

**Chapter 2**  
**State of the Art**



## 2. State of the art

### 2.1. Basic definitions

It would be better to start with some general remarks. Table 2.1 contains several topics that are closely related to the subject of this research. At differentiation can be made in approach, strategies and technical tools to reach the goals of environmental management.

<b>Approach</b>	<b>Management strategies, Technical or legal instruments</b>	<b>Technical tools</b>
<ul style="list-style-type: none"> <li>• Sustainable development</li> <li>• Environmental management</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental assessment</li> <li>• Strategic Environmental Assessment (SEA) (Environmental Assessment of Plans and Programmes)</li> <li>• Environmental Impact Assessment (for projects)</li> <li>• Land-use planning</li> <li>• Environmental planning</li> </ul>	<ul style="list-style-type: none"> <li>• Landscape planning</li> <li>• Landscape sensitivity</li> <li>• Environmental sensitivity</li> </ul>

It is important to clarify that some of these issues do not have a unique definition that is entirely accepted. This is a consequence of the relative infancy of the environmental sciences (Briassoulis, 1989; Geerlings and Stead, 2003; UNEP, 2007), their broad field of studies and their dynamic changes. However, considering some agreements about premises and principles, and taking into account bibliographic references, the following definitions are formulated.

**2.1.1 Sustainable development** is defined as “the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” (Brundtland, 1987). In the Sustainable Development context emphasized, on one hand, is the overriding priority that should be given to essential needs of a large part of the world population that live in poverty; and on the other hand, the limitations imposed by the state of technology and social organization on the environment’s ability to meet the present and future needs (Kelly, 1998). Although the concept of Sustainable Development is still widely debated (Peterseil et al., 2004), currently their principles are the basic orientation for the environmental management addressed to development (Pokhriyal and Bist, 1988; Nijland, 2005; OECD, 2006).

**2.1.2 Environmental Management** refers to the strategies and actions implemented in order to achieve sustainable conditions in the use of natural resources and improve the quality of life. According to UNEP (2007), Environmental Management includes a complex set of activities, affects a number of development issues, and is implemented by

a wide range of social actors. As part of an environmental management process several technical, administrative or legal actions, or instruments can be implemented. Thus, Environmental Impact Assessment, Strategic Environmental Assessment, Land-use Planning or Environmental Planning should be seen as Environmental Management Tools (Wood and Lee, 1998; Diduck and Sinclair, 2002; Turnbull, 2004).

Likewise, Environmental Management System and Strategic Environmental Management are two terms widely used for example by corporations and business organizations. They refer to the management of those activities of a firm that have or can have impacts on the environment (Martin, 1998; Starkey, 1998). These procedures are also referred to as *corporate environmentalism*, *green management* or *the greening business* (Prasad and Elmes, 2005).

**2.1.3 Environmental Assessment** can be understood as all those studies carried out to recognize and evaluate the physical, biotic and socioeconomic characteristics of the territorial units. In general, Environmental Assessment represents an indispensable phase of any environmental study, because this process should provide the comprehensive knowledge of the past, present and future trends of the environmental conditions. Related to the Environmental Assessment, two very important instruments of environmental analysis have been developed. Both, Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA), are technical processes widely known, adopted and applied by in many countries around the world (Marsden and De Mulder, 2005).

**2.1.4 Environmental Impact Assessment (EIA)** is the legal, administrative and technical process to forecast and assess the environmental effects of the major engineering projects, or other types of action significantly affecting to the environmental conditions (Conesa, 1993; Hülsmann et al., 1995; Espinosa, 2001). EIA integrates environmental concerns into projects and forms an integral part of the process of formulating, evaluating and decision making regarding a proposed action, e.g. a new power station, road or airport. EIA forces the competent authority to examine possible environmental effects before a decision is made about the execution of a project (Devuyst et al., 1993). Thus, the EIA orients to the official authorities about the possibility or necessity of modification of refusing a given project, as a measure to mitigate or to avoid the forecasted environmental impacts (Wood and Lee, 1988). The *environmental impact assessment* has become a standard tool for the initiation, implementation, and evaluation

of major development and investment projects in many countries around the world (Hughes and Wood, 1996; UNEP, 1997). This has been supported in the fact that the EIA results in economic savings by avoiding the need for costly remedial actions (Canter, 1997; Burton, 2003).

The requirement of EIA has been incorporated within Venezuelan legislation, having a preponderant place in the environmental normative. Thus, the Constitution of the Bolivarian Republic of Venezuela, in its Article 129, establishes that “any activity capable of generating damage to ecosystems must be preceded by environmental and socio-cultural impact studies” (Venezuela, 2006). In this sense, since 1996, the principles and technical strategies to carry out the EIA have been regulated by means of the “*Norms of environmental evaluation of activities susceptible to degrade the environment*” (Venezuela, 1996).

**2.1.5 Strategic environmental assessment (SEA)** is the technical instrument that evaluates the environmental consequences of policies, plans and programs (Marsden and De Mulder, 2005; Cashmore et al., 2007) supporting the decision making in accordance with the premises of sustainable development (Sebastiani and Díaz, 2004). In general terms, SEA means the integration of environmental considerations into other policy fields (“external integration” and “integration requirement”), which increase in the course of tackling sustainable development (Niestroy, 2000).

SEA starts at the very beginning of the process of producing planning documents, which should include explicit environmental goals. The draft plan is then evaluated to determine whether such goals could be reached through the implementation of its proposals. If not, the proposals should be newly delineated in order to maximize the performance of the plan according to the preconceived objectives (Therivel et al., 1992 and Therivel and Partidario, 1996 cited in Díaz et al., 2001).

Many countries in different regions have incorporated either environmental impact assessments or strategic environmental assessment within their legal framework (UNEP, 2007), as a strategy to improve and support the legal, social and environmental viability of plans, programs or projects.

**2.1.6 Land-use planning** is the systematic assessment of land and water potential, alternatives for land-use and socioeconomic conditions, in order to select and adopt the best land-use options. In general terms, the purpose of the land-use plan is to select and

put into practice those land uses that will best meet the needs of the people while safeguarding resources for the future (FAO, 1993). The land-use planning implicates a policy to orient the spatial distribution of the development in accordance with a given model of national development (Briceño, 2004).

