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Model of Water Environmental Planning Seasonal

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Abstract

The current paper sumarize the first results of the research that promotes the integration of the environmental planning in the integrated management of the resourses (IWRM) a model that includes the future possible events and the adaptation to climate changes, focus on improving the main restrictions and distortions associated to the low articulation in the instruments of command and control, lack of regulations and normativity, frequently biased application of planning instruments not including the aspects of randomness of the weather taking the decisions with characteristics under a Seasonal model of Hydric Environmental Planning (SMHEP) to hydric watersheds, which propose a new paradigm of planning focus on four objectives: 1)Protection of vulnerable aspects; 2)Reparing the damage components; optimization of the uses of the land to minimized environmental burdens and prevent the burdens related to the wellness and human health.

Keywords: Environmental Planning of the hydric resources. Weather variability.

INTRODUCTION

To organize a territory, include the environmental variable represents assure in the time the quantity and quality of natural resources renewable and nonrenewable, also the

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environmental services available itself, and for that reason have an environmental rule stablish a vector of environmental sustainability of the territory and the vector is in the politic, the environmental planning helps the strategies organizing the system a desired system, logical and flexible, it means, and instrument to guide actions and criteria of the management or the sustainable use of the territory (Vega L. , 2002; Wernes, 1995)and build spaces, subjects and territory in a simultaneous way.

In this regard, planning the order of the environmental dimension, stablishes a qualitative and quantitative knowledge of the composition of the ecosystem and a rationality and also the efficient use of resources, in terms of potential, edges and characteristic of the environment as a base of functionality of the natural system (Wernes, 1995), with this can take decisions in a collective way of actors binding over the environment to avoid unacceptable mistakes and exist a sustainable development integral of the territory in the framework of reference which stablish the rules and specific measures of intervention (Leitmann J. , 1999; Millar D. , 2005; Sheila S. , 2004; Rivas, 2002).

Focus on the systemic level, is necessary to understand the environmental order of the territory considering the land problems by a global point of view for that reason needs to know, stablish and value the natural resources to organize the territory analyzed, by a environmental land diagnose and the analysis of the environmental land equilibrium, then realize and evaluation of the environmental consequences of the territorial allocation of activities by the environmental variable in each item of development, specially planning land process and seasonal (Conesa, 1997). By the other side, the seasonal environmental order points to the rationality of the seasonal investment by the criteria of environmental sustainability in all sectors of high environmental impact in the development of its activities (Vega, 2001). In important to mentioned that exists other instruments like the strategic plan of environmental management (Politics, environmental strategies to be develop in each territorial jurisdiction and has three main elements: diagnosis environmental land assessment, strategic solutions and mechanisms of tracing and evaluation) and the environmental action plan (operative instrument and compromise and environmental execution of the strategic solutions and has three main elements: environmental land diagnose, strategic solutions and mechanisms of tracing and evaluation (Gómez, 1980).

Related to this, should present a process of articulation and harmonization between the environmental planning, the land ordering, the land environmental order, the sectorial planning and the integral development planning and the strategic order in the territorial scope, sectorial and environmental sectorial and environmental, for this is necessary to know the sociocultural characterization, economical and biophysical, Specially this last to determine potentials by the base line of the natural resources, the pressure (by the use and deterioration) the characters and the balance of the offer and demand of the resources (thecnical criteria, standards and current regulation) (Vega, 2001; Ortega, 1994). The process and planning consists on stablish a sense of direction to a group of decisions and a proper environment for an accurate management and get the wished and possible changes, related to the activity in the future (Saavedra, 2001; Molins, 1998; Cuesta, 2012); and the strategic planning is related to the objectives (wide statements and reasonable to get in real and period of time) and strategies (actions to

get the objectives). In the enterprise, the environmental planning is a rational process for the decision making about what to do, it has the mission to guide the environmental performance to the environmental management, through the principles of systems of environmental management, plan and business environmental assessment.
The environmental planning in the state level, is like a rational process in the decision making to behave in the in environmental matters through the environmental management, through the principles of; policy harmonization and normative regulation (understand the environment by a global and integral, implies to be develop by the harmonization of the environmental policies, the normative regulation and cooperation and international negotiation); the control and institutional process (guaranty the maximum possible harmonization between formulation the public politics and its execution); the institutional strength (which design, define and develop each one of the instruments of the politics, including the coordination and articulation); planning and Strategic Environmental Assessment (including the environmental dimension in the ordering process, territorial development and sectorial, which include the land use planning, environmental land management and sectoral environmental management (Vega, 2001).

