ENVIRONMENTAL RECLAMATION AS STRATEGY FOR SUSTAINABILITY

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ABSTRACT

The environmental change by the society is recurring and has been intensified since the first civilizations. However, the lack of conservationist practices has caused the emergence of degraded areas, whose recovery is fundamental for the sustainability. In this context, this paper aims at analyzing the environmental recovery as a public policy strategy supported in the Brazilian legislation. As methodology, a documental and analytical research was developed on the regulations, discussed at a multidisciplinary perspective, from the view of legal and engineering specialists, from the agricultural and environmental areas. As a result, it was identified a collection of rules pointing at a significant commitment on the definition of guidelines. On the other hand, this meaningful quantity of legal mechanisms, associated to misalignment, may cause damages to its effectiveness. In conclusion, we can consider that environmental reclamation is widely regulated, and it represents one of the main strategies of the environmental public policy adopted in Brazil. Nevertheless, it still requires advances

to combine harmoniously practical and theoretical-conceptual aspects. Thus, considering the moment that Brazil is consolidating a new Forestry Code, we hope that the achieved outcomes can contribute to the debate and mobilization about the environmental reclamation as a strategy for sustainability.

Keywords: Degraded areas; Systemic perspective; Public policy.

RECUPERAÇÃO AMBIENTAL COMO ESTRATÉGIA PARA SUSTENTABILIDADE

RESUMO

A transformação do ambiente pela sociedade é recorrente e tem se intensificado desde as primeiras civilizações. Contudo, a ausência de práticas conservacionistas vem causando a degradação de áreas, cuja recuperação é fundamental para sustentabilidade. Nesse contexto, o presente artigo objetiva analisar a recuperação ambiental como política estratégica amparada na legislação brasileira. Como metodologia, uma pesquisa documental foi desenvolvida para abordagem analítica de normativas, discutidas em uma perspectiva multidisciplinar, a partir da visão de especialistas em direito e engenharia, na área de ciências agrárias e ambientais. Como resultado, constatou-se uma numerosidade de normas que indicam um empenho significativo na definição de diretrizes. Por outro lado, esse grande número de normativas, associado à falta de um alinhamento, pode prejudicar sua efetividade. Portanto, conclui-se que a recuperação ambiental está amplamente normatizada, constituindo uma das principais estratégias de política pública ambiental adotadas no Brasil, mas que ainda carece de avanços para aliar harmoniosamente aspectos práticos e teórico-conceituais. Assim, considerando o momento em que o Brasil está consolidando um novo Código Florestal, espera-se que os resultados alcançados possam contribuir para o debate e mobilização acerca da recuperação ambiental como estratégia para sustentabilidade.

Palavras-chave: *Áreas degradadas; Perspectiva sistêmica; Política pública.*

INTRODUCTION

The environmental change caused by the society has occurred since the first civilizations. However, the concern about environmental impact on the anthropic activities has emerged in the recent decades, mainly after the World War II, requiring rethinking the human relationship with the nature (HOSHI, 2012; BALIM; MOTA; SILVA, 2014).

With the advent of mechanization and technological advances, the lack of conservationist practices has caused the environmental quality loss, with negative effects on the natural resources, the biodiversity conservation and the maintenance of ecosystem services (BRESSANE et al., 2015a). Therefore, due to the flora removal and the   expulsion of the fauna, the loss of fertile soil and the quality and the water regimen compromise, the degraded areas arise (IBAMA, 1990).

Despite its ongoing decrease, the global deforestation rate is still alarming: "Around 13 million hectares of forest were converted to other uses or lost through natural causes each year in the last decade compared with 16 million hectares per year in the 1990s" (FAO, 2010, xiii p.). In Brazil, the rates that reach 23 mil km² a year $^{-1}$ the deforestation between the years 2002 and 2003 (SOARES-FILHO et al., 2005), the peak of 27.772 km² in 2004, reduced to 4,5 mil km² in the period from 2011 to 2012. Despite this reduction, the effects remain severe, with the occurrence of extreme weather events, such as floods in certain regions and prolonged drought in others (NOBRE, 2013; BRESSANE et al., 2016).

So the environmental recovery represents a fundamental instrument for the maintenance of the biodiversity, for the environmental resources and services availability, as well as to provide essential conditions for the well- being and security of human populations (BRESSANE et al., 2015b).