For a long time, two simple principles oriented land-use planning: 1) use each portion of land according to its potential to produce, and 2) protect each portion of land according to its susceptibility to degradation (Roberts, 1991). However, this in many cases has not led to satisfactorily achieving the goals of sustainability. In order to improve its efficiency, a renovated concept of land-use planning known as *Environmental Planning* has been claimed and developed. This concept implies a comprehensive and holistic approach, in which the collaborative involvement of the social actors is highly valued and applied. Characteristics of the approach for environmental planning have been formulated as part of critical appraisals of the instruments of environmental management (Marsden and Mulder, 2005), or as part of specific evaluations of the land-use planning process and its efficiency (Briassoulis, 1989; Selin and Chavez, 1995; Pennington, 2003; Nidumolu et al., 2004; Colantonio and Galli, 2006; Geneletti, et al, 2007; Kohornen, 2007; Hermans et al., 2007; Gezeluis and Refsgaard, 2007; Fang et al., 2008).

**2.1.7 Environmental planning** can be understood as the improved land-use planning process, which implies a comprehensive and holistic approach, where the premises of sustainable development are the fundamental axes. It involves a temporal and spatial arrangement of human activities and land uses, attempting to find ways for preserving and enhancing environmental values or resources, and finally achieving sustainability (Fang et al., 2008). The following are the main aims of the environmental planning: 1) to produce the goods needed by people, 2) to conserve the natural resources, and 3) to ensure its maintenance for future generations.

Moreover, environmental planning has a strong base in the landscape ecological analysis. This process emphasizes that the optimizing utilization of the landscape should be suited in harmony with the ecological conditions which allows a rational utilization of the natural resources (Zang et al., 2002).

Nowadays it is recognized that holistic and comprehensive environmental planning is an essential technical-political and participatory instrument for resolving, mitigating, avoiding or forestalling land-use conflicts and the resulting environmental impacts (Owens, 1994; Cocks, 1992 and Zinck, 1996 cited in Recatala and Zinck, 2008).

**2.1.8 Landscape.** Landscape can be understood as a unit of space, such as a region of middle-sized dimension. In the English word, *land-scape*, ‘scape’ is related to ‘shape’, so it may be understood as the totality of land forms in a given area. However, the equivalent German word, ‘*Land-schaft*’, can be interpreted as a piece of land with different features or structures that constitute an entity, because in this language ‘schaft’ designates a variety of things belonging together. Such as the case of words like: ‘*Wissenschaft*’ (science) and ‘*Gesellschaft*’ (society) (Haber, 2004).

Miles et al. (2001) argue that landscapes are made up of mosaics of different habitats arranged in intricate patterns at different scales, and also the concept of landscape being entirely anthropomorphic, which is a function of how human perceive the spatial variability in vegetation and landforms. Additionally, a broad concept of landscape not only includes the biotic and abiotic components, but also, the anthropogenic issues (Bastian, 2001; Haber, 2004; Peterson and Lui, 2008). Hence, as fundamental part of the landscape, people have high potential to affect landscapes, through the shaping of soil, the cutting of rock and the re-routing of rivers (Usher, 2001; Sayadi et al., 2009).

**2.1.9 Landscape planning** represents a strategy of environmental planning which has been traditionally based on ecological principles. According to Hawkins and Selman (2002) landscape ecological plans are finding increasing application, especially in Europe and the USA, because there is a growing acknowledgment of the need to renew ecological integrity and visual coherence of towns and countries by planning at the landscape scale. The particular approach of this procedure is supported by the landscape ecology whose principal intention is determined by goals oriented to environmental protection (Drdoš, 1996 cited in Bastian, 2001). Based on the broad landscape conception, it can be argued that landscape planning constitutes a tool of environmental management embedded into a holistic and comprehensive planning process, which offers suitable results for the environmental sustainability challenges.

**2.1.10 Landscape sensitivity** may be discussed in terms of the response of the landscape system to perturbation on different time and spatial scales (Thomas, 2001). Thus, landscape sensitivity concerns the likelihood that a given change in the controls of an environmental system or the forces applied to the system will produce a sensible, recognizable and persistent response. The idea is an essential element to describe the spatial and temporal distributions of the landscape resistance and the disturbing forces, in order to evaluate the stability-instability of the landscape (Brunsden, 2001; Miles et al.,

2001). Both propensity of a system to respond to externally imposed change, and the capacity of a system to absorb such change are dealt with in landscape sensitivity (Gordon et al., 2001).

Schütt et al. (2006) explain that this term concerns the capacity of landscape to resist the forces of change, independent of whether these arise from the variability of climate, endogenous triggers or human impact.

The response of the landscape components can be measured through the ratio of the change from an initial condition to a final condition; hence a larger ratio means a greater sensitivity (Usher, 2001). To assess this variation ratio constitutes a basic aim in environmental assessment, facilitating the evaluation of the intensity of environmental damages, but also the establishment of the needed control measures.

**2.1.11 Environmental Sensitivity.** This term represents an adaptation of the landscape sensitivity to the environmental context. Having the same principles of landscape sensitivity, it is often defined as the response of a given environmental unit to a given stress, perturbation or change (Buckley, 1982; Basso et al., 2000). The concept is closely related to other terms such as environmental vulnerability, fragility, stability and resilience. Authors argue that fragility or vulnerability is the grade of response of an ecosystem to exogenous and endogenous stress factors which is frequently is characterized as the sensitivity to disturbances (Villa and McLeod, 2002; Mahabir and Nurse, 2007). For Luers (2005) vulnerability is a function of sensitivity, exposure, and the state relative to a given threshold of damage.

Buckley (1982) considers that it is the definition as a stress-response relation that makes environmental sensitivity a useful tool for planning. In the same sense, Schiller et al. (2005) recognize that foreknowledge of both the sensitivity and vulnerability of habitats is essential to environmental planning, protection and minimizing the impact of unplanned activities.