METHODOLOGY

The type of research applied to this job, is the exploratory type, in which inquiries about everything that already existed, exists, or could exist in the theme of environmental planning and the relations with the hydric watersheds and planning the management of the integral management of hydric resources, also has the object precise the comprehension, identify synergies and limit the theme analyzed (Hurtado J., 2000). Depend of the time of occurrence of the facts and the register of information related with this subject of study, the type of research applied is also consider as retrospective, with the propose of getting fundamental knowledge (Vergel G., 2010). The information collected (Study of special literature) has been categorized and classified depend on the structure and correlation that exists between the environmental planning and the relations with the hydrographic watersheds and planning the integral management of the hydric resources.

DEVELOPMENT

It is important to mention that exists a difference between the environmental management and environmental planning. The first is the group of activities leading the integral management of the environmental system; while the second should be understood as a continuous process of transformation of information the information in knowledge and take the decisions related to the environmental situation of the geographical space, able to guide the development in the framework of sustainability that enegize and environmental policy (Sheila S. , 2004; Millar D. , 2005), nevertheless both, stay integrated in the context of the environmental policy, territorial development and sectoral policies.

Related to the environmental management focus on the systems of productivity or products, has proposes on minimized environmental impacts in the process itself of production but with a clear focus in the management of the cycle of the product, in some cases limited the cycle of the life (Raw materials, suppliers, processes, products, emissions and waste) adapting decisions and strategic objectives. In general focus on production systems or products, mainly sometimes solve problems and environmental themes immediately in the short term, for that reason the rationality of investment in terms of environmental costs or do not invest on this, lack of strategic direction on environmental themes and the wrong conception to take apart environmental problems well known or planned punctually and not integral in the environmental management (Harrison L., 1996).

For that reason, could happened several steps of maturation of the environmental planning, that could be of reactive type (resistance to accomplish the environmental normativity till being obliged), responsible (focus on the past with the environmental information and then gives a vision retrospective of the system related to the accomplishment of the environmental regulations), proactive (manage the environmental themes creating scenarios about themselves, also some which are not regulated) and competitive (manage the environmental aspects with a competitive approach). This exposes a change of traditional way to manage the environment and the way to apply this. Also could exist different options for the applied environmental management to systems of production or products, consider in the long term, medium term and short term according to the strategic plan adopted, but are based on interesting application to take decisions according to the knowledge and information in the process, activity, project or services.

In the options of environmental management could mention:

a- The analysis of environmental risk, which could evaluate ecological risks and real impacts caused for specific sources of diffuse pollutant, in a qualitative analyze and criteria of probability of risks that could appeared in adverse situations.

b- The study of the environmental impact assessment, which is used to estimate environmental changes generated in a specific project, considering the environmental effects generated by an specific project, which is vulnerable to an environmental license, also could be an useful tool on taking the decisions related to the investment in the infrastructure, because reduce the environmental costs and contribute positively to the sustainable development (CAF, 2009);

c- The environmental audit, is a systemic process, objectively documented to verify, evaluate evidences and determine specifically that environmental aspects, events, conditions, systems of management the information, according to the criteria previously defined.

d- The evaluation of the environmental performance consists on making an internal audit to measure, evaluate and verify the environmental performance, to several activities in the organization.

e- The substance flow analysis is used to balance the flow of a specific substance during the life cycle, including the production and the use of itself, to improve the environmental quality through the measures of control and reduction.
f- The analysis of the material and energy could be understood as a pioneer of the analysis of the life cycle, but differences of the other cause this one use the algorithms to quantity all the materials and energies input and output of the system in the study, to let it be evaluate in an specific step or period of the life cycle of the product, to interpret the impact in the environment caused by several emissions;
g- The integrated substance chain management, is the pioneer of the analysis of the life cycle simplified, which consists on comparing different options with respect to certain environmental and economical improvements in the system.
h- The product line analysis is very similar to the life cycle, but presents and wide spectrum of analysis, cause it incorporates economic and social aspects; this tool is conceptually correct but it is not practiced;
i- The life cycle assessment, which identifies the resurses used and generated to which are generated issued to environmental vectors (water, air and land) along everything the life cycle of an asset or specific service (de Carvalho F 2001)

