

Sustainability and environmental regional autonomous corporations in Boyacá – Colombia

Sustentabilidad y corporaciones autónomas regionales ambientales en Boyacá – Colombia

Sustentabilidade ambiental e corporações autônomas regionais ambientais em Boyacá - Colômbia

*Carlos Humberto Salamanca Sarmiento**

Research article

Date of reception: 12 August 2015
Date of approval: 9 December 2015

<https://doi.org/10.19053/22565779.4147>

Abstract

For economic development to have sustained growth it must be linked to the social structure, with the interest of improving the quality of life of the population and environmental sustainability. This paper analyzes the environmental policies included in the Colombian national development plans as from 1990 and the guidelines which involve the different regional autonomous corporations. Furthermore, the origins of the environmental sustainability issue and the responsibility that the autonomous corporations have as regional environmental authorities are established. Recently, there have been attempts to articulate regional measures with the normative framework and the sectorial guidelines that govern environmental policies, the responsibility for which belongs to the autonomous corporations based in Boyacá.

Keywords: economic growth, sustainable development, normative framework, environmental sustainability, planning and development policy.

JEL: O47, Q01, D63, O21, Q59

Resumen

Para que el desarrollo económico tenga un crecimiento sostenido debe estar ligado a la estructura social, con el interés de mejorar la calidad de vida de la población y la sustentabilidad ambiental. Este documento analiza las políticas ambientales incluidas en los planes nacionales de desarrollo colombianos a partir de 1990 y los lineamientos que involucran a las diferentes corporaciones autónomas regionales. Asimismo, se establecen los orígenes de la problemática de la sostenibilidad ambiental y la responsabilidad que tienen a las corporaciones autónomas como autoridades ambientales regionales. Recientemente ha habido intentos de articular las medidas de

* Candidate for a Master's degree in Economics in the Universidad Pedagógica y Tecnológica de Colombia. Employed by the Planning Advisory Office of the National Protection Unit. Postal address: calle 145 No. 12-29 apartamento 401, Bogotá, Colombia. Email address: carloshsalamanca@yahoo.com

alcance regional con el marco normativo y las directrices sectoriales que guían las políticas ambientales, cuya responsabilidad recae en las corporaciones autónomas que tienen asiento en Boyacá.

Palabras clave: crecimiento económico, desarrollo sostenible, marco normativo, planificación y política de desarrollo, sustentabilidad ambiental.

Resumo

Para o desenvolvimento económico para o crescimento sustentado, deve ser ligado à estrutura social, no interesse da melhoria da qualidade de vida da população ea sustentabilidade ambiental. Este documento analisa as políticas ambientais incluídas no desenvolvimento nacional planeja colombianos desde 1990 e diretrizes que envolvam as várias corporações autónomas regionais. Além disso, as origens do problema da sustentabilidade e da responsabilidade das corporações regionais autónomas e autoridades ambientais ambiental são definidos. Recentemente, tem havido tentativas de articular as ações de alcance regional com o quadro regulamentar e as orientações sectoriais que norteiam as políticas ambientais, a responsabilidade recai sobre as empresas autónomas com sede em Boyaca.

Palavras-chave: crescimento econômico, desenvolvimento econômico, sustentabilidade ambiental, planejamento e política de desenvolvimento.

INTRODUCTION

The progressive and continued growth of the human population in the last 250 years, added to the industrial development since the end of the 18th century, characterized by its extreme dependency on fossil fuels, have caused negative effects on our planet (Gifford, 2012), to such a point that it has become necessary to reassess different aspects related to the classical notions of economic growth and development.

As from the first works of Malthus in his essay on population (Díaz, 2004), on through to the work titled *The Limits to Growth*, which in 1972 laid down the research efforts commissioned by the Club of Rome (Rodríguez, 2011, p. 76), up until the *Declaración de Mentón* (1971) and the publication of the Founex Report (Switzerland) in June of 1971, the first efforts to explain how under the industrial production model the available natural resources in the different latitudes of the globe were being dramatically reducing, which in other words means that the production model does not take into account that natural resources are finite.

Based on the above concerns, in 1972 there began a period that would last almost twenty years during which the concept of *sustainable development* would be consolidated, the results of which would be initially reflected in the Stockholm Declaration (1972) and would conclude with the Rio Declaration on Environment and Development in 1992, as well as Agenda 21, under which the contemporary notion of sustainable development was developed and consolidated (Romero, 2012, p. 47).

Despite the above effort of the international community, the notions of environmental sustainability should be specifically focused in the concrete areas of the development of each state, for which the global declarations went unheeded. For these purposes, the

signee countries of this agenda should take into consideration international legal instruments and mechanisms such as:

The recognition that the following vital aspects of the universal, multilateral and bilateral treaty-making process should be taken into account: The further development of international law on sustainable development, giving special attention to the delicate balance between environmental and developmental concerns; the need to clarify and strengthen the relationship between existing international instruments or agreements in the field of environment and relevant social and economic agreements or instruments, taking into account the special needs of developing countries; at the global level, the essential importance of the participation in and the contribution of all countries, including the developing countries, to treaty making in the field of international law on sustainable development. Many of the existing international legal instruments and agreements in the field of environment have been developed without adequate participation and contribution of developing countries, and thus may require review in order to reflect the concerns and interests of developing countries and to ensure a balanced governance of such instruments and agreements; developing countries should also be provided with technical assistance in their attempts to enhance their national legislative capabilities in the field of environmental law; Future projects for the progressive development and codification of international law on sustainable development should take into account the ongoing work of the International Law Commission; Any negotiations for the progressive development and codification of international law concerning sustainable development should, in general, be conducted on a universal basis, taking into account special circumstances in the various regions. (Agenda 21, Chapter 39)

With these instruments a series of positive and environmental obligations were assumed through public policies (Cubides, 2007, p. 33).

In consequence, this document seeks to establish the origins of the concern for environmental sustainability, as well as the responsibility that has been assigned to regional environmental corporations, by the environmental policies designed by the different Colombian governments over recent decades. The focus of attention of the analysis is concentrated on the performance of regional autonomous corporations, especially Corpoboyacá, an authority that implements public policies, plans, programs and projects regarding the environment and renewable natural resources, as well as being in charge of applying the current legal provisions on administration, management and use, according to the regulations, guidelines and recommendations issued by the Ministry for the Environment, Housing and Territorial Development (MAVDT by its acronym in Spanish).

