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FIRE MANAGEMENT: MULTIPURPOSE TECHNICAL CADASTRES, CONSTRUCTIVIST MULTICRITERIA DECISION AID APPROACH, AND GEOGRAPHIC INFORMATION SYSTEMS. CASE STUDY OF CHAPADA DOS GUIMARÃES, STATE OF MATO GROSSO, BRAZIL

Gestão de incêndio: cadastro técnico multifinalitário, metodologia multicritério de apoio à decisão, sistemas de informação geográfica. Estudo de caso na Chapada dos Guimarães, estado do mato grosso, Brasil

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ABSTRACT

The discussion about forest fires has been increasing significantly in recent decades. Due to nature of land occupation, that was quickly, loosely, and disorderly, without preventing impacts to the environment, coupled with a history of political motivations, and actions within a geopolitical framework, the result is a land without adequate care, in especial related with fire. On the other side, actions to manage this situation in relation to fire have led to create a State Committee for Management of Fire. However, political interference, different point of views of this problem has conducted to poor results, due mainly lack of land knowledge and to interest conflicts among its members. This research was aimed at applying a Multicriteria Decision Making Support Model for the Management of Fire in Chapada dos Guimarães Environmental Protection Area-State of Mato Grosso, Brazil. Much of the situations related to fire management, involving the selection of alternatives, events or strategies of actions, especially preventive might be the main focus. Therefore, in the organizational context, are increasingly attracting more concern for fire management. The actors of the State Committee for Management of Fire usually have conflicting views and different value judgments. A Methodology Multicriteria Decision Support together with Constructivist approach appears as an option for these differences are identified, understood and integrated. The instrument of intervention used was the MCDA-C methodology linked to the Multipurpose Technical Cadastre and the Geographic Information System. This coupled methodology allowed the identification, organization, measurement, and integration of different points of view materialized as criteria. The result of the constructed model allows the decision makers of the Fire Management State Committee to visualize the picture and to establish action priorities in the criteria identified as relevant for the success of the organization. The figure that presented a higher susceptibility by area of interest were: Area 1- Anthropic Aspect (scenario 5); Area 2 - Physical Environment (scenario 6); Area 3 - Biotic Environment (scenario 7). In the general scoring, the most susceptible scenario is number 9.

Keywords: Multipurpose Technical Cadastre, Fire Management, Geographic Information System, Support the Decision.

RESUMO

A discussão sobre os incêndios florestais tende a aumentar de forma significativa nas últimas décadas. Devido à natureza da ocupação do solo, que foi rápida, e vagamente desordenada, sem impedir os impactos ao meio ambiente, juntamente com uma história de motivações políticas e ações dentro de um quadro geopolítico. O resultado é uma terra sem cuidados adequados, especialmente relacionados ao fogo. Por outro lado, as ações de gerir a situação em relação ao fogo levaram à criação de um Comitê Estadual de Gestão do Fogo. No entanto, a interferência política e diferentes pontos de vista desse problema têm conduzido a um mau resultado devido, principalmente, à falta de conhecimento da terra e de conflitos de interesses entre os seus membros. Esta pesquisa teve como objetivo a aplicação de um modelo de tomada de decisão Multicritério de Apoio para a Gestão do Fogo em Gestão Ambiental na Chapada dos Guimarães - Estado-Área de Proteção de Mato Grosso, Brasil. Grande parte das situações relacionadas com a gestão do fogo, envolvendo a seleção de alternativas, eventos ou estratégias de ação, especialmente preventivas, poderia ser o foco principal. Portanto, no contexto organizacional, estão atraindo cada vez mais interesse para a gestão do fogo. Os atores do Comitê Estadual de Gestão do Fogo geralmente têm visões conflitantes e juízos de valor diferentes. A decisão Multicritério Metodologia de Apoio, em conjunto com a abordagem construtivista, aparece como uma opção para essas diferenças serem identificadas, compreendidas e integradas. O instrumento de intervenção utilizado foi a metodologia MCDA-C, ligada ao Cadastro Técnico Multifinalitário e do Sistema de Informação Geográfica. Esta metodologia aliada permitiu a identificação, organização, avaliação e integração de diferentes pontos de vista materializados como critérios. O resultado do modelo construído permite que os tomadores de decisão do Comitê de Gestão de Fogo Estado visualizem os cenários e estabeleçam prioridades de ação nos critérios identificados como relevantes para o sucesso da organização. Os cenários que apresentaram maior susceptibilidade por área de interesse foram: Área 1 - Aspecto Antrópico (cenário 5); Área 2 - Ambiente Físico (cenário 6); Área 3 - Meio Biótico (cenário 7). Em geral, o marcador, o cenário mais susceptível é o número 9.