Even though, the planning momento and specially the land environmental dimensión needs to transform the information in environmental knowledge in the territory; it means, when the system is complex and changes in the time, for that reason, the formulation to take the decision is needed to limit the characters. (Do not take decisions cause receive and give information) agents (take decisions cause it is cognitive) planning objectives and strategies, to preserve and or modify accurately the environment (Yan, 2015; George, 2011; Hillman, 2012). This last conduct to the environmental planning which has a transversal vision and also intersectional about a territory, that built with the base of widely known of the dimensions of the territory (characters and the interrelation) and the physical, natural attributes built itself, it means, a dynamic equilibrium represent as an environmental sustainability, minimizing the environmental burdens and conflicts by the use of resources of the characters.

Strategically, have been realized the integrated management planning of the hydric resources as one of the resources that produce mayor conflicts, to stablish a balance between the ecological capacity of the offer of the environmental goods and services the ecosystems and the demand of themselves, and the compatibility of the activities realized around the water bodies and mitigate possible effects in the long term (Monzonís, 2015), this last indicates that is required a deep comprehension of special value of the water to the human life, the interaction of the human being with the nature and the social importance of the hydric resources for the regional economic development (Safavi, 2015; Zhang X. , 2008; Mariño, 2001). the Integrated Water Resources Management (GWRM), begins with the conference of the United Nations (ONU) about the human environment in Stocolm in 1972; In 1992, in the ONU summit in Rio de Janeiro, reforce the concept by the agenda 21 (Meire, 2008; Porto, 2008; Coelho, 2010; Xie, 2010; Dukhovny, 2005). One approach of the integral management of the hydric resources (under the premise that they are finite) to manage and develop

these resources in a sustainable and balanced way, taking care of the social, economic and environmental interests, recognizing the different groups of interests that compite between themselves, the sectors that use and abuse of the water, the needs of the environment (GWP, 2009). Includes the possible future effects and adapt to the climate change (García M. , 2012);this has an important function in the ecological way, public health, socioecological impacts, of contamination and the mechanisms of command and control.

Adicional to this, the planning and integral management of the hydric watershed, as a territorial unit, structural and functional to delimit objectively transformations, flow and ecological process, biophysical and socioeconomic and cultural, that will allow to name it as a unit for a better explanation of the Land use planning, taking the best advantage of the information available and the biophysical, economic, technological and sociocultural potential (Vega, 2001; Ortega, 1994; Clark, 1986; Dourojeanni, 1989).

Also the management of the hydric resource with the sectoral approach do not respond to the needs of the society, against it, would exacerbate the crisis of the water increasing the social risk associated to the distribution spatio temporal of itself. Responding to this, arises the building of a new model of multipurpose management sustained in conductive actions to the planning and integrated management of the multiple uses (García M. , 2007). This last guide a characterization on: definition and allocation of the uses and priorities of the water (plan of sub- watershed, local plan of management of aquifers, local plan of the water allocation in the districts of the users of the water, local government plan); Instruments of implementing (management plan local scale or basin) and the politics (national and international process to develop actions, treatments and laws of the water). And in this planning, the spatial unit of the hydric planning named Hydric watershed (GWP, 2009), exposes the equal characteristics in the physical, environmental and as a hydric resource, looking for guaranty the sustainability of the hydric resource in terms of the use, control and protection of themselves (Pilar, 2011), by the knowledge of the interactions between the ecosystems and the hydric process which depend on the hydric offer to quantify the quantity of water for the different uses, including the water required to s keep the ecosystems.