Throughout this work the principles of landscape sensitivity, environmental sensitivity and vulnerability are used. The aim is to build a spatial analysis model in which the sensitivity of some environmental issues is assessed and consequently utilized as an indicator for the decision making in the sustainable environmental planning of rural areas.



## **2.2. Sustainable development and rural areas**

### **2.2.1 Importance of the rural areas**

The definition between rural and urban areas is always controversial and frequently differs among countries (Salvatore et al., 2005). Normally, the thresholds among rural, urban or peri-urban areas are established according to population size, density, buildings (Plessis et al., 2002) or even services and functional character of the regions. In this work it is understood that *rural areas* are land units characterised by agricultural and forestry production, natural protection or natural areas without defined uses, where the density of population and building are relatively low. Also, infrastructure, facilities and services have a relatively low importance, often, with a limited accessibility (Amler et al., 1999; Plessis et al., 2002). In these regions, people live in small towns, settlements or scattered villages and their principal activities are related to the primary sector of the economy.

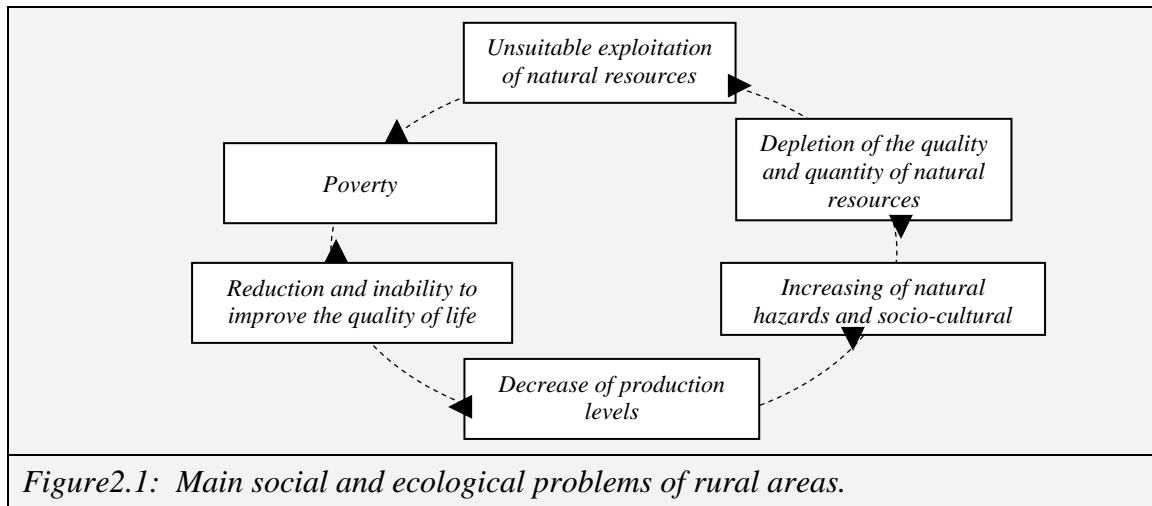
Worldwide, the largest area can be classified as rural area. These regions contain at the same time the highest percentage of the natural resources, such as soil, forests, water, minerals and landscapes, which are the fundamental sources of both current and future human development.

Furthermore, it is recognized that rural areas have a special importance for less developed countries, where the main wealth is represented by the natural capital. According to the UN (2008) given the importance of natural resources in the wealth of low-income countries, land even represents the most important tangible capital for most of the rural communities, representing more than 75% of the natural capital.

Rural areas have an overriding importance for the social and economic development of countries. These areas provide the basic alimentary products, raw material for the industry, the basic sources of water for human necessities, forests, natural habitats, biological diversity and landscape for recreation and tourism. Natural resources of the rural areas have vital importance in environmental benefits like clean air, water budget or genetic resources. Additionally, the agriculture, as an important activity of the rural areas, can be developed with ecological techniques. The strategies of sustainable agriculture could improve the quality of farm products, protect the health of people and reduce the environmental cost (Rivero, 2004). Therefore, the sustainable development of rural areas constitutes a requirement in the achievement of global sustainability.

### 2.2.2. Main social and ecological problems of rural areas

The environmental impacts on natural resources of rural areas are frequently related to an inappropriate land-use. These problems are characterized by: 1) excessive or unsuitable exploitation and depletion of natural resources, 2) depletion of the quality and quantity of natural conditions, 3) increase of natural hazards and socio-cultural risks, 4) decreasing of production levels, 5) reduction and inability to improve the quality of life of many people, and 6) poverty (Figure 2.1), which affects a high percentage of the world population. The poverty, as a reflex of the unbalanced population/resources, is at the same time the cause and effect of socioeconomic and environmental problems. Poor people frequently need to intensively use the limited resources to which they can accede (Sepúlveda et al. 2001).



The critical process described in Figure 2.1 should be attended by means of coordinate actions at global and local level in order to control the present environmental problems, maintain the ecological systems and improve the wellbeing of the population.

According to FIDA (2001) and Sánchez (2007) at global level the number of the rural poor is three times higher than the number of the urban poor, while in Latin America more than 60% of poor people live in rural zones (Echeverría, 1998). The situation in Venezuela, however, shows some particularities. Since the 1950s the country has had an intensive process of migration rural-urban, as a consequence of precarious socioeconomic conditions in rural areas, weakness of agricultural sector and growth of industry and services which offer urban employment. Therefore, the rate of urbanization reaches 87% and only 13% of the population live in rural areas (FAO, 2006).

The data is contradictory about the Venezuelan poverty indexes. While official statistics indicate that 33% of the population lived as poor in 2001 (INE, 2005), other references indicate worse conditions (Pulido, 2004). Thus, Ugalde et al. (2005) state that poverty in Venezuela grew from 17% in 1978 to 70% in 2002. The differences between the amounts may in part be explained by the fact that several methods and thresholds were used to evaluate poverty (Sandia et al., 1999). Apart from this, Valdez and Wiens (2008) indicate that in Venezuela 30% of poor people live in rural areas, whereas 70% reside in urban areas.