Palavras-chaves: Cadastro Técnico Multifinalitário, Gestão de Fogo, Sistema de Informação Geográfica.

1. INTRODUCTION

The discussions about forest fires have been increasing significantly in recent decades, according to Pereira and Setzer (1996), Soares (1994), Costa (2004) and Batista (2004), among others. This research aims at the implementation of a model of Management of the Fire, where the major forest fires are the main problems, in the large natural surfaces or grown in Chapada dos Guimarães Environmental Protection Area - State of Mato Grosso, Brazil.

From this perspective, this research turns out to the creation of future fire figure, in order to identify them in their susceptibility, presuming actions. Much of the decision-making situations related to fire management involve the selection of alternatives, events or strategies of actions, especially preventive, organizational context, are increasingly attracting more concern for fire management.

In this context, the great challenge of Fire Management is to deal with analytical and systematic by appeasing and trying to solve the conflicts among the State Committee for Fire Management members. The actors of the State Committee for the Management of the Fire have, generally, conflicting points of view and different value perceptions.

The Constructivist Multicriteria Decision Aid Approach (MCDA-C) appears as an option in order to such differences could be identified, understood, and integrated. This initiative allows supporting the decision-makers in contexts where they mutually recognize their limitations as to the understanding of the consequences for each of the fire effects management alternatives; they acquire, then, the knowledge to provide grounded and thoughtful decision making.

It was employed the methodology MCDA-C conjugated to Technical Multipurpose Cadastre (TMC) and the Geographic Information System (GIS), which has enabled to organize, measure, and integrate the various points of view materialized in the form of criteria.

These methodologies have differents criteria for the decision-making process by creating new expectations and scenarios, solving complex of problems by identifying, organizing and integrating the analysis criteria, thus creating new possibilities.

The area of interest is structured on the basis of the interviews with the representative of the decision-maker, developing their value functions and observe the impact on the interests of decision of the Committee. The result allows showing scenarios

and establishing priorities for action in the criteria identified as the most relevant.

2. AREA OF STUDY

Chapada dos Guimarães Environmental Protection Area, is located at the south center of the State of Mato Grosso, between the geographical coordinates of latitude 15° 04' N and 15° 44' South and longitudes 56° 04' N and 55° 16' West Greenwich (Fig. 1) with 300 km². The study area falls within the domain morphoclimatic and Cerrado phytogeographic provinces, created by State Decree 537 of 21/11/1995.

3. DISCUSSION OF THE METHODOLOGICAL MODEL

The systems for prediction of burned existing today are basically computational tools are based on a combination of mathematical models to provide support for specific activity on the description of the behavior of front of advancement.

These systems do not consider the actors in the process, making them excessively technocratic and outside the current standards of social and territorial management. In addition, knowledge of the effects of fire on the savanna is scarce, sometimes bypassing mere speculation, due to the uncertainties inherent to human behavior in relation to fire (ROTHERMEL, 1980).

According to Andersen and Braithwaite (1992), the knowledge of effects caused by the fire and little more than speculation based on patterns of vegetation, or the appearance of superficial area burned. This creates uncertainty and requires scientific, increasingly, the search for a new paradigm of management and a comprehensive framework for fire management in the region have increased our understanding of decision-making context.