Even though in general the planning of the hydric resource is a dynamic process, interactive and complex defining in the objectives; minimizing the conflicts between users, jurisdictions and or successive generations; The prevention of the risks associated to the excess or lack of water; the protection of the quality of the superficial water and subway water; assuring the hydric offer; looking for the balance between the availability and exploitation of the hydric resources under the rules of sustainable development; and the prevention of the process of contamination and Environmental degradation that could be irreversible (Schreider, 2011). In the other side, the manage of the hydric resource under the premises of the sustainable development; and the prevention of the process of contamination and Environmental degradation that have been fragmented and little integrative, this generates problems and negative externalities (waterbody pollution) and, environmental imbalances in the systemic

order of the watershed, especially when the management is not articulated with the environmental dynamic and the behavior of climate variability seasonal (IPCC, 2008); this causes a weak model of relations of actors and agents, because the low satisfaction of the demand of the water by different type of users and agents, then this increase the conflicts by the use and alters the quality of the water which became compromised even more for the climate variability (IPCC., 2014). Cause the water is a scarce and shared resource (several times uneven distribution), the characteristics of the use generates conditions of environmental unsustainability, cause the exploitation does not focus on the conservation of the resource and this will be submit to a high pressure and consequently, are the result of the lack of process of planning and ordering the hydric watersheds.

Interpreting the priorities of the sustainable development of the sustainable structures in the territories evidence disequilibrium in three dimensions of itself (social equilibrium, economic growth and environmental sustainability), cause de bad articulation between institutions of the state with the environmental competence, this produces a lack of ordering process and land planning and the environmental assets , what implies the need of redefinition of the model of relations to an specific that carries the representation and transformation of the intial state, based on the knowledge and domain of the attributes and dimentions of the territory.

The problems identify in the national system National Environmental System of Colombia (NESC) could simplify at this way: dislocation and low capacity implementing the environmental policies in all levels; lack of mechanisms and instruments to control the institutional management; functional dislocation, jurisdiction, sectorial and environmental; asynchrony in the formulation and execution of the ordering and environmental plans by several characters, whose present strategic and operative solutions incoherent; lose of institutional memory and others (Vega L. , 2001). Also exists the environmental planning of the hydric resource an environmental imbalance in the systemic order of the hydric watershed, not articulated with the environmental dynamic not the seasonal behavior, causing a model of relations between actors and weak agents, that increases the conflicts by the use and alters the quality of the water, generates the environmental unsustainability, that is seen by the lack and inefficient planning and ordering of the hydric watershed.

According to the above, the inaccurate decisions in the Integrated Water Resource Management (IWRM), also the information and the knowledge of the hydric watersheds, damage by the little articulation on the instruments of randomness of the weather on taking the decisions and frequently biased application of planning instruments, changes the factors that distort the management of the water in our territories. For that reason get a Water Environmental Planning model Seasonal (WEPMS) for hydrographic watersheds exposes a new scheme or paradigm applied in all hierarchical structures in the Model of Seasonal Environmental Hydric Planning (MSEHP) for hydrographic watershed exposes the new scheme or paradigm applied in the hierarchical structures between the Management Plan and Management watershed

(MP/MW) and the land use planning, in terms of areas, zones and levels applied to every aspect of watershed; this last, understanding that the Environmental Land Management (ELM), as an instrument of environmental planning (EP), which is a type of of planning oriented to the operability of four general objectives of the environmental policy; The protection of the components especially vulnerable or consider valuable for the society; the repairing of components or damage areas; The optimization of the uses of the land to minimize the environmental burdens and prevent and discharge related to the wellness and human health (Aronoff S. , 1989; Brilhante, 2003; Leitmann J. , 1999; Millar D. , 2004; Sheila S. , 2004; Sujual, 2015)
This last take care of aspects like: Studies of the environmental impact of the anthropic activities, the planning of protected areas, actions of decontamination, the environmental contributions to the urban planning and the land use planning and the sectorial planning to protect and repair several components (recuperation of rivers and water bodies, management of biotopes, systems of green areas, etc). that conventionally includes the environmental dimension (ED) and the protection, manage and order of the hydric watershed (PMOHW) (OEA, 1978; López, 2012; Villavicencio, 2011). This analyses the inventories of the Superficial Hydric Resource (SHR), influenced by the population that press the hydric watershed by socioeconomic activities of the municipalities (M), zones of protection of forests on the Water births (ZWB), the actions of protection of the hydric watershed (PHW) and the offer and demand of the hydric resource (ODHR), generates this (Rodriguez, 2014):