SOME INITIAL REFLECTIONS

Sustainability

The concern for the effects of industrial development on the environment opened up one of the most difficult and complex discussions related to the incompatibilities between development and the environment. In effect, in England during the second half of the 18th century (1750-1780) a period began, known as, the Industrial Revolution (Chaves, 2004), characterized by the development of technological innovations that in certain aspects of production meant the replacement of human and animal effort with the mechanical energy of machines (Landes, 1979). The massification of the machines of

the Industrial Revolution also led to the need for energy, the demand for which grew exponentially as from the 18th century, to such a point that by the year 1870, England produced 100.000.000 tons of energy annually (Chaves, 2004). Chaves Palacios explains:

That huge demand for energy continued until the advent of the electrical and nuclear era, the main industrial areas of the world were located in zones near to coal-mining areas. This is what happened in Great Britain, afterwards in Belgium, without forgetting the well-known Ruhr Valley in Germany or the regions of Allegheny in the United States (2004, p. 96).

The rationality introduced by the economic model of the period applied to the processes of the Industrial Revolution, caused all kinds of irrational and merciless pillaging of the Earth, under the logic of economic growth, impinging little by little on the very same human race. The reaction to the above phenomenon was delayed by more than one hundred and fifty years, when the environmental question appeared as a topic of international interest and relevance. In principle “the predominant vision was ecocentric, with the strong support of biologists and ecologists, who assumed the neo-Malthusian interpretation of understanding the problem as caused by the populational pressure on limited resources” (Pierri, 2013, p.79). In this way, the thesis is maintained according to which there exist some physical limits that suggest the need to limit resources, halting economic and population growth. This view, integrated with ideas of conservation, allowed the environmental question to begin to find a channel in the tension or absolute contradiction between society and nature, between economy and ecology, between growth and conservation.

As with all decisions that must be taken regarding the environment, they are subject to and framed within the decisions of the economy. These have instruments of their own for determining non-monetary costs and benefits, giving them a value and attempting to translate them into market prices so as to allow analysis and decision making.

Sustainable development

Sustainable development has as a conceptual background the concern for the scarcity of natural resources and the effects of this on economic development, concerns that began to be expressed in isolation with the works of Malthus in his essay on population (cited by Díaz, 2004), but efforts on the subject began to be more and more evident as from the sixties, with precedents such as the publication of the book titled *The Limits to Growth*, in the year 1972, solicited by a private international organization known as the Club of Rome¹. In this study five fundamental variables were analyzed: population, industrial capital, food production, consumption of resources and pollution (Rodríguez, 2011); highlighting conclusions related to the physical impossibility of infinite growth in a world with finite resources and criticism of the goal of economic growth that used to be confused with the notion of wellbeing (Rodríguez, 2011).

¹ “In the year 1972 there was an enormous commotion in the world consciousness of the global community with the publication of the report, *The Limits to Growth*. This report was commissioned by the Club of Rome and was elaborated by a multidisciplinary team of researchers of different nationalities from the Massachusetts Institute of Technology (MIT), led by the young professor Dennis” (Rodríguez, 2011, p. 76).

The concept of sustainable development has had all kinds of meanings, the reason why it has been the object of criticism insofar as it is not clear in its content or in the way of putting it into practice. Its economic bias is also questioned in that it contradicts itself when it attempts to equate economic growth or development with sustainability (Leal, 2010).

The concept of development began to be used in the 18th century in biology, in order to indicate the evolution of young individuals towards to adult phase. Since then, it has been applied to multiple fields and as from the Second World War it was adopted by economics so as to indicate the model of economic growth of the industrialized countries which for some also integrates the idea of social justice. Thus, developed countries are defined as those most industrialized and the countries more or less poor as “developing countries”. The measurement parameter for all is per capita income. So, any option that, without reaching a very high per capita income is capable of covering the universal satisfaction of basic needs is discarded (2010, p.177).

But despite such criticism, the most common definition is that offered by the Brundtland Report, presented by the World Commission on Environment and Development of the UN, according to which “this development is the development that satisfies the needs of the present generation without compromising the ability of future generations to satisfy their own needs”; a definition that was retaken and broadened later in the Declaration of Rio (UN, 1992), and the Agenda 21 that subsequently elaborated the mechanisms to reach said sustainability in the diverse components of development.

It is considered that this definition offers a three-dimensional interpretation, by combining the social and economic dimensions in the concept of development and the ecological or environmental dimension in that of sustainability (Bermejo, 1995). In this way, the definition of sustainable development was consolidated during the period that began with the Stockholm Declaration and ended with the Declaration of Rio de Janeiro on Environment and Development in 1992. It favored the consensus on three objectives of sustainable development: i) it is necessary to promote ways towards development that preserve, and if possible improve, the quality of the environment for present and future generations; ii) living conditions should be improved exclusively within the limits of the capacities of the diverse ecosystems; and, iii) it should be avoided or reduced to a minimum any social, spatial or temporal transfer of the consequences and costs on the environment. This consensus was developed in four dimensions of “sustainable development” in particular: the environmental dimension, the social dimension, the economic dimension and the spatial dimension, from the local to the world scale (Burguess, 2003).

Environmental policies in Colombia

Environmental public policies in Colombia have elements of great importance enshrined in the Constitution and in the law and are by their nature what guide the actions of public and private institutions on the long term. These elements are part of the policies of the state, so as to differentiate them from the policies of the incumbent regional or national governments, a good part of which are established with regard to the results that their leader can show during the short period of their administration.

These public policies are the set of objectives, principles, approaches and general guidelines for the protection of the environment and they are implemented by means of the necessary instruments and plans, which act on behalf of environmental protection in very varied forms in response to the problems that are perceived: the establishment of new regulations, the formulation and setting in march of a detailed plan, the issuance of a permit, or the creation of a fund to promote decontamination or to preserve biodiversity.

The responses to the policies can come from very different sources: some are designed by the legislative bodies, others by the main environmental agencies at the national, regional or local level, or by civil society organizations. They can be directed to foresee or mitigate environmental damage, to conserve or to restore a certain ecosystem. Some responses can have the aim of dealing directly with the environment in the strictest sense of the word (water, forests, air, soil), confronting the environmental problems, many times in an indirect way, with policies, development plans, strategies, action plans, programs and projects.

Environmental policies have economic and financial instruments which the municipalities make use of for the realization of environmental management, to this effect there are two classes:

- a) Economic incentives for environmental investment: they constitute a variable of great importance in the investment decisions that the taxpayers carry out, these add a positive consideration for sound environmental investments, in contrast to those that damage the environment. That is how an environmental tax has been established for those big industries that in one way or another contribute to polluting the environment
- b) Tax incentives for issues such as the adoption of clean technologies, the conservation of strategic ecosystems and reforestation activity. These incentives were introduced by means of tax reforms that are found in the Taxation Statute, and with them the taxpayer saves a sum of money that they stop paying in tax.