Thus, guidelines are established to guide the recovery practices, such as the norms from the Brazilian Institute for the Environment and the Renewable Natural Resources (IBAMA), from the Ministry of the Environment (MMA) and from the National Council for the Environment (CONAMA). However, the normative guidelines often require scientific discussion (ARONSON et al., 2011), (RAD), especially because in Brazil the recovery of the degraded area "was intensified in the recent decades, going through a series of conceptual and paradigms changes" (ASSIS et al., 2013, p.599). Effectively, in the scope of these norms, the diversity of

similar terms with meanings that in general are not equivalent, undermine the understanding of these guidelines and, thus, they may compromise the RAD planning and effectiveness.

In this context, this article aims to analyze the degraded areas reclamation as the instrument of the Brazilian Law. Thus it seeks to see the hypothesis that the environmental reclamation is one of the main strategies of the environment public policy in the country.

As a methodological approach, a qualitative research based on documents was carried out, starting from this normative guidelines integrated collection and analysis and the study of the applied technical literature, which were the main materials used. So a systemic perspective was sought supported by the multidisciplinary view of the Law and Engineering experts in the area of the agrarian and environmental sciences.

The systemic perspective developed in this study is founded on the Systems General Theory, in construction since the first notions established by Von Bertalanffy (1968). In this view, it considered a set of normative arrangements as interdependent and interagency components that form the legal regime of environment recovery practices.

To this end, it is started from the understanding that the normative guidelines are conceived in different contexts, not infrequently accompanied by operational guidelines applicable in different conditions, jointly and adaptively. Thus, an analytical approach of the legal regime was taken focusing on the guidelines that regulate the rights and duties, prohibitions and penalties applicable to the environmental recovery events.

1 TEORETICAL-CONCEPTUAL ASPECTS: CONTRIBUTIONS TO A SYSTEMIC PERSPECTIVE

In general, environmental quality recovery can be understood as a condition (*sine qua non*) to get an environment ecologically balanced and, therefore, mandatory according to the Federal Constitution:

> Art. 225. Everyone has the right to the ecologically balanced environment, the people common right use and essential to a healthy life quality [...]. §1º To assure this right effectiveness, it is incumbent to the Government: I to preserve and restore the essential ecological processes [...] §2º Whoever exploits the mineral resources is obliged to recover the degraded environment [...] in the form of the law (BRASIL, 1988, s/p.).

With this end, the Environment Law is presented as a set of norms to guide the individuals´ behavior and thus discipline the human activities. In this sense, the National Environment Policy (BRASIL, 1981) provided a systemic regulation, setting the principles and juridical-economical instruments (DERANI; SOUZA, 2013; BARBOSA; NÓBREGA, 2013). Therefore, so that the economic environment is able to grow and develop without exhausting the natural environment resources, the recovery of the degraded areas has become one of the environment policy principles established by the 1981 Federal Act 6938:

> Art. 2nd. The National Environment Policy aim is the preservation, improvement
> and recovery of the environmental quality conducive to the life, aiming to assure, in
> the Country, the conditions for the social-economical development, for the national
> security interests and for the protection to the human life dignity, complying with
> the principles as follow: [...] VIII – recovery of the degraded areas [...] (BRASIL,
> 1981, p.1).

As a control device, the legal guardianship seeks to harmonize the nature protection with the fulfillment of the human needs and rights that, inevitably, result in the undertaking of activities that change the environment (GOULART; FERNANDES, 2012). To this end, instruments are established, both with preventive and corrective aims, which usually involve punitive measures (BARBOSA; NÓBREGA, 2013; WEBER, 2014). Among the degradation preventive instruments are the studies about the environmental impact, set by the 1986 Conama Resolution 01:

> Art. 2nd. It will depend on the elaboration of the environmental impact study and
> its environmental impact report – RIMA, to be submitted to the competent state
> organ approval, and to IBAMA on supplementary basis, the licensing of activities
> modifying the environment (BRASIL, 1986, p.1).

However, when the damages to the environment have already occurred, in addition to the fines and restriction of rights provided in the 1986 Federal Act 9605, the sentence may still imply deprivation of liberty. Alternatively, the provision of services to the community may be determined, such as the execution of measures in support to the recovery of degraded areas as environmental compensation (BRASIL, 1998).

In this respect, it is worth highlighting that the environmental

values protection involves unavailable interests. When an environmental damage occurs, it affects not only a local community or a town, but also the whole integrated community, and this is a perspective that makes necessary a systemic view of the legal order for a more effective environment legal protection. Therefore, among the motivations for a recovery proposal is promoting the environmental damages repair, which jointly with the established conditions for issuing licensing and real estate regularization is among the main normative requests (Figure 1).