A determinant factor of poverty is precisely the bad distribution of the land tenure that characterises the rural areas of the less developed countries (Amler et al., 1996). It is also an overriding problem in Venezuela, where the traditional land tenure system shows a high concentration of the land in small groups of landowners. Although official actions have been implemented since the 1960s in order to apply the agrarian reform; these actions have not been totally successful. One estimate in the late 1980s indicates that in Venezuela 42.9 percent of all farms covered only 1 percent of arable land, while only 3 percent of the landowner reached as much as 77 percent of arable land (Haggerty, 1990).

In Venezuela, like in many developing countries, the poor land tenure status of many rural inhabitants limit their access to the land resources, which pushes them onto marginal land mainly characterized by low rainfall, infertility, steep slopes and also often by high fragility (Cohen et al., 1996; Rosse, 1996).

Some rural areas of Venezuela have had changes as well as many other rural areas of Latin American. Supported by technical and scientific advances, in recent decades some rural production systems have been transformed, such as the case of the study areas. Although agriculture production has been increased, many of these changes have implicated negative effects on the quality and quantity of natural resources and negative effects on both the quality of life and health of the people (Cabeza et al., 1994; Sandia, 1995; Colmenares et al., 2004).

Additionally, the economic and political problems of the region, and the inefficient administration of the economic resources, have traditionally affected the rural public management. Institutions related to the rural sector have few staff, deficient economic resources, poor equipment and precarious information which make it almost impossible to work efficiently. In accordance with Camacho et al. (2004) for decades the

Venezuelan countryside has lacked a technical management addressed to integral and sustainable development, which has contributed to a deficient control of the increasing depletion of natural resources.

The social services in rural areas such as schools, hospitals, irrigation systems or roads, have been improved in the last few decades, however, these changes have not been sufficient to offer to all of the people adequate quality of life. Sometimes social conditions in rural areas are very deficient, showing either high rates of infant and child mortality, illiteracy or a high percentage of the population without safe water and sanitation. People in rural areas have a high risk of suffering parasitical or infectious diseases due to the deficient disposal of human excreta and sewage management (Holmes, 1995; Sandia et al., 2001). In general, people of rural areas have worse access to education and health care, as well as other basic public services such as electricity, water, and sanitation than people in urban areas (Cohen, 2006).

Many families and especially young people of the rural areas have migrated to the cities due to the deficient infrastructure and services as well as the scarce opportunities of education and work (Cohen, 2006). The progressive reduction of the rural population as a consequence of the migration process it is a very important phenomenon in other Latin American countries (Mertins and Paolasso, 2005). Once in the cities, the rural migrants often don't have the right training and abilities to obtain a well-remunerated job with which to cover their basic needs. This finally results in one of the most frequent causes of urban poverty, which in Venezuela has dramatic indexes. In respect to this, GTZ (1996) argues that the migration to the cities represents a real solution to rural poverty only in very few cases.

Rural areas are also affected by a progressive increase of agricultural lands and the reduction of natural areas (Pulido et al., 2004; Pacheco, 2006; Merry et al., 2008). The denudation of the vegetal cover is the first phase of a process of environmental damage that consequently includes, loss of biologic diversity; alteration of habitats of animal communities and reduction or extinction of its population; increment of zoonosis risk; changes of microclimatic conditions; increase of surface runoff and evaporation; soil erosion, reduction of the percolation, soil moisture and groundwater. Therefore, the stream flow and the water availability for human uses are reduced, whereas the soil degradation is increased. Finally the risks and natural hazards are incremented (Figure 2.2).

As well as the agricultural uses increasing their territory on natural areas; the cities have a progressive expansion on agricultural zones or natural areas not intervened. It is related to the land-use changes that occur in the neighbourhood of the cities as a consequence of the intensive process of urbanization and the emplacement of new urban developments (FAO, 1995). Frequently, these areas have the appropriate conditions for the agriculture activities such as soils, slope, drainage or accessibility, which increase the socio-environmental impacts.

Venezuela is endowed with one of the largest tracts of forests in Latin America which has been highly deforested. Although Kammesheidt et al. (2001) state that the Venezuelans' logging history has been poorly documented data of FAO show the high intensity of the deforestation in the last few years. According to FAO (2006) in Venezuela, of the total surface area (916.445 km<sup>2</sup>), around of 53.1% (484.499 km<sup>2</sup>) were covered in 2005 by forest or other wooded land. The same data also indicate that between 1990 and 2005 the country lost 43.287km<sup>2</sup> of forest and wooded land, with an annual deforestation rate of 2.886 km<sup>2</sup>.

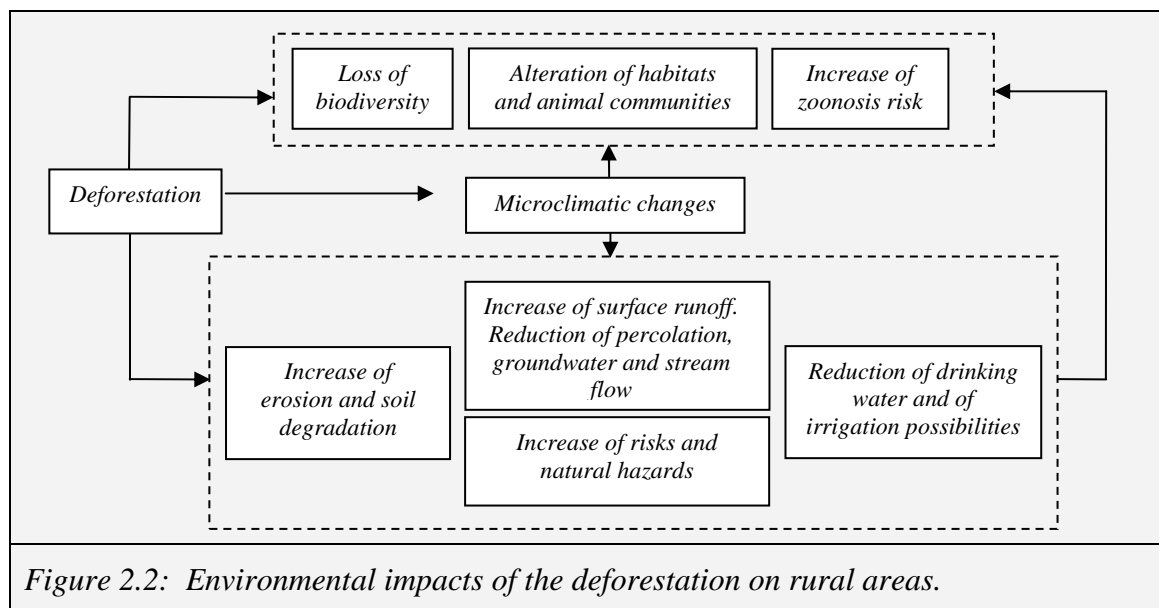


Figure 2.2: Environmental impacts of the deforestation on rural areas.