These incentives were made to stimulate environmental investment in areas like clean technologies, the conservation of ecosystems and reforestation. The incentives seek the fulfillment of objectives established in the environmental development plans in these areas. However, these incentives have not been used in a widespread manner, but they constitute an important variable in the investment decisions that taxpayers carry out, given that, thanks to these incentives, sound environmental investments have increased in contrast to those that damage the environment. This tax saving is the sum of money that the taxpayer saves upon applying for the incentives and dedicating it to sound environmental investments.

ENVIRONMENTAL POLICY IN NATIONAL DEVELOPMENT PLANS

Among the most common guidelines that are found in the development plans adopted by the different governments of Colombia, beginning as from the nineties, are the following bases for population and environmental policy, guidelines for a policy of civic participation in environmental management, policies of environmental education, policies for forests and forestry development plans, policy guidelines for integral water management, biodiversity policies, strategies for a system of protected areas, policies

for the management of wild fauna, policies of cleaner production, policies for the integrated management of solid wastes, policy guidelines for the use and handling of pesticides, policy guidelines for the environmental classification of the territory, policies for the integrated classification and development of coastal areas.

- *National Development Plan 1990 – 1994*. During this period, with the development plan known as "The Peaceful Revolution", during the Government of President César Gaviria, the creation was ordered of the Ministry for the Environment and the procurement of credit with the multilateral bank with the purpose of strengthening environmental management. Through Law 99 of December 22, 1993, the Ministry for the Environment was created, reorganizing the public sector responsible for the management and conservation of the environment and renewable natural resources, the National Environmental System (SINA, by its acronym in Spanish) was organized and other dispositions were dictated (Congress of Colombia 1993).

- *National Development Plan 1994 – 1998*. With the development plan denominated "The Social Leap" under Ernesto Samper's presidency, the environmental policies known as "Toward sustainable human development " were established, in which five basic objectives were set out: to promote a new culture of development, to improve the quality of life, to promote clean production, to develop environmental management and to guide populational behaviors.

- *National Development Plan 1998 – 2002*. In this plan executed under Andrés Pastrana's presidency and called "Change to build peace", "The collective environmental project to build peace" was incorporated, where water is defined as a primary concern and a central axis of the environmental policies of this period.

- *National Development Plan 2002–2006*. Known as "Towards a community state ", it corresponds to the first period of the Government of Álvaro Uribe Vélez. The environmental policy of this government was characterized by two central facts:

The decline suffered by the first environmental authority of the country, represented by the Ministry of Environment, Housing and Territorial Development, as well as by the autonomous regional corporations, was reflected in a decline of the environmental policies of Colombia. The role granted to the environment in the development policies was characterized by the sacrificing of environmental protection for objectives of short term economic growth. It is a vision that served as a guide for the conception of some of the main policies advanced in the period (Becerra, 2007).

- *National Development Plan 2006–2010*. This plan corresponds to the second presidential period of Álvaro Uribe Vélez, which is known as "Community state: development for all". As regards the environment, the National Planning Board established that, as is expressed by Becerra (2007): the document does not assume in a coherent way what the environmental part implies and on the contrary, the environment frequently appears as a marginal matter of sectoral management. Ultimately, this fact expresses a lack of concern for the topic (pp. 36).

- *National Development Plan 2010–2014*. The plan called "Prosperity for All" of the government of Juan Manuel Santos has environmental policy as one of its strategic pillars. The objective of this policy was to "guarantee the recovery and maintenance of

the natural capital of its eco-systemic services, as a support of economic growth and contribution to the drivers towards democratic prosperity”.

In conclusion, in the nineties, the topic of the conservation of the environment was important for the governments of the time as from the creation of the environmental law. It is for that reason why during the governments of Cesar Gaviria Trujillo, Ernesto Samper, and Andrés Pastrana, a stable panorama was formed, as regards policies and generally, in the government's institutions, there was a process of continuity, generating a favorable atmosphere for institutional environmental management. It is worth clarifying that during these three periods (1990 to 2002), environmental work was only that of generating environmental institutionality, and little was achieved in terms of environmental protection, through which a country can undertake processes of environmental conservation and obtain concrete results as regards the generation of positive changes in its ecosystems, with conditions determined by organizations, resources and instruments and the legislation, that is to say, the institutionality.

In the two governments of Álvaro Uribe Vélez 2002 to 2006 and 2006 to 2010, budgetary cuts were made along with a restructuring with an eye towards economic growth. It was decided to fuse the Ministry of Development with the Ministry for the Environment by means of Decree 216 of 2003; a fusion that would integrate, in one role, the environmental dimension with that of territorial development and the topic of housing; although it would not happen this way in practice, because the structure of the Ministry didn't facilitate interrelated work and, therefore, each one of its parts had to work in an individual way. This fact would demonstrate an institutional decline regarding environmental management and therefore a decline in environmental policy, prioritizing those policies tending towards the growth of the economy and sacrificing the protection of the environment.

In the government of Juan Manuel Santos 2010 - 2014, more importance was given to the environmental topic, because one of its strategic pillars was environmental policy, as well as environmental sustainability and climatic change mitigation strategies.

But, even though Colombia is considered to be the second most biodiverse country in the world, and having a long tradition of implementing policies and laws for the protection of its natural patrimony, nevertheless, much of that patrimony, like the well-being of the Colombian people, is faced with the growing threats coming from the mining industries, extensive cattle raising, urbanization and motorization. The vulnerability of Colombia to environmental changes, and the necessity of strengthening their environmental protection policies and institutions, was made evident in the face of the floods and landslides related with the phenomenon of *La Niña* of 2010 - 2011. The economic losses affected more than three million people. Forty-five recommendations have been presented to Colombia in order to confront their main environmental challenges (ECLAC, 2014, p. 03), including the following:

- Making green growth a core element of the National Development Plan of 2014-2018 and holding the sectoral ministries accountable for the environmental effects of their policies.

- Promoting the greater use of environmental taxes and gradually eliminating the subsidies and tax extensions that are harmful to the environment, at the same time mitigating any negative effect on poor and vulnerable groups.
- Strengthening the system of environmental management in which different the levels of government intervene, mainly by means of a clearer definition of their functions and responsibilities.
- Improving the management of the environmental effects of mining, especially those stemming from the use of mercury, and the effects that mining operations have on biological diversity.
- Strengthening the system of environmental information and promoting support in favor of environmental measures, through the better communication of environmental information to those in charge of the formulation of policies, and to the public (ECLAC, 2014, p. 3).