They also provide greater flexibility in the integration of methods that allow others to work in the causes that lead to the problem. As for the actions performed by State Committee for Management of

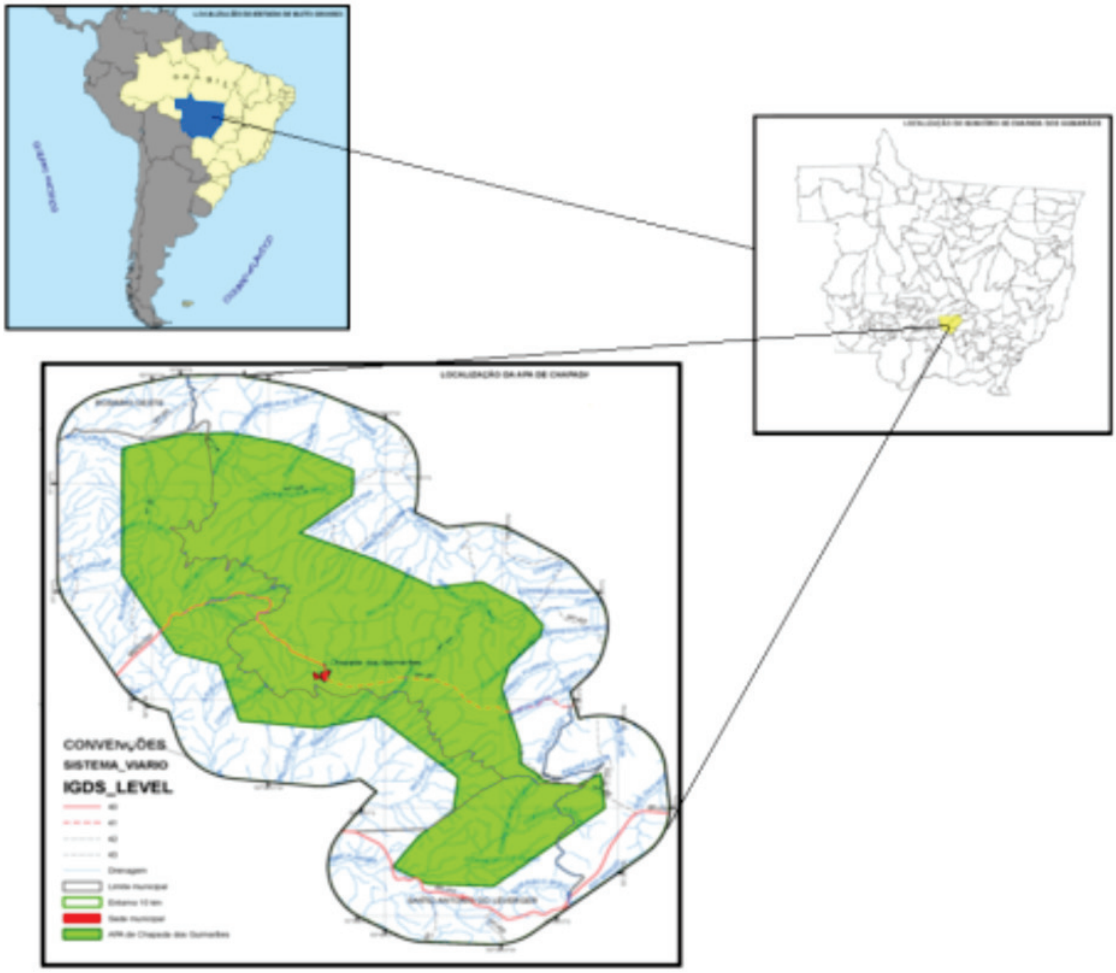

Fig.1 - The Location of the Chapada dos Guimarães Environmental Protection Area

Fire (SCMF), it is clear that the planning and management initiatives are characterized by the following factors for short-term analysis:

a) Technical and institutional hegemony in decision-making;

b) For the sectorization SCMF by management;

c) The relative ease of injection of public resources to finance their actions.

3.1 Hegemony technical-institutional in decision-making of Committee

The hegemony technical and institutional on the control of the disease and the prevention of fires and exercised by SCMF, approved by State Decree 7436, of 04/12/2006, which proposes remodel the actions to prevent and fight fires in Mato Grosso. This Committee shall have the aim at implementing the State Program of Prevention and Control of Forest Fires and Forest Fires, imposed by State Decree no 6958 of 12/29/2005.

