difficult to fully affirm at the general and political level, since they refer to very general and widespread interests for them to be immediately identified in objective and subjective terms, as is the case in environmental protection and outside the scientific certainty of the occurrence of environmental damage (O'RIORDAN; CAMERON; JORDAN, 2001).

In other words, it is precisely the jurisdictional activity, linked to the application of the “legal responsibility” rules for the exercise of activities considered dangerous (SALEILLES, 1897; JOSSERAND, 1937), that allows to gradually establish the subjective and objective contours of environmental protection, indicating “when” and “how” to apply the precautionary principle to balance environmental protection with other relevant interests, such as the needs of international trade or competition in the market (MIGLIORINI, 1997, p. 677; FERRARA, 2003, p. 526; PORCHIA, 2014, p. 155).

Based on what the judges previously decided, condemning or absolving accusations of damage caused and the respective compensation, it becomes possible to identify who and what is legally mandatory to do or not to do to comply with environmental protection duties.

The subsequent development of environmental protection rules often represents the translation of these results of judicial decisions into preventive rules: avoiding a new sanction for compensation for damage to the environment is, in this sense, the motivation both so that individual States include mandatory rules in their general systems and so that individuals or companies adopt self-regulatory rules.

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