Otherwise, in Venezuela, the oil exploitation, as well as other mining activities, causes damage to natural ecosystems, soil, air and water. In spite of Venezuela having great possibilities for agricultural development, this economic sector represents less than 5% of the gross domestic product (GDP). Since the early 1920s, the oil production has become the economic base of the country, while agriculture has progressively lost its importance. With a production of 2.33 millions barrels/day (OPEC, 2008), and being the

fifth biggest oil exporter within the Organization of the Petroleum Exporting Countries (OPEC, 2007), Venezuela has a strong economic dependence on oil exports, an incapacity to produce its own agricultural products and an increasing dependence on the importation of food and goods (Haggerty, 1990; Krissoff and Trapido, 1991; Corrales and Cisneros, 1999).

In this sense, it is necessary to apply policies addressed to investing the high oil income in order to diversify the national economy. Thus, it could be possible to initiate a process of rural development taking into account the high potentiality of the country for the agriculture, tourism and natural preservation. This could not only guarantee a sustainable development of rural areas, but could also allow a reduction in the medium and long term of the dependence on the oil price fluctuations, as well as improve alimentary security, independence and sovereignty. Moreover, this is a needed strategy due to the effort of developed countries to find alternative energy forms in order to reduce the current foreign oil dependency (CPI, 2008; Hardy, 2008; Olivares, 2008).

### **2.3 The sustainable environmental planning and the Venezuelan legal framework**

Environmental questions have a fundamental importance in the Venezuelan legal framework. The sustainable environmental planning is specifically considered in the National Constitution as well as other legal instruments, such as the organic law of municipal power the organic law of the environment, the law of forests, soil and water, the law of protection of wild fauna, the organic law of land-use planning and the organic law of city planning.

#### **2.3.1 National Constitution**

The Constitution of the Venezuelan Bolivarian Republic approved in 1999, argues in its preamble that the ecological balance and the environmental resources are a common and inalienable heritage of humanity (Venezuela, 2006). This is the basis for other specific issues related to the environmental management and sustainable development such as land use planning, environmental impact assessment, environmental monitoring and control, and public participation.

According to Article 15 of the constitution, it is a responsibility of the state to establish a territorial policy preserving the diversity and the environment in accordance with the cultural, economic and social development. Additionally, Article 112 establishes that the economic activities in the national territory will be subject only to legal limitations due

to reasons of human development, security, health or environmental protection. In the same sense, Article 299 refers that the economic regime of the country is based on principles of social justice, democratization, efficiency, free competition, environmental protection, productivity and solidarity. Thus, an economic model according to the sustainable development is defined.

About the environmental rights, Article 127 argues that it is a right and a duty of each generation to protect and to maintain the environment for its own benefit and that of the future generations. Everyone has the right, individually and collectively, to enjoy a safe, healthful and ecologically balanced life and environment. Next to this, it is a fundamental duty of the state, with the active participation of society, to ensure an uncontaminated environment, in which air, water, soil, coasts, climate, the ozone layer and living species receive special protection. It is recognized that this article of the national constitution is embedded into the principles of sustainable development.

Article 128 indicates that the state shall develop a policy of land-use planning taking into account the ecological, geographic, demographic, social, cultural, economic and political realities, in accordance with the premises of sustainable development, including information, consultation and citizen participation.

One of the most important environmental references is included in Article 129, which says that any activity capable of generating damage to ecosystems must be preceded by environmental and socio-cultural impact assessment.

According to Article 178, among others, the principal responsibilities of the municipalities are: the management and promotion of socioeconomic development, public services, the promotion of public participation, the improvement of life conditions, the land-use planning, and the city planning and the environmental protection. It is emphasized that the legal basis of this work can be found in this article, because it establishes the direct responsibility of the municipal and local authorities to develop processes of land-use planning in conditions of environmental sustainability.

Regarding rural activities, the national constitution establishes specific references for agriculture and tourism. Thus, Article 305 says that the state shall promote sustainable agriculture as strategic basis for overall rural development, guaranteeing a secure food supply for the population. Article 310 indicates that the tourism represents a priority

economic activity as part of the national strategy for diversification and sustainable development.

### **2.3.2. Other legal instruments**

The *Organic Law of the Environment* (Venezuela, 1976), stipulates the preparation of a *national plan of conservation, defense and improvement of the environment* in which must be included the arrangement of national territory, the definition of areas of special management, such as protected natural areas; and the strategies to orient the processes of urbanization, industrialization, deconcentration and settlement.

The *Organic Law of Land-use Planning* (Venezuela, 1983) contains the principles for carrying out the land-use planning processes as well as delineating the national plan system. This comprises the national plan, the regional plans, the sectorial plans as well as the plans of protected areas. The municipal plans of land use are not concretely indicated in this law. However, they can be carried out, because Article 5 recognizes that other plans, needed in the process of integral development of the country, can be executed.

Additionally, the municipal plan of land use, conceived as a sustainable environmental plan, also has a legal fundament in *the organic law of municipal power* (Venezuela, 2005). There, the Article 60 states that each municipality shall have a plan that includes the arrangement and promotion of social and economic development, which encourages the improvement of life conditions. The land uses according to the national and regional plans must be regulated through the municipal plans, establishing the possible land-use types and the intensity levels, as well as the infrastructural equipment and environmental measures of protection, conservation and defense of the environment (Article 61). In the same sense, Articles 62 and 64 emphasize the responsibility of local authorities in environmental management, but also in the promotion of economic activities and the management of public services in conditions of environmental sustainability.