Articulation of the environmental policies in Boyacá

Environmental policies on a national level are articulated by means of laws, decrees and regulations related with the protection of natural resources, of the historical and cultural patrimony of the country, environmental management and the prevention of and attention to disasters, the main objective of which is to support the sectoral and intersectoral actions that lead to the improvement of public management and the control and reduction of pollutants, by means of the adoption of sustainable production methods and procedures.

Environmental public policies have had great importance in the country. As from 1990 they have seriously confronted the topic of the reach of sustainable development, reconciling economic growth, equity and environmental sustainability. The regions and especially the river basins (administered by The Regional Autonomous Corporation of Cundinamarca, from now on CAR, its acronym in Spanish), play a very important role in allowing the participation and integration of the actors involved in the development and goals of environmental sustainability. This participation allows the bringing together of regional and local levels, which highlights the dilemmas to be solved regarding the privatization of natural resources, the performance of the state, the public sector, as well as the local and regional role in the management of natural resources that, like water, fauna, native forests, natural ecosystems, are usually considered to be the patrimony of a country.

In Boyacá, environmental public policies are articulated in accordance with Decree 1200 of 2004, where the Regional Environmental Management Plan (PGAR, by its acronym in Spanish) is established, which is the main tool for the unification of environmental public policies and the instrument for the strategic long term planning of the autonomous regional corporations for the area of its jurisdiction. This allows the orientation of the management and integration of the actions of all the regional actors with the aim that the development process advances toward the sustainability of the regions. The autonomous regional corporations have the responsibility of formulating this plan in coordination with the territorial entities of their jurisdiction and the representatives of the different social and economic sectors of the region.

Boyacá is a department dedicated to agriculture, which is characterized by its climatic diversity and optimal agro-ecological conditions for the production of diverse crops and for the development of livestock farms. In the department, the production of potatoes, vegetables, milk, sugar cane and meat stand out, there being other important areas that are being projected such as cocoa, *physalis peruviana*, other fruits, forestry and special coffees. Boyacá is a producer of food for the country where most of the production chains are present.

In accordance with Article 80 of the Political Constitution, "The state will plan the handling and use of natural resources, to guarantee their conservation, restoration or substitution. Also, it will prevent and control the factors of environmental degradation, impose legal sanctions and demand the repair of damages caused...". The programs, projects and actions of the agricultural sector in the department of Boyacá will have an environmental component, with the purpose of strict adherence to the Political Constitution, which will be coordinated with the autonomous regional corporations.

The training programs for producers, technicians and professionals of the sector, incorporate environmental topics in accordance with the type of environmental effects that can take place according to the sector that is being developed. Agricultural and agro-industrial projects, in agreement with the current normativity and the geographical area, will promote the protection of *páramos*, river basins, natural parks, among other, and they will envisage actions within the projects that are formulated and carried out with the purpose of avoiding contamination by solid wastes, liquids and gases that affect the environment, for which the recommended technical measures will be taken. The municipalities will have to take into consideration, in the land development plans, the inclusion of demands on producers as regards the use of soils and respect for rivers, streams and lakes, promoting clean production, for which the department will give priority to the departmental water plans, which allow production with water of the quality required for agricultural production, and the consumption of fresh and processed foods.

The autonomous corporations of Boyacá and environmental policy

It should be highlighted that the management and putting into practice of the public policies of natural resource management and the environment are focused in the territorial entities of the department of Boyacá, and also include the work of the autonomous regional corporations as the primary environmental authority at the regional level, making emphasis on the integral management of the use of water, mining exploitation, solid waste management, etc., in order to provide a general vision of the current state of the different regions of the department and to contribute in this way to the projection for the defense of the environmental patrimony in the period 2012 -2015.

Through Law 99 of 22 December 1993, the Ministry for the Environment was created, the public sector responsible for the management and conservation of the environment and natural resources was rearranged and the National Environmental System (SINA by its acronym in Spanish) was organized, which is comprised of the regional autonomous corporations, among them Corpoboyacá, Corpochivor, Corporinoquía and Car.

Article 23 of Law 99 of 1993, defines the autonomous regional corporations as public corporate entities, integrated by the territorial or sectoral entities, which, because of their characteristics, geographically constitute an ecosystem or form a geopolitical,

biogeographic or hydrogeographic unit, endowed with administrative and financial autonomy, their own patrimony and legal identity, responsible by law for administering, within the area of their jurisdiction, the environment and renewable natural resources and tending to their sustainable development, in conformity with the legal dispositions and the policies of the Ministry for the Environment and Sustainable Development.

Law 99 of 1993 created the Regional Autonomous Corporation of Boyaca (Corpoboyacá), regulated by Agreement 001 of 1995. The statutes of the Regional Autonomous Corporation of Boyaca were approved by the Ministry for the Environment, Housing and Territorial Development, through Resolution 876, whose jurisdiction includes the department of Boyaca, with the exception of the municipalities of Chiquinquirá, Saboyá, San Miguel de Sema, Caldas, Buenavista and Ráquira, which are part of the CAR. The municipalities of Pajarito, Labranzagrande, Paya, Pisba and Cubará are part of Corporinoquía. The rest of the municipalities belong to the Regional Autonomous Corporation of Chivor (Corpochivor).

From the statutory provisions, in the department of Boyacá, the environmental authorities that participate are: Corpoboyacá, with jurisdiction in 87 municipalities of Boyacá, CAR (6 municipalities), Corporinoquia (5 municipalities), Corpochivor (27 municipalities) and the National Natural Parks of Colombia. Corpoboyacá is the environmental entity with the most widespread territorial jurisdiction and in turn, the second in the country as regards number of municipalities.

Management of autonomous corporations in Boyacá

The autonomous regional corporations have the objective of implementing the policies, plans, programs and projects with respect to the environment and renewable natural resources, as well as applying the current statutory provisions to their arrangement, administration, management and use, according to the regulations, rules and guidelines set by the Ministry for the Environment, Housing and Territorial Development (MAVDT, by its acronym in Spanish). Apart from the functions of the control, administration, management and use of natural resources, the autonomous corporations have developed the following management in Boyacá:

Corpoboyacá: in relation to the situation of open landfills and under the effect of Resolution 1390/2005 and its amendments, to date there are six cells in the process of closing, some of them with transformation possibilities as landfills and so only the municipalities of Muzo, Quípama and Covarachía continue to inadequately dispose of urban solid waste; although it is clarified that these municipalities have the appropriate sanctioning processes.