If $\mathrm{OAT\ f\ (PA)\ y\ PA\ f\ (PMOCH, DA)}$, could consider a representation of $\mathrm{CH} = \{\mathrm{IRH, M, ZPB, APCH, ODRH}\}$. Could realize an approach of the MPAHE considering $\mathrm{N} = \{\mathrm{PTRAM, CA, EA, CH}\}$ where CA is the environmental burden and EA is the environmental effect. Integrating the seasonal climate variability (SCV), cause it is consider that exists regists of data of precipitation between 6 and 12 months, and stablish a medium term plan (Ruiz, 2009; Zuñiga, 2012; Costa, 2007) the resolution per month of precipitation in the model considers an impact of changes and significant analysis of the phenomena (García M. , 2012).

Also considers a qualitative variable named Disturbance (Per), this last is consider as a variable consider as a variable controlled and measured, that affects adversely the value of the output of the system. In the quantification, measure consists on knowing if the hydric watershed have the policies of integral management of the hydric resources, land use planning and management of the hydric watershed, control of emergent pollution, development municipal plan, control on the health factors for the exposition to hydric contaminants and affects the productive sector. Stablishing that VCE is a function of the hydric watershed, which proves and validate if $\forall(VCE, CH)\colon PAHE(CVE, CH)$, can be an accurate in the hydric watershed and an interrelation of the environmental dynamics.

For that reason can plan objectives of analysis like:

- Identify and analyses factors in the integral scenario, that influences in the behavior of the plants of municipal wastewater treatment (PMWT) in terms of variability

like: Flow (Q), DBO_5, SST, N NO_2, P total, charge of sludge (CS), electric energy consumed (EEC), emission of CO_2 (ECO).

- Analysis of the information of the hydric watershed of the quality of the water DBO_5, SST, N NO_2, P $_{Total,}$ information of precipitation (P) and disturbance (Per).
- Related to this last, integrates in a $MPAHE\ f\{Q, DBO, SST, N\ NO_2, P_{total}, CL, EEC, ECO, P, Per\}$ stablishing the problem as the whole not partially. For that reason, considers the interrelationships with the environmental dynamic of the hydric watershed in the scalable and integrated way.

With the seasonal hydric environmental planning could disposes an input to guide patterns which allow to have a concurrent appreciation of the standardization of variables equivalent to the environmental quality, considering the interval of $0{,}8 < \mathrm{CA_i} \leq 1$ the state or quality of the hydric resource is very good; the interval of $0{,}6 < \mathrm{CA_i} \leq 0{,}8$, is good; the rank of $0{,}4 < \mathrm{CA_i} \leq 0{,}6$, is regular; the rank of $0{,}2 < \mathrm{CA_i} \leq 0{,}6$, is bad, the rank of $0{,}0 < \mathrm{CA_i} \leq 0{,}2$, is very bad.

This last will be useful as a collaborative model of management (Zhong, 2015)eto map the management of the resource(provide the sustainability of the natural resources and keep the hydric resource) with the propose to provide information on taking the decisions (considering the available data, possible options and logical process (Heizer, 2007)); reduce the local impacts in the watershed; establish conditions and critical areas of the water bodies; incorporates new technologies to control the contamination, adaptability along the time (20 to 30 years) In terms of territory, climate context and regulatory.

Everything generates a model of accurate intervention in the hydric watershed considering it as a natural complex system and empiric (exosystemic service) and of adaptability to the climate variability; the measures of intervention in the water body could be simple or complex, of tracing and control, to apply the technologies and the investment needed to improve or keep the hydric resource, could be;

- Strategic; imply answers in the medium and long term. In general, with investment, in the construction of treatment plants of sewage water, installation of devices to reduce the water contamination for several reasons (negative externalities) implantation of reuse of the water and more, in the hydric watershed with a vision of sustainability of the territory.
- Tactic: Represent the answer in the short term. These last are measured to promote a culture in the control of the contamination, to accelerate process of development of the infrastructure planned in the hydric watershed.
- Emergency: Are associated to the appearance of circumstances unexpected by events of contamination that are out of the normative compliance and generates temporary restrictions or occasionally in the use of the resource of the hydric watershed.