Two other laws are also directly related to sustainable environmental planning. The *Organic Law of Planning* (Venezuela, 2001) orients about the elaboration of the municipal plan of development, which consists of a plan for governmental investments, in which the economic and official social actions are defined, but also the amounts of investment for each sector. This plan must be elaborated for periods of four years in accordance with each period of municipal government. At the same time, the *Law of Local Advice for Public Planning* (Venezuela, 2002) defines the local planning councils



as communal organizations which, according to the municipal plan of development, orient the investment policies of the local government to attend to the necessities of the communities and the balanced development of the territory.

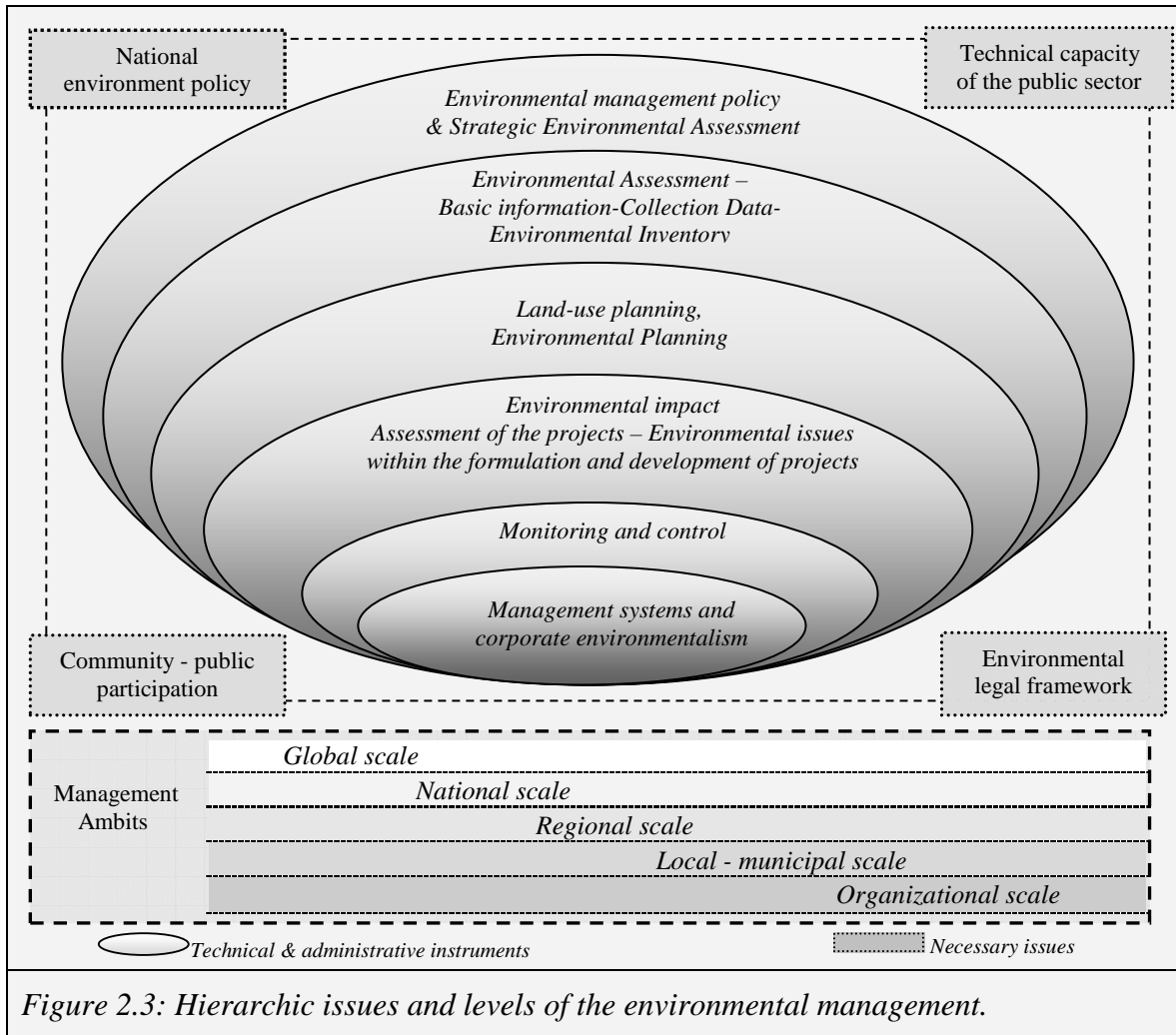
The sustainable environmental planning proposed in this work is represented in the Venezuelan legal framework as the municipal plan of land use, which is defined in the law of municipal power, and has an important legal fundament in the organic law of land-use planning. In order to contribute with a comprehensive model of sustainable development for the municipal entities, the proposed plan must have an interactive and closed connection with the municipal plan of development, which is defined in the law of local advice for the public planning council. However, it is hoped that in the future the implementation of this instrument of planning will allow a definitive and concrete incorporation of the Sustainable Environmental Planning Process into the Venezuela legal framework.

#### **2.4. Building a concept of sustainable environmental planning**

The comprehensive framework of Environmental Management (EM) is one of the most important theoretical approaches of this research. EM is understood here as a set of processes and practices that are implemented in order to control the environmental impacts of human activities, prevent the risks and natural hazards and promote the sustainable development. Environmental management involves groups responsible for environmental planning and development as well as public authorities and private enterprises (Cooke and Doornkamp, 1993).

Moreover, EM is related to several instruments and legal and administrative issues that need to be considered, developed and implemented as parts of the whole EM system, which should be applied in different ambits of actuation, using in each case a suitable scale of work. At national levels, EM should offer a general overview of policies, programs and projects, while local scales are the ambit to offering details about strategies of environmental management (Figure 2.3).

The environmental planning and, consequently, sustainable environmental planning of rural areas, constitutes one of the major instruments of environmental management. This instrument represents the connexion level among the general aspects of the national environmental policy and the environmental laws with the concrete technical phases of environmental management (Amler, 1999; Burton, 2003).