The actions of the Committee in the area of social and territorial occur through the establishment and development of projects and programs. However, it does not happen in a transparent way for the various actors and builders of the processes affecting the learning spaces, as well as the integrated actions and sustainable. However, one of the obstacles to this hegemony and the incorporation, the Committee, the difficulty of identifying and understand its strategic objectives, in addition to the activities of management of the fire.

To be a collegiate structure, it has natural resistance to its members collegiate in developing their actions within the target communities. Due to this paradox, the Committee does not find it in their relations to issues involving the complexity, i.e. the need to know how to deal with the new, the uncertainties, the unknown and the uncertain.

3.2 What occurred in the Fire by the State for the Management of Fire

The act what occurred in management of the fire is guaranteed in their own hegemony technical and institutional the SCMF. The act leads to an ambiguity between the governmental body responsible for the management of the fire.

Example of this is the appearance of a conflict between the strategic goals and its operational targets among the own collegiate members of the Committee. However, monitoring and evaluation of the policy of the Committee are compromised by a lack of production of performance indicators for explicit. Thus, the effectiveness of the management of the fire by the Committee never assessed.

3.3 Ease of Input and Public Resource

To ease of supply of public resource for funding facilitated by the actions of prevention and control of forest fires by the Committee makes the actions of suppression of fire have their costs always high.

In context, the lack of administrative capacity in the environmental body in its territorial space (that is still in its infancy), which leads to rupture and loss of continuity of programs, partnerships and other current challenges. This frustrates the expectations of the population when solving environmental.

In spite of the financial investment have been carried out, what if questions and their applicability to the disadvantage of a management that will benefit the planning and land use planning. This topic is conflicting in the opinion of the Company before the lack of capacity of the managers of the Committee to demonstrate the total annual cost applied to the activities of suppression of fire.

Despite the tentative efforts, there is a need to develop a coherent strategy to define various perspectives possible to respond to this event. These include, in addition, the participation of all actors, as well as the calculation of costs associated with each approach and the "trade-off" involved.

4. TERRITORIAL MANAGEMENT OF FIRE IN MATO GROSSO

In Mato Grosso, the occupation and use of territorial space come from a background of change, coupled with a history of political motivations, and actions within a geopolitical framework that historical moment. This process was marked by heterogeneity of the distribution of natural resources of the available infrastructure, the political motivation of the different processes of colonization, flows and volumes of resources and the origin of the colonizers.

The occupation process occurred quickly, loose and disorderly, characterized by the blurring of a pattern of ownership and land use, without preventing impacts to the environment. Currently, efforts were made to control and solution of environmental and social impacts generated in the

process of occupation, previously created and encouraged by the Federal Government.

In addition, issues related to fire management in Mato Grosso are translated into rules of command and control. It introduced various policies, strategies and monitoring actions to control fires. It is noted the proposed advertising campaigns during this period, trying to inhibit human actions on the remaining areas of natural vegetation, with disappointing results.

In this context, there are incipient mechanisms the mechanisms of social control and audit of resources Budgetary, intended for the prevention and control actions of burned on the liability of the SCMF in Mato Grosso. This makes it impossible for the evaluation of results to file improvement in the ability to cost-effectiveness. The Chapada dos Guimarães Environmental Protection Area - State of Mato Grosso, the focus of this study, suffers continuously ecological losses, on the basis of forest fires. The arson is the cause of a large number of outbreaks of fire, whose result combines interests that involve claims of change of use or occupation of the soil.

5. CHARACTERISATION OF THE ACTORS IN THE CONTEXT-MAKING

The actors were defined according to their relationship with the problem identified in actors who take part directly in the process, and actors affected by the consequences of decision making in a passive way, having no influence on the population of the municipalities of Chapada dos Guimarães Environmental Protection Area - State of Mato Grosso.

Depending on the SCMF be a collegiate body (involving 23 institutions), when addressing a technical problem, it becomes unfeasible to individual opinion on a collective problem. Given this context, the Decision Maker(s) was defined as the State Committee for Management of Fire.