CONCLUSIONS

Is to accept that the water management in Colombia does not respond with the sufficiency to the own concepts of the Integrated Water Resource Management (IWRM) what is written and distorted by the precariousness of the instruments of command and control, the insufficiency in the normativity and reglamentation, the exclusion of the aspects associated to the instruments of planning. It is evident the addition to the environmental dimention that in the land use planning assures the quantity and quality of the removable natural resources and not removable in the time and allows to stay balanced of the environmental services available in itself.

For that reason the environmental policies establishes a vector of environmental sustainability of the territory and in this last the environmental planning helping the strategies themselves of the order of the wished system, logical and flexible, it means an instrument to guide actions and criteria in managing or using sustainability of the territory. Is acceptable that the water is a scarce and shared resource (several times with an unequal distribution), the characteristics of the current use generates environmental unsustainability, cause the exploitation does not prevent the conservation of the resource and this is pushed under high pressure, consequently, are the result of the lack of planning process and ordering of the hydric watershed, for that reason is needs change on the traditional guide of the environmental manage and then in the practical way.

The Environmental National System in Colombia (ENS) evidences a group of problems that limit the possibility of an efficient integral management of the hydric resources, which summarize on: not articulation and low capacity implementing the environmental policy in all levels; lack of mechanisms and instruments to control the institutional management; without functional, jurisdiction, sectorial and environmental articulation; asynchrony in the formulation and execution of the ordering plans and environmental plans by several actors, whose represent strategic solutions and operationally incoherent; losing the institutional memory.

The environmental planning of the hydric resource characterizes by the existence of the environmental structural imbalance in the systemic order of the hydric watershed, which is not articulated with the environmental dynamic either the seasonal behavior, causing the weak relations sometimes troubled between the characters and agents, which alters the quality of the water generating and environmental unsustainability, everything named by the lack and inefficient planning and ordering of the hydric watershed, The proposal of the Water Environmental Planning model Seasonal (WEPMS) to hydric watershed exposes a new paradigm or scheme applied in the hierarchical structures in the Land use plannig and management of the hydric watershed (POMCA/POMCH in Spanish) and the territorial ordering in terms of areas, zones and levels applied to every aspect of watershed; this last, means that the Environmental Land Management (ELM), as an instrument of Environmental Planning (EP) which is a type of planning orientated to the operation of four general objectives in the environmental planning; the protection of the components and aspects specially which

are vulnerable or estimated as valued by the society; the repairing of components or damage aspects; the optimization of the uses of the land to minimize the environmental burdens and prevent and discharge related to the wellness and human health.

Integrating the seasonal climate variability (SCV) as a new a proposal, developing the (MPAHE singlas in Spanish)considers the impact of the changes and the significant analysis of the rainfall take care of; the studies of the environmental impact of the anthropic activities, the planning of protected areas, actions of decontamination, the environmental contributions to the urban planning and the land use planning and the sectorial planning to protect or repair specific components or areas (recuperation of the rivers and waterbodies, management of the biotopes, systems of green areas etc). that conventionally includes the environmental dimention (ED) and the protection, management and order of the hydric watershed (PMOCH).

Analyses the inventories of the hydric superficial resource and subway resource (IRH), the influence of the population that pressure in the hydric watershed by the socioeconomic activities in the municipality (M), and the protected zones of forest, water birth, the actions of protection in the hydric watershed (APHW) and the offer and demand of the hydric resource (ODHR). This model of integral management of the hydric resource provides information to take decisions and reduce the local impacts in the watershed; stablishing conditions y the critical areas in the water bodies; incorporating new technologies to control the contamination, adaptability by the time (20 a 30 years)in terms of territory, context and climate variability and the regulatory frameworks.

Everything generates a model of efficient intervention about the hydrographic watershed, mind while the complex system and the capacity of responding to the climate variations, addressing the measures of intervention of the body of the water that could be simple or complex, of tracing and control, technological and investment of optimization of the hydric resource;

Strategies (answers in the medium and long term); tactics (responses in the short term); the Emergency (related to unexpected circumstances).

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