Source: Modified after Sandia, 2004.

In order to reach the objective of this work, a basic framework is needed about what is sustainable environmental planning of rural areas actually is. Hence, this concept is here defined here as a political, technical and administrative process addressed to establishing the best land uses for a given rural territorial unit according to its physical, ecological, social and economic characteristics (Venezuela, 1983; Méndez, 2002;). The process should be supported by a collaborative cooperation among official authorities, technical-scientific staff and communities (Hermans et al., 2007). Thus, it is possible to obtain concerted results that could be effectively and efficiently achieved within a general framework of planning, implementation, monitoring, evaluation, and correction or adjustment (Nijland, 2005) (Figure 2.4).

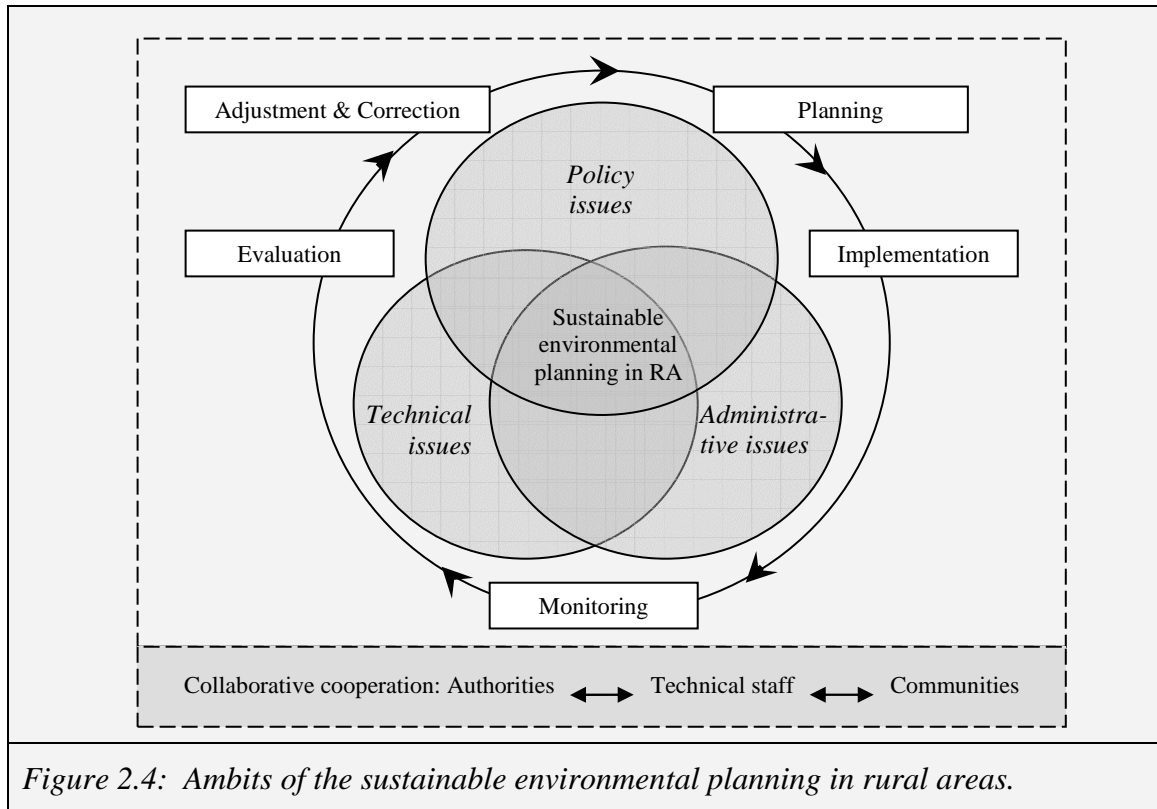


Figure 2.4: Ambits of the sustainable environmental planning in rural areas.

Source: Own elaboration based on Méndez , 2002.

## 2.5 General methodology for sustainable environmental planning

Finally an overview of the general phases of an entire environmental planning process is shown in Figure 2.5. Over six sections, the scheme contains the methodological steps that must be fulfilled to allow a plan of sustainable development of a given rural area to be constructed. Specifically the methodology includes 1) plan preparation, 2) diagnosis, 3) prospective, 4) plan formulation, 5) instrumentation and 6) execution and control.