Figure 1 - Main requirements for disturbed land reclamation
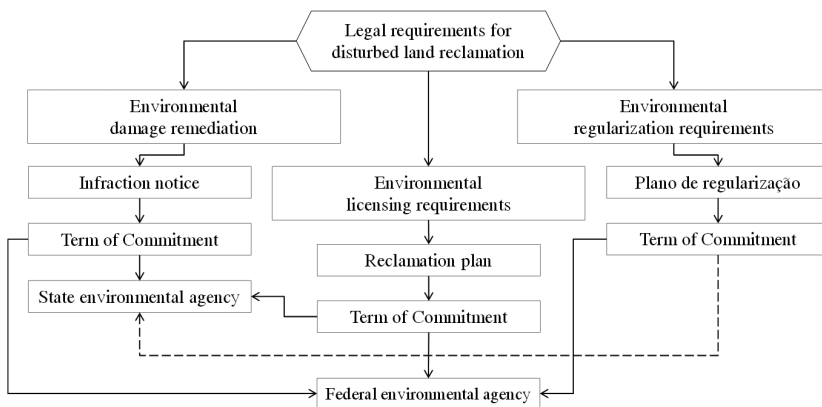
To this end, the liability for damages repair has found adherence in the legal regime for environmental recovery, and the obligation to revert the degradation is one of the most important principles for achieving effective sustainability in the country (BEDRAN; MAYER, 2013; SOUZA; HARTMANN; SILVEIRA, 2015; SOUZA, 2016; RIBEIRO et al., 2016).

In addition, it is worth noting that the normative assumptions of the environmental recovery precede even the Brazilian Legislation, with origin in international sources constructed along the years, mostly as agreements, treaties, conventions and protocols, including the Geneva Protocol for the prohibition of biological weapons (1925), Rhine River Agreement against pollution (1963), the Conference on Human Environment(1972), Protocol of Montreal on the Ozone Layer (1987), Taranco Declaration on the environment (1995), Protocol of Kyoto (2005),

and recently the Paris Agreement on the Climate (2015), and many others (HOSHI, 2012; JAQUES, 2014; DUBOIS; MOROSINI, 2015; PAVONI; PISELLI, 2016).

As previously discussed, environmental changes come from human activities and, as consequence of the demand generated by an unsustainable pattern of growth, the environmental quality degradation has been intensified. According to studies of the 1981 Federal Act 6938, this degradation can be extended as the adverse changes of the environment characteristics (BRASIL, 1981). Accordingly, by the 1989 Federal Decree 97632, it is considered as degradation the result of damages to the environment through which some of its properties are lost or reduced, such as the soils productive capacity, the air quality or the shortage of water resources (BRASIL, 1989).

For the Technical Standard of the Brazilian Association of Technical Standards - ABNT 13030 (1999) , that guides the preparation of environmental rehabilitation projects, the degraded areas are those with varying degrees of change, concerning both the biotic factors as the vegetation, and the abiotic components as the water and the soil (BRASIL, 1999).

In turn, the Normative Instruction of the 2009 MMA 05 defines as degraded area the one where there are changes in the biotic, edaphic and water quality, due to the destruction, removal or expulsion of the flora, fauna and soil, even partially (BRASIL, 2009). In this sense, the 2001 IBAMA 04 Normative Instruction differentiates these partial degrees of changes, so that, depending on the case, the area may be degraded or, in less extreme conditions, simply disturbed. In this perspective, the disturbed area corresponds to the one that, once closed the degradation process, still keeps ways for regeneration. In turn, the degraded area would be the one that could not return naturally to an ecosystem similar to the previous situation before the degradations (BRASIL, 2011). This distinction is also made in the terms of the 2012 Federal Decree 7830 (BRASIL, 2012), that considers as altered area and degraded area those with and without capacity of natural regeneration, respectively.

According to the Special Coordination of Restoration of Degraded Areas (CERAD, 2013), the concept that has been accepted is that of the ecological restoration, defined as a strategy of aid to the restoration of an ecosystem that has been degraded, damaged or destructed. However as discussed ahead, some regulations make a terminological differentiation,

treating restoration as a particular case that should not be confused with other recovery strategies, including the rehabilitation and the redistricting.