Thus, according to the MCDA-C, was defined in the collegial group, a single decision maker (shakeholder), involved in the decision process to model building and conjugate Multicriteria the MTC and GIS.

To this end, it took into account knowledge and opinion of the field working directly in the planning and suppression of fires in the study area. In the case analyzed defined the following actors involved in the research context:

1. The (s) Decision Maker (s) – SCMF

2. Representative Decision-Maker-01 (a) of its collegiate members who has the power to make the decision;

3. The Facilitator - function to support the process in case the author of the research.

4. The (s) acted (s) - a company resident in the APA.

6. INTEGRATION OF MCDA-C, MTC AND GIS FOR THE MANAGEMENT OF FIRE

6.1 Multipurpose Technical Cadastres

The MTC includes a set of information regarding the environment, in the form of thematic maps and attributes with their respective matches. It is an important tool facilitating the construction of the Fire Management process, and may redeem the characteristics of the system of actors, decision makers and facilitators involved and their potential and the integration of various public, private and community.

The MTC takes a prominent position in an environment of increasing social conflicts and cultural tensions, as it allows explicit forms of occupation and land use (current or future), when planning development. According to Ratia (2002), the register can help to reduce pressure on natural resources, through a good land use planning.

It also allows the formation of a series of events that have affected the community, considering their historicity as the identities of the project, involved actors, actions, results, successes and mistakes, technical, financial and legal as well as the use of natural resources according Zampieri, Loch and Braga (2002).

Registration may redeem the individual characteristics and the system of collective actors, decision makers and facilitators. This enables regaining the power of social networking at work, formed by a system of actors and inter-disciplinary, integrating them and making them interact with other projects (ARNS, 2003).

6.2 Geographic Information Systems

The advent of Geoprocessing digital have driven treatment methodologies, data integration, as the geographic and demographic census. In particular, the GIS do allow the integration of analysis of plans for different data (BATISTA, 2004; BURROUGH; MCDONNELL, 1998; CÂMARA

et al., 1996; CÂMARA; CASANOVA, 1996; CÂMARA; MONTEIRO; MEDEIROS, 2004; DRUCK et al., 2004).

In addition, the GIS is a tool to support the management of information for the decision-making process, and the goals to be observed are focused on environmental conditions understood by political variables, Legal, economic, ecological and other.

Such systems are of immense value, due to its ability to integrate data from different sources and remodel them and analyze them. The GIS is not an end in itself, but a useful tool to achieve a goal.

6.3 Methodologies MCDA-C

Surge in Multicriteria Methodology for Decision Support (MCDA) as a way to support decision makers in complex contexts, conflicting and uncertain, trying to improve their understanding of the decision context. Establishes itself as a scientific instrument of management, since 1980, with the publication of several scientific works, especially the authors: Bana e Costa (1995, 2005), Keeney (1992), Roy (1985), Ensslin, Montbeller Neto e Noronha (2001).

This approach is guided from a constructivist view of knowledge, considering concepts, procedures, models and results, in order to assist decision-makers to organize their context and better understand the situation. In addition, reflects the value judgments of decision makers on a particular issue in order to support the decision process.

The MCDA-C generates knowledge for individuals directly or indirectly involved in organizational decisions. Thus, it can be said that the MCDA-C provides a more comprehensive understanding of the issues relevant for the individual and the organization in a given context, managing to capture, incorporate their values, beliefs and perceptions.

Its methodology includes a set of methods and techniques to assist or support the decision-making in the presence of a variety of criteria. The application of the constructivist process of MCDA-C in the survey due to the fact that it is a problem involving multiple factors, not at first understood by various stakeholders, whose interests may conflict.

These settings, called by Landry (1995) have found in the complex MCDA-C to build a means of understanding what is important, as well as their evaluation and management (ENSSLIN; MONTBELLER NETO; NORONHA, 2001).

In context, the decision-making environment is formed by a system of actors that seek to meet the needs of a Fire Management model and find alternative solutions from the view of the subject of the action. The actors are characterized as an individual or group of individuals who influence the decision-making process directly or indirectly through their value systems (ROY; VANDER-POOTEN, 1996).