The follow up to the implementation of the 86 plans for the integral management of municipal solid waste adopted (PGIRS, by its acronym in Spanish) of the 87 formulated in the jurisdiction, taking into account the requirement made by Corpoboyacá through the administrative act so that they supplement and support the reports of PGIRS of the periods 2007 - 2011. In the same way, the notifications sent to the 87 municipalities in the months of January and June to participate in the orientation meetings regarding the methodology and upgrade of PGIRS documents and the inclusion of potential areas for the management and final disposal of dangerous wastes, the implementation of environmental subpoenas and the definition of the

benefit scheme of the special service for rubble.

Recommendations were conveyed at the regional level for the strengthening of the processes of the minimization and separation of solid waste at the source, with the purpose of reducing the volumes for final disposal in landfills and the associated environmental liabilities.

Support was provided in the optimization processes of the regional landfills of Tunja and Sogamoso, with the aim of offering the improved cover, continuity and operating life of these systems.

Within the regional solutions are found the disposal of waste. Corpoboyacá gives support to the departmental water plan and to the public service company of Boyacá in the definition of possible regional nodes, as a solution to the final disposal component, through the technique of landfill.

The Autonomous Corporation of Boyacá designed the Regional Environmental Management Plan 2009-2019, which aims to achieve the adequate coordination of the planning for the area to which it belongs, in order to promote, support and strengthen sustainable regional development processes based on the patterns of use and occupation in accordance with the biodiversity, population, and culture, so as to permanently strengthen the environmental information system of the territory. These goals are achieved through the formulation of management schemes and the management of river basins (POMCAS, by their acronym in Spanish), so as to begin actions oriented towards the sustainable management of natural resources, the declaration of protected areas and the strengthening of SIRAP (*Sistemas Regionales Áreas Protegidas*), the regulation of water flows, support in the inclusion of risk management in the municipal management plans of the territory, and the implementation of strategies for the management of natural disaster prevention.

In this plan, the Corporation, among other commitments, has proposed to establish a base line for the administration of water resources, for which it will have an integral information system. Equally, it will implement the management plans for basins, water supply and quality programs, and, additionally, undertake the actions derived from the above. It will move forward in the determination, establishment or adoption of consumption modules; the establishment or estimation of the census of users of the water resource; the definition of the hydrological units, for the collection of the rates of use and to continue with the regulation of water rates with the prioritization carried out in the POMCAS. Special importance is given to the implementation of the management and protection plans of aquifers, the evaluation and approval of the programs of efficient use and water saving, so as to guarantee their rational use, and equally the definition of the indexes of shortage for identified water flow.

It is also important to mention sewage treatment plants, and, in accordance with the report of the National Comptroller General CGR-CDMA-GDB – No. 010 July 2012, in the department of Boyaca the management that has been developed by the Autonomous Regional Corporation of Boyaca, Corpoboyacá, has advanced little in the implementation of the works corresponding to modules II and III of the Sewage Treatment Plant (PTAR, by its acronym in Spanish) in the municipality of Tunja. As a result of the follow up it was shown that for the period of 2011, there were suspensions

of the agreements 156 and 157 of 2009 undersigned by the municipality, without showing significant advances in the work. For example, by March of 2012, with the restarting of works, Module II only showed an advance of 39.6% and in Module III of 5.75%, percentages that are practically the same as those detected in the period of 2010. Although it is true that this poor progress is the result of exogenous circumstances, there has not been a decisive pronouncement on the part of the Corporation, even more so as Corpoboyacá is the main contributor of resources to this project (\$12 billion). Its delay in the execution of the works is generating a high risk that will imply additional possible expenditures as a result of the continuous extensions into the future, with the potential risk that the project is not finished or of a greater expenditure of resources due to the increase in costs (CGR-CDMA-GDB. No. 010 July 2012).

As of 2015, the sewage treatment plant in Tunja had not been finished, a circumstance that has caused the previously mentioned problems: the plant will help to decontaminate the Chicamocha river and will enter into operation at the end of the year.

This work, which has had an investment from the Ministry of Housing, City and Territory, Corpoboyacá (which should carry out the monitoring) and Tunja Town hall, an investment of over 30 billion Colombian pesos, also includes the construction of a three-module plant for the treatment of more than 300 litres of water per second, “covering 100% of the sewage production of the city”, as well as having a conduction network. This plant is of vital importance for the department, as it “forms part of the decontamination process of the high basin of the Chicamocha River, the second most contaminated in the country, after the Bogota River”.

Finally, it will be directed towards the strengthening and broadening of competitive sustainable production practices, such as the prevention and control of pollution and environmental destruction. The plan should contribute to the municipalities and productive sectors of the jurisdiction having adequate systems of waste disposal and management as well as controlling atmospheric emissions during its working life, both from mobile as well as fixed sources.

Corpochivor: will lead the process of sustainable development in the 25 municipalities of its jurisdiction, based on planned and concerted management with the different social actors, geared towards a more harmonic realization between nature, the community and its economic activities in creating a culture that values and respects the regional environment.

By 2013 Corpochivor had developed 22 workshops on environmental subpoenas (Law 1259 of 2008 and Law 14566 of 2011) in 15 municipalities of its jurisdiction, an activity that involved the participation of the National Police, mayor’s offices, public services companies and the community in general.

Also, the Corporation offered advice and assistance to the municipal administrations in the construction and operation of the regional systems of use, treatment and final disposal of solid waste in the jurisdiction, where the current conditions were verified and strategies were established that guarantee their operation.

Training and work groups were made for the project 402 around the integral management of residual wastes.

Work groups were formed in the 25 municipalities of its jurisdiction, with the aim of unifying criteria and defining a strategy for those municipalities to implement the environmental subpoena as an instrument of civic culture.

Also, the community of the populated center of Santa Teresa, of the municipality of San Luis de Gaceno was trained regarding the separation of solid wastes at the source and adequate disposal of the same in landfills.

With the aim of defining budgetary rubrics for the year 2013, the current state of the project called: “Construction of the first stage of the regional plant for the treatment and use of solid waste in the *vereda* of El Retiro of the municipality of Santa María”, which the municipal councillors of Santa María and San Luis de Gaceno attended.

A work group was developed in the municipality of Turmequé, with the goal of giving information on the current state of the treatment and utilization plant of solid waste and thus to define strategies for the municipality to put it into action. It was concluded that it was convenient to unify criteria according to the skills and the need to work together so that these projects be made operative.