The current Forestry Code, established by the 2012 Federal Act 12651, presents both the term restoration and the expression recovery in establishing the principles for the sustainable development (BRASIL, 2012a). In this norm the term restoration is used only once. In contrast, the term recovery is used to refer to the recovery of the soil capacity of use (article 3rd), of areas (articles 15, 41, 51 etc.), of the vegetation (articles' 41, 44, 61A) and of the environment (articles 50, 59 and 79). Thus, according the CERAD interpretation (ibid), the systematic reading makes possible to consider that the term recovery is used in a generic way, encompassing the others, understanding that is shared by the approach developed in the current study. Other term that is used frequently in the same regulation is recomposition, referring to the vegetation (articles 7º, 46, 54 etc.) and areas (articles 12, 13, 15, 41 and others), considered in the regulamentation given by the 2012 Federal Decree 7830 as the "restitution of the ecosystem or of a degraded or changed native biological community to the non degraded condition that may be different from its original condition" (BRASIL, 2012b).

In the here mentioned Forestry Code (BRASIL, 2012a), the term "regeneration" is also frequently used, composed with the expression "natural" as in: conduction of the natural regeneration of the native species (subsection I, §13, article 61A); and allow the vegetation natural regeneration (subsection II, article 66). In this sense, regeneration can be considered a self recovery process, that is, a revegetation able to occur with no atrophic support (APARICIO et al., 2014). However, as a recovery strategy, regeneration can be man-made, aiming to create favorable conditions, since the control of disturbance factors to the use of support techniques, such as nucleation (LEAL FILHO; SANTOS; FERREIRA, 2013). According to the National System of Nature´s Conservation Unit – SNUC:

> [...] recovery: restitution of an ecosystem or a degraded wild population to a non degraded condition that can be different from its original condition; [...] restoration: restitution of an ecosystem or a degraded wild population as close as possible of its original condition (BRASIL, 2000, p.1).

However, it should be emphasized that the definition presented

by a certain standard is made for the effects of its use, that is, in order to transfer the understanding to other cases, a systematic interpretation must be carried out examining its relationship with the other applicable standards (CARVALHO, 1999), as it was done in this study.

As example of supplementary regulamentation, there are the State of São Paulo regulations that due to the State development and relevance tend to be a reference for the country (DURIGAN et al., 2010), the reason why the evolution of its legal regime applicable to the environmental recovery is discussed below.

The state regulations set by the Environment Secretary of São Paulo state (SMA), which established guidelines for the degraded areas heterogeneous reforest, have applied the term forestry recovery defined as the "restitution of a deforested, disturbed or degraded area to the condition of native forest, according to the previously elaborated Project for area occupation" (SÃO PAULO, 2008, p.4). However, besides the areas formerly composed by forest physiognomies, there are areas in environments originally composed by camp formations and other forms of native vegetation to be recovered. Thus, repealing such standards, the Resolução SMA 32 of 2014 started to apply the term ecological restoration, defined as "intentional human intervention in degraded or changed ecosystems to trigger, facilitate or accelerate the natural process of ecological succession" (SÃO PAULO, 2014, p.2).

This standard (SÃO PAULO, op. cit.) establishes the ecological restoration as applicable instrument, both in rural and urban areas, whose recomposition, in the terms defined by the federal norm (BRASIL, 2012b), is its main objective. Therefore, this standard that deals with restoration as a general expression, doesn´t aim necessarily to bring the area back to a condition close to the original one, rather to a condition able to maintaining its structure and sustainability. However, as the composition, structure and restoration of the diversity, the ecosystem function in the area should also be considered as fundamental to achieve the ecological restoration objectives, included the self sustainability, considered as the "final community ability to survive with little or no maintenance at all" (PRIMACK; RODRIGUES, 2001, p. 252).

In this perspective, the approach given by the São Paulo state standards doesn´t align with the federal Standards that emphasize the functionality, as the SNUC (BRASIL, 2000) and the ABNT standards (1999), where the rehabilitation, recovery and restoration strategies are

distinguished. According to the (1999), the recovery aims to the area original function, while rehabilitation can be more flexible, seeking the adequation to future use, which can be both the productive function and the return to natural processes. To the contrary, the restoration is a more ambitious strategy aimed to the reposition of the exact ecological conditions prior to the degradation.

From the above it is verified that the environmental recovery in Brazil is largely normalized, as in a synthesis of the theoretical-conceptual aspects realized in the Tables 1 and 2, and a chronology of the main regulations presented in the Figure 2.