To achieve the proposed objective for the operationalization of the theoretical underpinnings of the MCDA-C, we use Decision Support activities. This is accomplished through three basic phases, different but intrinsically correlated, structuring, evaluation and recommendations seconds Ensslin, Dutra e Ensslin (2000).

In the design phase, Bana e Costa (1995) considers the understanding of the problem. It seeks to identify, characterize and organize the events considered relevant in the process of decision support, through the construction of a structure (model more or less formal), which is shared by the actors, it is determined the family of PVF's. These points correspond to the dimensions deemed necessary by the decision maker and sufficient to evaluate the context.

According to Bana e Costa (1995), the assessment phase is to clarify the choice, by applying Multicriteria methods to support the modeling of the preferences of actors and their aggregation. Since the phase is the formulation of recommendations for the most suitable courses of action.

7. STRUCTURING A PROBLEM

For the structuring of model MCDA-C, it is observed that the characterization of the decision context and of the actors involved the construction of the tree of the family of points of view, of the hierarchical structure of value and the construction of the descriptors for defined criteria.

With the identification of the actors in decision context, begins the planning of the interviews with the representative of the decision maker, deepening knowledge of primary elements of assessment of decision-makers, with its own aid.

The meetings between the facilitator and the representative of decision-makers were essential for the identification of the problem and the preparation

and legitimation of concerns and primary elements of the evaluation, with respect to decision context.

We identified the primary elements of assessment and their groupings structured hierarchically and interconnected. On the basis of their relations of influence, it was possible to propose a tree of views (KENNEY, 1992), which reflects the areas of interest to the Representative of the Decision Maker.

Next, in each area of interest (here represented by concern), the concepts were arranged hierarchically with the criterion of relations means-ends expressed by the representative of the Decision Maker. In this tree structure, you can see the three major areas of interest and its division into sub-areas, which allow an understanding of each one of them and may be modified if the representative of the Decision Maker identify important aspects.

It should be noted that relations are arborescent tree of influence between concepts (means-ends) and is explained in three areas of interest (Fig. 2):

Area of interest: Anthropic Aspects;
Area of Interest: Physical Environment
Area of Interest: Biotic Environment.

During the construction of the descriptors, we identified a set of levels based on information in the environment, (consequences and facts), that forest fires can result in environmental decision making. The construction of the descriptors follows the following stages: choice of descriptors, conceptualization of the candidates to the basic views in their areas of interest, identification and conceptualization of the points of view elementary, as well as to the identification of the consequences of each Fact within the possible states.

The key words drawn up, determines the degree of attractiveness between the levels of writers for mio of the creation of a function of value for each one. The functions of value, were built by the method of trial semantic, prepared with the aid of the software M-MACBETH Academic. This software (*www.m-macbeth.com*) allows evaluating options, comparing them qualitatively in terms of their differences of attractiveness in multiple criteria in accordance with Bana e Costa, Corte e Vansnick (2005).

There are conditions at that time to carry out the evaluation site, i.e. verify the performance of each element of the design of the management of the fire.