Joint working groups were set up with directors of Public Service Units and Corpochivor in the 25 municipalities of the jurisdiction, in order to follow up and monitor solid waste management plans (PGIRS), in compliance with programs , projects and activities set out in the planning document during the first half of 2012; to lead the process of sustainable development in the 25 municipalities of the jurisdiction of Corpochivor based on planned and concerted management with the different social actors, directed towards the search for a more harmonious realization between nature, the community and its economic activities, seeking to consolidate a culture that values and respects the regional environment (Report on the state of the natural resources and environment of Boyacá, 2012-2013).

The corporations Corporinoquia and CAR, as part of the corporations that geographically constitute one sole ecosystem or form a geopolitical, biogeographic or hydrogeographic unit, and are located on the borders of the department, participate in the control, management and conservation of the environment and the natural resources of these sectors.

Corporinoquia: leads the process of sustainable development in the five municipalities within its jurisdiction, based on planned and concerted management with the different social actors, aimed at finding a more harmonious realization between nature, community and its economic activities, in order to consolidate a culture that values and respects the regional environment.

Year	Corporinoquia management for 2005- 2013
2004	Corporinoquia agreement, the territorial directorate of Meta and the municipality of Pajarito, to advance the updating of the urban and rural cadastral training of the municipality with the IGAC (<i>Instituto Geográfico Agustín Codazzi</i>).
2004	Corporinoquia agreement, the territorial directorate of Boyacá and the municipality of Labranzagrande, for the updating of the urban and rural cadastral training of the municipality with the IGAC.

2005	Agreement to support the municipality of Labranzagrande in providing control software, billing training to officials responsible for the collection of property tax and co-financing of computer equipment.
2006	Agreement for the preparation of studies and designs for the optimization of the domestic wastewater treatment system of the urban center, and the construction of sewage and wastewater treatment systems for the inspection of the Mórcate municipality of Paya.
2006	Agreement to carry out activities necessary for the establishment of isolation, second and third maintenance of 12 hectares of protective forest in the La Guáimara basin.
2006	Agreement with municipality of Labranzagrande for the construction of missing sections and the final envoy of the first stage of the sanitary sewerage system of the municipality
2007	Agreement with municipality of Labranzagrande for the construction of the missing sections of the sewerage system of the urban center of the municipality
2007	Agreement with the Paya municipality, providing software control, training of officials for the collection of property tax and co-financing of computer equipment
2007	Agreement with the municipality of Pisba, providing software control, training of officials for the collection of property tax and co-financing of computer equipment.
2008	Agreement for the construction of the wastewater treatment plant of the municipality of Pisba.
2008	Agreement for the construction of a wastewater treatment plant for the municipality of Pajarito, so as to comply with the three-year action plan 2007 – 2009, the constitution and laws.
2008	Agreement for the implementation and improvement of the billing and collection system of the unified property tax for the municipality of Pajarito, so as to comply with the three-year action plan 2007 – 2009, the constitution and laws.
2009	Agreement with the municipality of Paya, regarding the regulation and implementation of the use of areas for subsistence crops in the jurisdiction of Corporinoquia, so as to comply with the three-year action plan 2007 – 2009, the constitution and laws.
2009	Agreement for the formulation of the water saving and efficient use plan of the urban center of the municipality of Pajarito.
2009	Agreement for the implementation of the regulation of the use of areas for the establishment of subsistence crops in the jurisdiction of Corporinoquia, in the municipality of Pisba, department of Boyaca.
2009	Agreement for the construction of a wastewater treatment plant for the municipality of Paya.
2010	Agreement with the municipality of Paya for the carrying out of protective reforestation in the micro-basin of the Combita or La Coraza stream in the <i>vereda</i> of Tutazá in the municipality of Paya.
2010	Agreement for carrying out reforestation in strategic environmental areas with community participation in the surrounds of the Majagua micro-basin of the municipality of Pisba, department of Boyaca.
2009	Agreement to carry out protective works on the right margin of the Cobaría river, in the sector of the urban center of the municipality of Cubará.
2011	Administrative, economic and operational agreement between the parts for the acquisition of plots for the conservation of water resources that furnish the water supply of the municipality of Labranzagrande.
2011	Agreement with the municipality of Labranzagrande, in order to contract an official called an environmental manager, located in the municipal mayor's office to deal with environmental issues.
2012	Agreement for the advance of actions with the environmental managers in the municipalities of Labranzagrande, Pisba and Paya, for the evaluation or treatment of solicitudes to establish subsistence crops.

Table 1: Corporinoquia management for 2005- 2013

Source: Environmental report Boyacá 2012-2013

CAR: The Regional Autonomous Corporation of Cundinamarca (CAR), province of Chiquinquirá, presents active processes up to December 2012, of which 487 are in process of sanction for the inadequate use of resources or not complying with the norm, and 663 are in permit processes carried out by the CAR.

Below is a list of the processes carried out by the Autonomous Corporation of Cundinamarca in the municipalities within its jurisdiction.

Permit Procedures	To be decided
Groundwater concession and well inscription	7
Surface water concession	109
Groundwater exploration	3
Environmental licenses	6
Permit for atmospheric emissions from fixed sources	3
Permit for dumping and the establishment of quality standards	18
Permit for the protection of waterways	5
Environmental management plan	7
Environmental management, restoration and recuperation plan	3
Regulation of water currents for public use	3
TOTAL	164

Table 2: Permit Procedures CAR
Source: Environmental report Boyacá 2012-2013

Permit Procedures	Monitoring and control
Environmental Certification for vehicle emissions revision	1
Groundwater concession and well inscription	27
Surface water concession	432
Groundwater exploration	9
Environmental licence	4
Granting quota for use of species	1
Permit for use of persistent natural forest	12
Permit for use of unique natural forest	1
Permit for atmospheric emissions from fixed sources	2
Permit for scientific study and research in biological diversity	1
Permit for dumping and the establishment of quality standards	3
Permit for the protection of waterways	2
Environmental management plan	3
Environmental management, restoration and recuperation plan	1
TOTAL	499

Table 3: Monitoring and control CAR
Source: Environmental report Boyacá 2012-2013

Other functions of the CAR

Other functions of the autonomous corporations are to collect, in accordance with the law, the contributions, remuneration and compensation rates, rights, tariffs and fines for the use and utilization of renewable natural resources, to fix the amount in the territory of their jurisdiction based on the minimum rates established by the MAVDT.

The concept of a remuneration and compensatory rate is the charge for the direct or indirect use of the atmosphere, water and soil, because of introducing or disposing of agricultural, mining or industrial wastes or refuse, sewage or waste from any source, fumes, vapors and harmful substances that are the result of anthropic or human-induced activities, or economic or service activities, whether for profit or not, shall be subject to the payment of remuneration and compensatory fees for the harmful consequences of the activities expressed.