Table 1 – Synthesis of the normative references about the environmental condition (diagnosis)

Conceptual Aspect		Reference
Degradation Process	Adverse change of the environmental components characteristics	Federal Law 6938 (1981)
	Results of damages, through the loss of the environmental properties	Federal Decree 97632 (1989)
Degraded Area	Area with several degrees of change of biotic and abiotic factors	ABNT standard 13030 (1999)
	Area where the flora, fauna and soil have been compromised, with biotic, edaphic and water changes	Instruction 05 MMA (2009)
	Area unable to return by natural trajectory to an ecosystem similar to the prior	Instruction 04 IBAMA (2011)
	Area changed due to the anthropic impact with no capacity of natural regeneration	Federal Decree 7830 (2012)
Disturbed Area	Area that still maintains means of biotic regeneration after the degradation process Instruction	04 IBAMA (2011)
	Area that kept its capacity of natural regeneration after the impact	Federal Decree 7830 (2012)

Table 2 – Synthesis of regulations references on the intended future state (prognosis)

Conceptual Aspect		Reference
Degradation Process	Set of procedures for area restoration and the restoration of its original function	ABNT standard 13030 (1999)
	Restitution to a non degraded condition, which may be different from the original condition	Federal Law 9985 (2000)
Degraded Area	Restitution of a degraded or changed ecosystem or native community to a non degraded condition, which may differ from the original condition.	Federal Decree 7830 (2012)
		SMA Resolution 32 (2014)
	Return of the area or natural processes´productivefunction, aiming the adaptation to the future use	ABNT standard 13030 (1999)
	Reposition of the degraded area exact ecological conditions, according to an established plan	ABNT standard 13030 (1999)
	Restitution of an ecosystem or wild population as close as possible to its original condition	Federal Law 9985 (2000)
Disturbed Area	Intentional intervention in ecosystems in order to trigger, facilitate or accelerate the ecological succession	SMA Resolution 32 (2014)

Figure 2 - Chronology of regulations related to environmental reclamation in Brazil
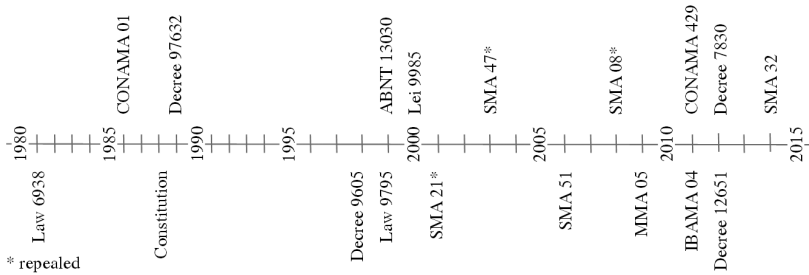
As it can be seen in the Figure 2, the Federal Act 6938, in 1981, has started a process of normatization of the main regulation guidelines related to the environmental recovery in the country, which has deepened along the following years, especially from the end of the 1990 decade. However, despite the evident commitment to the creation of guidelines, the lack of alignment of theoretical aspects, as summarized in the Tables 1 and 2, represents a problem to be surpassed for the advancement of the environmental recovery as a strategy of environmental public policy in Brazil.

2 PRACTICAL ASPECTS: SYSTEMATIZATION OF SCOPE AND OPERATIONAL GUIDELINES

As previously discussed, three main demands can be highlighted for the proposition of a degraded area recovery plan (PRAD), as follows: the requirement of a given activity environmental licensing; a real estate conditioning for environmental regularization; and the damage repair object of an environmental infraction notice. In general, in order to fulfill these demands, the recovery plan phases include the steps of planning and execution of the environmental diagnosis and prognosis as well as the achieved results maintenance and assessment (Figure 3).

Analyzing Figure 3, it is noted that the PRAD elaboration phase focus on the awareness about the area current condition and in the projection of the intended future situation to be achieved through actions of topographic reconstruction, soil remediation and vegetation recomposition.

In turn, it highlights that the implementation and maintenance processes during the execution of the PRAD are not linear, as adjustments may be required during the assessment by the environmental organ. This approach by means of cyclic processes is important as management mechanisms to assure that the PRAD achieves satisfactory   results.