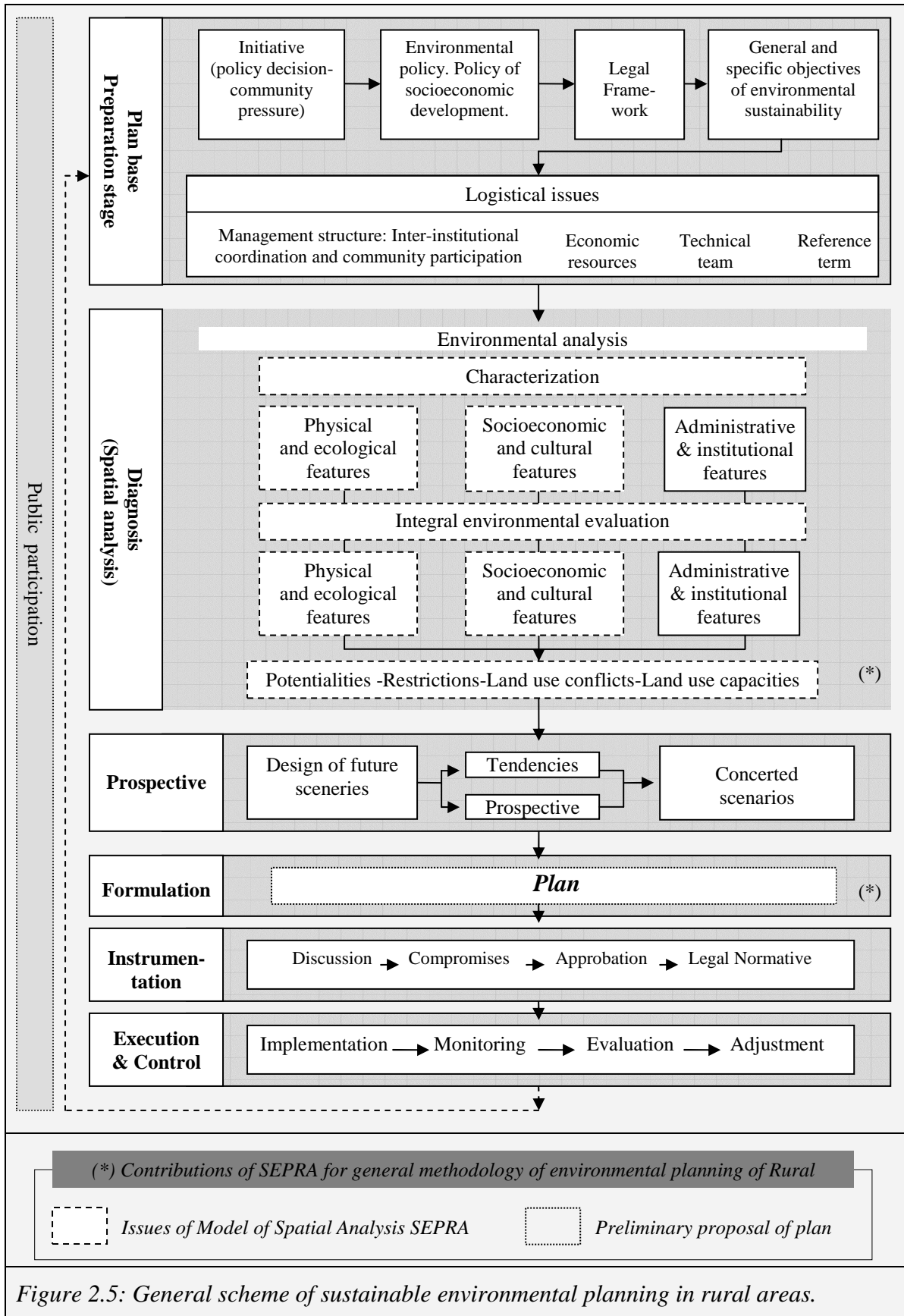


Figure 2.5: General scheme of sustainable environmental planning in rural areas.

Source: Own elaboration based on Amler et al., 1999; IGAC, 1997; Méndez, 1999.

The first part tackles the basis of the process; it is “the plan of the plan”. The initiative to carry out the process of environmental planning is supported by an administrative decision which could be an answer to community pressures, or as fulfilment of an established legal requirement. An environmental plan of a given municipality not only benefits the communities but even the elected authorities. Indeed, by means of this plan the authorities can have realizable, concrete and efficient governmental actions lines. Practically, a planning process can be understood as both government guidelines for the local authorities and an instance of consensus among social actors about land uses, the environment, the economy and development.

In the first stage it is important to determine the logistical issues such as the management structure, which must be supported with an inter-institutional coordination and active community participation. This assures that the decision making will be reached by means of consensus and concerted agreements (Hansen, 2004). Normally in Venezuela the planning processes have been mainly based on technical-administrative approaches, with scarce community participation and consequently, weak formulations and poor results (Estaba, 2000; Rojas, 2006).

The diagnosis builds a central phase of the planning process. The analysis of the natural, social and economic characteristics of the area accesses its environmental potentialities and restrictions. The second objective of this research work is focused on this stage. Once a general methodological scheme for environmental planning has been proposed (Figure 2.5), a specific model of spatial analysis is developed (see Chapter 4). By means of this model of spatial analysis, the environmental diagnosis can be carried out in a way that considers the most important environmental features in order to generate the basic references to identify environmental potentialities and restrictions for the land uses. One of the most important attributes of this method consists of the integral management of large quantities of basic data by means of accessible and user-friendly technical tools.

The above represents the basis for the prospective, which is the subsequent part of the general methodology. In this section the future scenarios are formulated: on one hand the trend scenarios (tendency), on the other, the prospective scenarios. Tendencies refer to the future evolution of the current environmental conditions without incorporation of control measures. The prospective scenarios refer to several possible environmental future conditions, which could be raised by means of the implementation of management strategies (FAO, 1995; Pokhriyal and Bist, 1988; Méndez, 2002). It is considered that in

order to guarantee the success of a plan the scenerios need to be analysed and decided through public participation and consensus among the social actors (Schemmel, 2000; Strasdas, 2000; Chufamanee and Lonholdt, 2001; UNEP, 2007).

Based on the analysis of the future scenarios, the environmental management plan can be formulated. The principal result of this section is the zonation of the studied area, which includes the recommended land uses for each territorial unit. The allocation of the land-use options must include the territorial delimitation represented cartographically with suitable scales. At the same time, the plan must contain a general profile about the specific projects that could be emplaced in each territorial unit. Thus, the proposed plan offers concrete options for development, which are normally not considered in traditional land-use planning.

In accordance with this general scheme, it is emphasized that the most important objective of this thesis is specifically referred to in this phase of diagnosis, in which the spatial analysis is required. Therefore, as a result of this research a zonation of the land uses for every study area is formulated. Moreover, as indicated in this thesis is indicated, the technical product of the diagnosis phase must be considered as a guideline which will be consulted and discussed with the social actors in order to achieve the definitive plan to be applied.

In the instrumentation stage the necessary arrangements for putting the plan into operation are established. Discussions among social actors, assumption of compromises, articulation of the various parts and moments of the plan, as well as the political and social legitimization are required in this phase. The legal expression of the proposed plan constitutes a fundamental support in order to ensure that the plan will be officially required and fulfilled by the social actors. In this sense an ad-hoc legal normative must be promulgated.

The final section of the process is the execution and control, which implies the application of the legal, technical and political strategies included in the sustainable environmental plan. In this sense, the participation of all social actors is greatly required (Peel and Lloyd, 2007). Finally, the plan must be integrated into a process of monitoring, evaluation and adjustment in order to identify and solve unforeseen problems of weakness. This makes a fundamental contribution to making a permanent adaptation to environmental changes.