In Colombia, remunerative and compensatory rates appear with Law 99 of 1993 (Article 42), the direct or indirect use of the atmosphere, water and soil to introduce or dispose of agricultural, mining or industrial wastes or refuse, sewage or waste water from any source, will be subject to the payment of fees for the harmful consequences they cause. The remuneration rates have been regulated by Decree 901 of 1997, which has been modified, among others, by Decree 2667 of 2012 and by article 211 of Law 1450 of 2011 (modified article 42) paragraph 2, where it was established that the resources derived from the collection of remuneration rates will be used for investment projects in the decontamination and monitoring of the quality of the respective resource. To cover the costs of implementing and monitoring the levy, the competent environmental authority may use up to 10% of the resources collected.

The Colombian model of remunerative and compensatory rates during the three years of application has been based on the technical rigor of describing the instrument, giving it applicability in the national environment, promoting concertation as the basis of implementation, thereby reducing resistance to the payment of the tariff by the regulated sector, especially the industrial sector, which is the main contributor to the collection of the tax in the regions where the instrument has been implemented in the first instance.

In the following table, in the billing and collection of the retributive tax 2014 by Corpoboyacá for the first half of 2013, partial payments were obtained in December 2013, of \$ 938,178,329, equivalent to 40% of its invoiced value, as this period was initially invoiced on October 30, 2013 and canceled in December 2013; in February 2014 the new billing for the same period was issued. Regarding the percentage of the collection indicator, it is clarified that Proactiva Aguas of Tunja, owes the amount of \$2,826,132,780, a figure that corresponds to 38% of the final value to be collected in 2014. This obligation is in coercive collection.

In the portfolio there is 29% of the value budgeted for collection, which is equivalent to COP\$282,038,210.

It is important to clarify that the corporation has utilized persuasive billing instruments, in order to avoid resorting to procedural instances and obtaining the cancellation of the debt. Effectively, through a conciliatory policy, it has been sought, through official communications and calls that debtors come to sign payment agreements, for which they must pay the 30% initial fee and 70% in instalments, according to the amount of the debt.

REVENUES	2014	2013
Rate of water use	328,858	215,293
Retributive tax	7,489,172	820,995

Rate for electricity generation	5,014,650	3,878,136
Fines	5,014,650	1,037,271
Water use interest rate	17,407	26,026
Remunerative interest rate	51,601	15,747
Percentage interest and environmental surcharge	4,239	378

Table 4: Retributive tax billing and collection 2014
Source: Corpoboyacá management report 2014

Because of the above and taking into account the debtors that are difficult to bill, the Regional Autonomous Corporation of Boyaca advances the collection activities, applying the corresponding external and internal regulations, according to the operational policy in the management process of financial and physical resources, by which this corporation has resorted to the necessary legal mechanisms, in order to guarantee the collection of resources for the fulfilment of its mission.

This table shows the increase in revenue from the retributive tax, which, for December 2013, presents a balance of \$ 820,995 and for December 2014 a balance of \$ 7,489,172 (an increase of \$ 6,668,117), because in 2014 the billing for the 2013 period was generated.

						Portfolio				
YEAR	AMOUNT OF USERS	BUDGETED VALUE	BILLED PERIODS	BILLED VALUE	VALUE COLLECTED	INDICATOR WITH RESPECT TO BILLED	INDICATOR WITH RESPECT TO BUDGETED	BUDGETED VALUE	VALUE COLLECTED	INDICATOR
2014	186	32,000,000	1ST. Semester 2013	\$ 2,360,708,956	\$ 4,411,910,441	55%	138%	\$ 400,000,000	\$ 117,961,790	29%
			2nd. Semester 2013	\$ 2,451,141,332						
			1st. Semester 2013	\$ 4,170,801,861						
			TOTAL	\$ 8,982,203,051						
			BONDS RECIEVED DEC.2013	\$ 938,178,329						
			BILLED VALUE 2014	\$ 8,044,473,820						

Table 5. Income by retributive tax Corpoboyacá 2014 (p. 19)
Source: Report Corpoboyacá

Agro-industrial sector. In order to respond to the new challenge that has been imposed, the departmental government, seeking to take advantage of its variety of soils and its geographic location, aims to consolidate itself as the major agro-food provider in the center of the country, with the possibility of projecting to other domestic and foreign markets. Within this bid, several products are favored, including crops that are

widespread in the department, such as potatoes, sugar cane and vegetables, as well as beef and dairy production.

Taking into account that the agricultural and livestock sector is the biggest polluter of the environment due to the emission of greenhouse gases, indiscriminate tree felling and soil degradation, it is the responsibility of the regional autonomous corporations to counteract these effects by incorporating into the retributive taxes, the physicochemical parameters and their maximum permissible value limits, in the specific discharges of non-domestic wastewater into water sources from the activities of the regulated sectors.

These parameters have not been effectively incorporated into the retributive taxes for the total of the polluting agents of this sector, although much of the agro-industrial sector meets the obligation to pay these rates, many of the large, medium and small agribusinesses do not pay them, or are classified as domestic wastewater (ARD, by their acronym in Spanish), which are paid at a very low rate.

Mining and energy sector. The internal departmental agenda seeks to give new impetus to this activity through, among other measures, the attraction of foreign investment to undertake large-scale mining projects, involving exploration and exploitation infrastructure with a high technological component. As far as emeralds are concerned, the productive commitment includes the construction of a technological park and a gemological laboratory in the province of Occidente, where the Muzo mines are located. The objective is to incorporate technologies into the extraction work and to certify the emeralds that are produced in the area, famous all over the world for their fineness and beauty.

Also in this sector, it is important to emphasize that the regional autonomous corporations and the Ministry of the Environment have incorporated the physicochemical parameters and their maximum permissible limits in the specific discharges of non-domestic wastewater into water sources by mining and energy activities.

In this sector, it is important to point out the great inconvenience that is presented in Boyacá, not only in the application and collection of these rates for illegal mining, but also in the approval of exploitation licenses

CONCLUSIONS

Once it has been demonstrated through study and research, the difficulty of achieving sustainable development in Boyacá and achieving long-term sustainability, it is necessary to take into account some mechanisms that guide social, economic and political forces, so that they operate with criteria different from those that now prevail and so as to establish norms or criteria that can mark a starting point towards sustainable development.

It is difficult to articulate sustainable development, incorporated in public policies, and the actions of autonomous corporations, because at a given time, in the light of economic, social, political, and even ideological and cultural changes of a community, this development is not so sustainable.