Figure 3 – Systemic perspective of practical aspects in the main phases of a reclamation plan
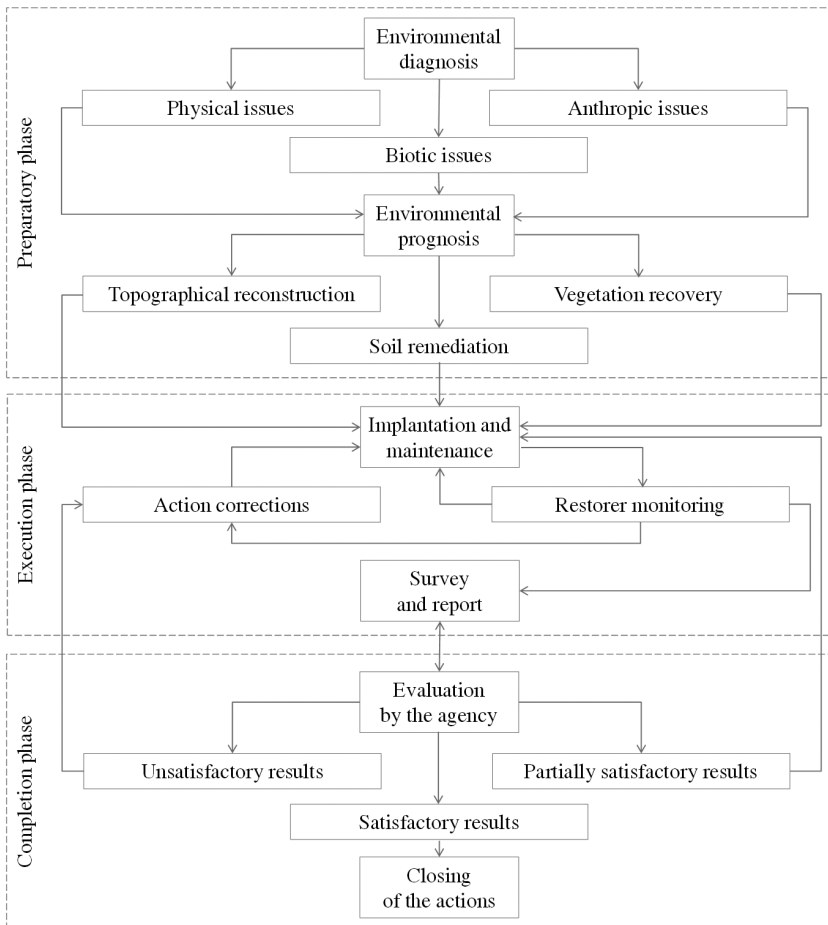
Mining activities are among the companies that require PRAD for environmental licensing. For mining the PRAD is required both for larger and smaller projects, and for the latter one it is required in the form

of the chapter Environmental Control Plans and Reports:

> Art. 1st The enterprises designed for mineral resources exploitation should, when submitting the Environmental Impact Study- EIA and the Environmental Impact Report - RIMA, submit to the approval of the competent environmental organ, a degraded area recovery plan (BRASIL, 1989, 1p.).

In both cases it is determined that the recovery purpose should be to return the degraded site return to a form of use, according to a plan pre-established at the time of the activity licensing, however "it should be object o specifical authorization if there is intervention in permanent preservation areas and in native vegetation" (SÃO PAULO, 2006, p. 1).

In order to comply with the applicable legislation, especially concerning the procedures related to environmental damages repair, the IBAMA Normative Instruction 04 (2011) decides:

> Art. 1st. To establish procedures for the preparation of the Degraded Area Recovery Project PRAD [...] §2º. PRAD should gather information, diagnostics, surveys and studies that allow the assessment of the degradation or change and the consequent definition of the appropriate measures for the area recovery (BRASIL, 2011, p. 1).

For the guidelines analysis, it is verified that the minimum content depends on the PRAD scope, which can be simplified for small properties and family rural properties or for medium and large rural properties when the altered areas are of smaller size or equivalent to small properties (BRASIL, 2011). However for any purpose, PRAD must propose measures that assure the protection of the areas against factors that can make difficult or prevent the recovery process. In addition, the plan needs to pay special attention to the protection of the soil and the water resources and, if necessary, also control erosion techniques. However, specifically for the mandatory recovery situations, PRAD must be prepared according to a term of reference and accompanied by cadastral documents and georreferenced information (Figure3).

In the proposals of direct implantation of seedlings, seeds or other propagules, the native species from the regions should be used, and the definition of their number and of the individuals per hectare should take into account published researches, technical information and the available regulation acts, aiming at the greatest possible diversity and the

compatibility with the local phytophisiognomy.

It is emphasized that in the farmer family property or ownership, the rural family entrepreneur or the traditional people and communities, may use the Agroforestry Systems (SAF), ways of land use in which wood species are cultivated in consortium with herbaceous species or animals, with benefits resulting from ecological and economical interactions. Monitoring should take place during some years after the PRAD implantation, through regular reports for the evaluation purposes (please see conclusion phase in Figure 3), except for the small rural owners or legitimate holders of rural family ownership, who are exempt from this obligation.

On additional basis, in Municipalities of São Paulo the procedures of the federal regulations concur with those defined by the resolutions from the State Secretary for the Environment (SMA), among which stand out the Resolution SMA 32 (2014), which revokes previous guidelines, in particular, given by the Resolutions SMA 21 (2001), 47 (2003) and 08 (2008), denoting not only the constant transformation of the conceptual aspects, but also of the operational practices guidelines.

According to the regulations in the São Paulo State, PRAD may establish strategies such as the planting of seedlings or techniques as the nucleation, direct sowing, induction or conduction to natural regeneration, which concerning the maintenance practices must consider: the areas protection, eliminating the factors that prevent the plants survival and growth; the control of problem species; areas improvement, prioritizing the endangered and zoocoric species. (SÃO PAULO, 2014).

As a minimum content, the PRAD must include information about the physical environment, the occurrence of natural remnants in the region, the surrounding area occupation and use, the degradation history, the methods for elimination of the impending factors and for the conduction of the natural regeneration process, in addition to the maintenance practices for the recovered area.

In the Figure 4 analysis below, it should also be described how the recovery monitoring will be carried out, considering the establishment and development of the forest cover, the increase of the species richness, the evidence of erosion processes (silting, furrows, ravines, gullies etc.), as well as the occurrence of disturbances (anthropic or natural).

As for the property environmental regularization, the main demands deal with the recovery of the especially protected areas, particularly the areas of permanent preservation (APP) and legal reserve

(RL), for which the Normative Instruction MMA 5 (2009) set the applicable procedures (BRASIL, 2009), with supplement by CONAMA Resolution 429 (2011) that deals specifically with the preservation areas considered as social interest (BRASIL, 2011).

Figure 4 - Scope and operational procedures of a reclamation plan
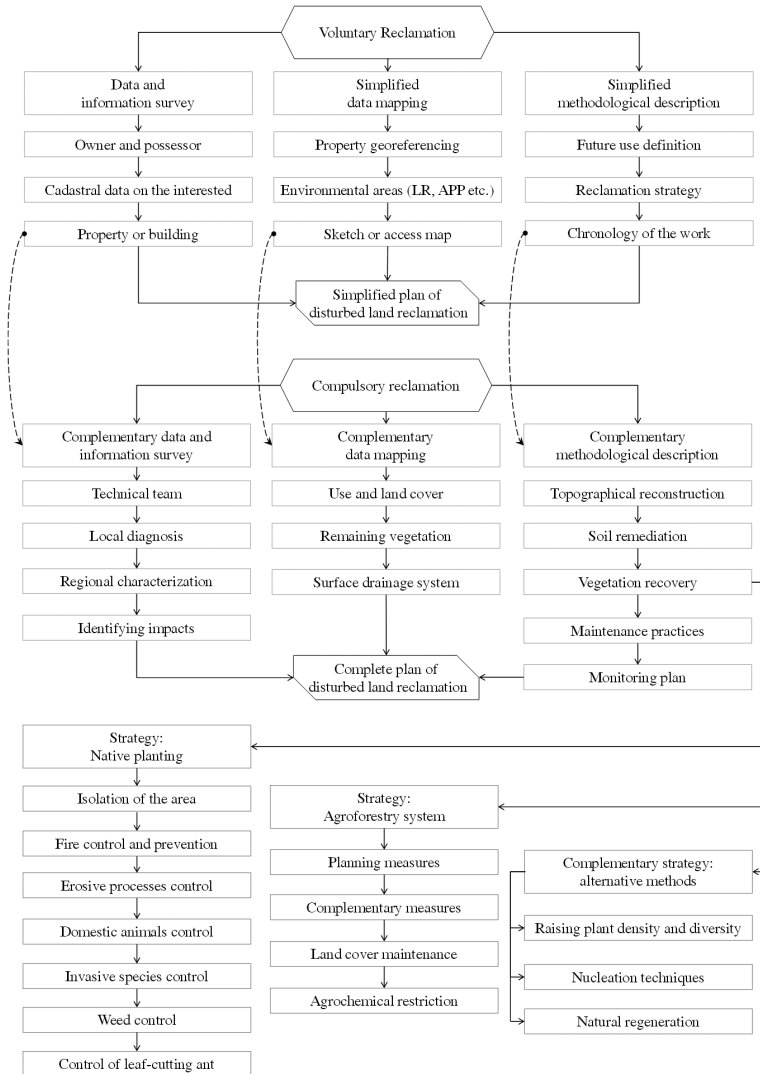
According the regulations from the Ministry of the Environment (MMA), the APP and RL recovery does not depend on prior authorization from the competent environmental organ, but can be communicated to this, providing the basic information as the property owner data and the property or possession data; the property and the areas to be restored georreferenced localization; as well as the simplified recovery methods to be adopted, including the implementation chronogram. However, in the non-voluntary recovery cases, that is, those arising from licensing submission, compliance with legal obligations or conduct adjustment, the PRAD must be previously approved by the competent organ. In these cases, the plan should be supplemented with mapping and characterization of land use and cover, remnants of native vegetation and natural surface drainage network in the area to be reclaimed

The methodology presentation and justification are also required, including the quantity of native species to be planted and the proposal for the natural recovery process implementation. Practices for preventing degradation factors, such as area insulation or enclosure, fire prevention, invasive vegetation competition, erosion control, should also be reported. Finally, the plants threatened with extinction in the region, as well as the maintenance practices in the recovered area and the implementation schedule should be previously approved in the environmental organ.