Environmental public policies are aimed at coordinating actions for the well-being and development of human beings using the area of a river basin as a management base, or the administration of a regional autonomous corporation, which has had different approaches and an unequal evolution in the country.

The environmental public policies implemented were affected by the merger between the ministries, by the Government of Álvaro Uribe Vélez in 2003, which reduced the environmental role to a vice-ministry. This was harmful for the initiation of a process based around the conservation and the efficient management of natural resources, since priority has been given to development projects, mainly in housing and, to some extent, basic sanitation. This shows the duality between environmental conservation and development.

Public policies and autonomous corporations must be interrelated and form a single identity, starting from the MAVDT, as the governing body of national public environmental policy, environmental management and the coordinator of the National Environmental System (SINA) and liaise with the regional autonomous corporations with functions of administering the reserve areas located in their jurisdiction; which means the provision of the necessary resources for proper delimitation and preservation.

The department of Boyacá is in an incipient stage in environmental regulation and control, because, despite the issuance of Decree 2667 of 2012, considered to be a complementary normative instrument, the autonomous corporations have not implemented it fully, but have focused their action on the provision of domiciliary public services, the responsibility of the municipal and departmental authorities, leaving aside the missionary function of environmental protection.

In the development of the environmental management plan of Corpoboyacá it was evident that there is a serious limitation due to the lack of implementation of a baseline that could have served as a starting point for the structuring of municipal and regional information so as to make an environmental management plan. For this reason, it has been tried to leave a baseline of what could be elaborated and rescued from the processes of territorial organization, which do not contain the total and precise information.

The retributive taxes to "mitigate" the damages that are caused to the environment in Colombia, are guided by settlements and the granting of incentives for the protection of the environment. However, the processes and procedures that are being applied for environmental problems and the way in which these are approached in Colombia and in particular in Boyacá, are still in the settlement phase because of the resistance by polluters to the payment of the fee.

REFERENCES

Azqueta, D. (2002), *Introducción a la economía ambiental*, Madrid: McGrawHill.

Becerra, R. et al. (2014, marzo). Desarrollo de la agricultura colombiana. *Cuadernos Fedesarrollo*, 48, 54-55

Bermejo, R. (1995). *De la economía a la ecología*. Madrid: Trotta.

- Burguess, R. (2003). Ciudad y sostenibilidad: Desarrollo urbano sostenible. Cuadernos de la CEPAL, 9 (88), 193-2014.
- Cepal. (2014). *Evaluaciones del desempeño ambiental: Colombia 2014*. Bogotá: Cepal.
- Chaves, P. J. (2004). Desarrollo tecnológico en la primera revolución industrial. *Norba Revista de Historia*, 17, 93-109.
- Constanza, R., et al. (1997, 15 de mayo). The Value of the World's Ecosystem and Natural Capital. *Nature*, 387.
- Contraloría General de Boyacá (2013). *Informe sobre el estado de los recursos naturales y del ambiente en el departamento de Boyacá 2012-2013*.
- Cubides, H. (2007). Trazos e itinerarios de diálogos sobre política con jóvenes contemporáneos de Bogotá. *Nómadas*, (32), 33-79.
- Declaración de Merton. (1985). En M. Marino (comp.). *Ecodesarrollo Tomo I*. Bogotá: Carlos Valencia Editores.
- Díaz, M. A. (2004, oct.-dic.). *Desarrollo sustentable: pasado presente y futuro*. En *Revista Ingenierías*, 7(25), 17-23
- Escobar, E. (2015). *Panorama regional del desarrollo sostenible en América Latina*. Revista Luna Azul, 40, 195-212.
- Estevan, A. (1995). Monetización del medio ambiente y ecologismo de mercado. En *De la economía a la ecología* (pp. 67-78). Madrid: Trotta.
- Gifford, C. (2012). *Desarrollo sostenible*. Colección: ¿Y tú?, ¿Qué opinas? (1 ed.) Editorial Morata, S.L.
- Gómez, S. & Roberto, B. *Del desarrollo sostenible según Brundtland a la sostenibilidad como biomimesis*. Recuperado de http://publicaciones.hegoa.ehu.es/assets/pdfs/315/Sostenibilidad_DHL.pdf?1399365095
- Haro, A. & Toddei, B. (2014). Sustentabilidad y economía: la controversia de la valoración ambiental. *Revista Economía, Sociedad y Territorio*, 14(46), 743-767.
- Kurz, A. & García, R. (comp.). (2010). *La sustentabilidad en el arte*. Recuperado de http://hometech.com.mx/articulos.php?id_art=370
- Landes, D.S. (1979). *Progreso tecnológico y revolución industrial*. Madrid: Tecnos.
- Leal, C. G. (2010). *Ecourbanismo, ciudad, medio ambiente y sostenibilidad*. Bogotá: Ecoe.

- Ministerio del Medio Ambiente. (1997). *Política nacional de producción más limpia*. Bogotá: MMA.
- Naranjo N. L. (2012) *Construcción de un pensamiento económico o ecológico. Acerca de cómo se articula la ciencia de la economía ecológica*. En *Bioeconomía, de los límites del crecimiento a la incertidumbre global*, (pp. 61-80).
- Naredo, J. M. (2011). *Fundamentos de la economía ecológica*.
- Pearce, D. W. & Warford, J. J. (1993). *World without End*. New York: Oxford University Press.
- Pierri, N. (2005). Historia del concepto de desarrollo sustentable. En: Foladori, G. and Pierri, N. *¿Sustentabilidad? Desacuerdos sobre el desarrollo sustentable*. (1 ed) Montevideo: Trabajo y capital.
- Red de Desarrollo Sostenible de Colombia. (2010). *Redes*. Recuperado de <http://www.rds.org.co/politicas.htm>
- Riechmann, J. (1995). Necesitamos una reforma fiscal guiada por criterios igualitarios y ecologistas. En *De la economía a la ecología* (pp. 79-116). Madrid: Trotta.
- Rodríguez, R. I. (2011, jul.-dic.). Las tesis de los límites físicos del crecimiento: una revisión a los informes del Club de Roma. *Perspectivas Revista de Análisis de Economía Comercio y Negocios Internacionales*, 5(2), 75-103.
- Romero, E. (2012). *Desarrollo Sostenible. Hacia la Sostenibilidad Ambiental*. Bogotá, D.C.: Produmedios.
- Turner, R. K. (1993). Sustainability: Principles and Practice. In R.K. Turner (ed.). *Sustainable Environmental Economics and Management: Principles and Practice*. London: Belhaven Press.