If the induction and conduction of the natural regeneration is proposed, the number of the species and individuals per hectare (planted or germinated) should be values close to those of the local phytophisiognomia, considering the increment of new plants starting from the regrowth.

As strategy for area maintenance, in the case of planting native species in line, the interweaving may be occupied by exotic herbaceous species of green manure or by annual crops, at most until the third year of implantation of the PRAD, which must be monitored for at least three years, although the competent organ may assess its effectiveness at any time.

Thus, the regulation foresees that the APP and RL recovery can be both through natural regeneration and planting native species (seedlings, seeds, cuttings, etc), in an isolated or conjugate way, as well as with the use of the SAF. However, dealing with APP, there can be no impairment of its environmental structure and functions, particularly: the stability of slopes and the banks of bodies of water; maintenance of flora and fauna corridors;

maintenance of drainage and water courses; biota maintenance; and waters quality maintenance.

In the case of the recovery of the social interest permanent preservation areas it should be observed the methodology disposed in the CONAMA Resolution 429 (2011), however it adopts the same guidelines established by the MMA regulation, whose minimum requirements are summarized in the Table 3.

Table 3 – Synthesis of the minimum requirements according to the recovery strategies

RAD Measures of implantation, maintenance and monitoring	Strategy		
	Natural Regeneration	Native Planting *	Agroforestry system
Protection with area insulation or enclosure	X	X	X
Control and eradication of ruder and exotic invasive vegetation species	X	X	X
Measures of prevention, firefighting and control	X	X	X
Preparation of the soil and erosion control	X	X	X
Prevention and control of domestic animals access	X	X	
Conservation and attraction of seed dispersers native animals	X	X	
Crowning, weed control, cutting ants and fertilization		X	X
Compatibility with local phytophisiognomy		X	
Space distribution considering functional groups		X	
Maintenance of the native physiognomy, maintaining land cover			X
Establishment of 500 individuals/ha with 15 perennial native species			X
Limitation of agrochemicals use, prioritizing green fertilization			X
Restriction of the area use for grazing domestic animals			X
Ensure the maintenance of the preservation area environmental function			X
Consortium of non-invasive perennial species, native or exotic, for the production and collection of non-timber products			X

*whether conjugate or not with the natural regeneration.

Ultimately, although the ABNT Resolution 13030 (1999) does not represent mandatory legal disposition, it provides technical subsides that enable the enterprise environmental management, and can be voluntarily adopted without prejudice to the compliance with the applicable legal determinations (BRASIL, 1999). Some orientation can be highlighted, concerning differences between this regulation and the above discussed guidelines. Using widely the local constitution and behavioral characteristics is one of the relevant particulars, aiming at the economy and effectiveness, as well as the area future performance. Another relevant diferential is the evaluation of the environmental impacts and effects in the implementation, operation, abandonment and deactivation phases of the enterprise in the areas under its direct and indirect influence.

CONCLUSION

From the regulations discussed above, it was verified that the environmental recovery is widely normalized, both in the federal and the state of São Paulo, addressed in this study given its relevance as a reference of supplementary legislation in the national scenario paulista. In this sense, it was verified that the environmental recovery legal regime has sought its effectiveness through the conditioning for the regularization of properties, as well as for licensing environment-changing activities. In addition, with no prejudice to the other applicable sanctions, environmental damages repair is also one of the main requirements of the regulatory regime.

Thus, the results achieved corroborate the hypothesis that the recovery of degraded areas is among the main strategies of the environment public policies in Brazil. On the other hand, it was also seen that, in addition, this number of regulations still lacks some alignment, both in the conceptual-theoretical aspects and the operational procedures that are constantly changing.

Therefore, considering the moment when Brazil is preparing a new Forest Code, the hope is that the systemic and multidisciplinary approach, presented herein, may contribute for reducing the existing gap between the technical-scientific and the legal components, as well as for the debate and mobilization needed to harmonize the applicable guidelines to the environmental recovery as strategy for sustainability.

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