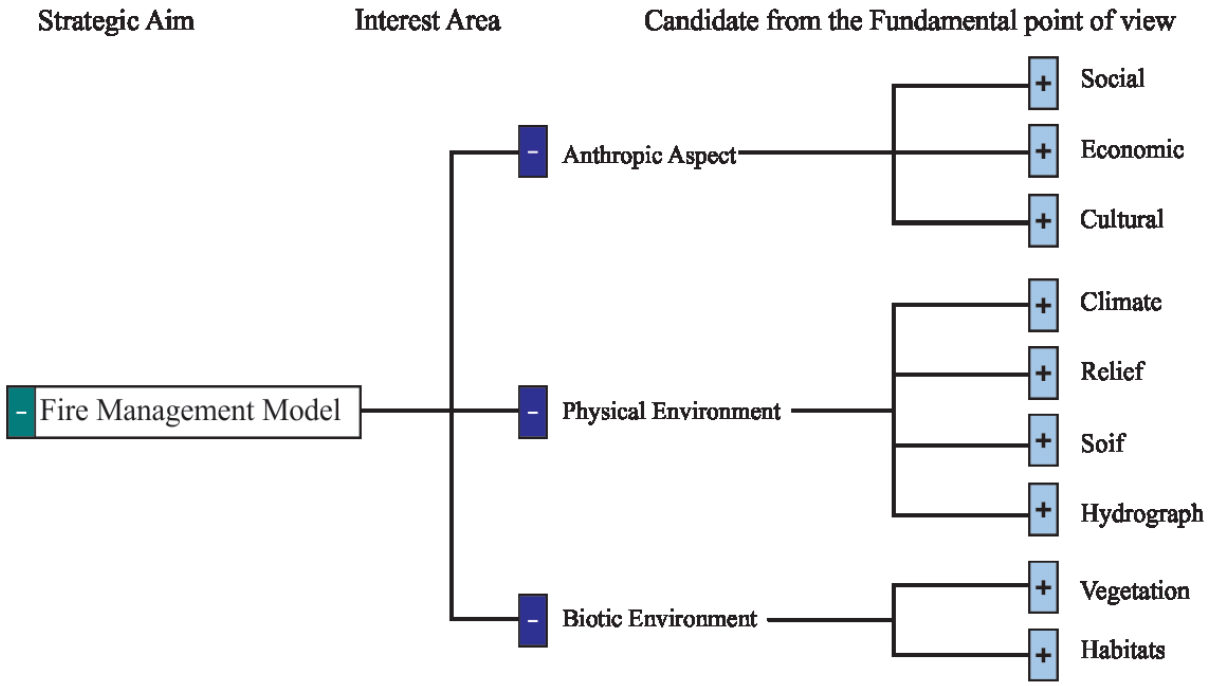

Fig.2 - Area of Interest. Source: Data from the Survey

The last stage of the construction of the model consists in the identification of the rates of substitution, which inform the relative importance of each element (PV) in the model.

From then on, if it is able to carry out the assessment of organizational scenarios. To this end, it analyzes the performance of the descriptor, resulting in an evaluation site. As Also aimed to provide a comprehensive assessment of the model, add to these places. Thus, the overall assessment is calculated by means of a mathematical equation of aggregation additive. Finalizing the process, we obtained a global model, organized in a table electronics to become more operational.

In the phase of evaluation of the alternatives, the MCDA-C it is concerned primarily with the measurement of the current situation and of the effect of the action potential, both local (for each point of view), and globally (for the system as a whole).

The first step of this stage consists of the construction of value functions, from the descriptors of each point of view. Such functions are numerical scales which enable decision-makers reflect in quantitative manner on their preferences in the framework decision-making.

Already the evaluation site it is characterized by its simplified form, as the decision maker expressed their preference. If the representative of the decision maker has the belief that two or more actions are also attractive (situation of indifference), just represent only one of these actions in the process of assessing absolute by peers.

Therefore, when the number of shares to be compared, there is also a growing number of trials to be performed by decision-makers, becoming complex coherent assessment. For avoiding inconsistency semantics and cardinal, and necessary to create a matrix to be applied in the software *M-MACBETH Academic* for analysis of inconsistency.

In this setting, it takes into account a category of attractiveness (Fig. 3). Thus, it reflects the way in which the decision-maker as expressed their preference.

We tabled As a result the aggregate scores for each area of interest. At each point of view essential (PVF's) there is a detailing of the points of view elementary (PVE's), which in turn the detailing of the sub-PVE. For better understanding will be shown below the value functions by area of interest with their respective PVF's.

For the delimitation of the scenarios was used a portion of the territorial area of the APA-MT that presents a better detailing of the figure used for the Management of the Fire. The Next step was to define an area representing the areas of interest validated by the representative of the decision maker.

This step was performed by means of a supervised classification for the reduction of the information that meets the areas of interest of the structure tree fern and subject to a severe stressor such as forest fires.

This case there was concern with the identification of the environment, and the differen-tiation of them, for this reason it was applied to the classification supervised, always validated by Representative of the decision maker.

The interview with the representative of decision-makers were identified 12 different scena-

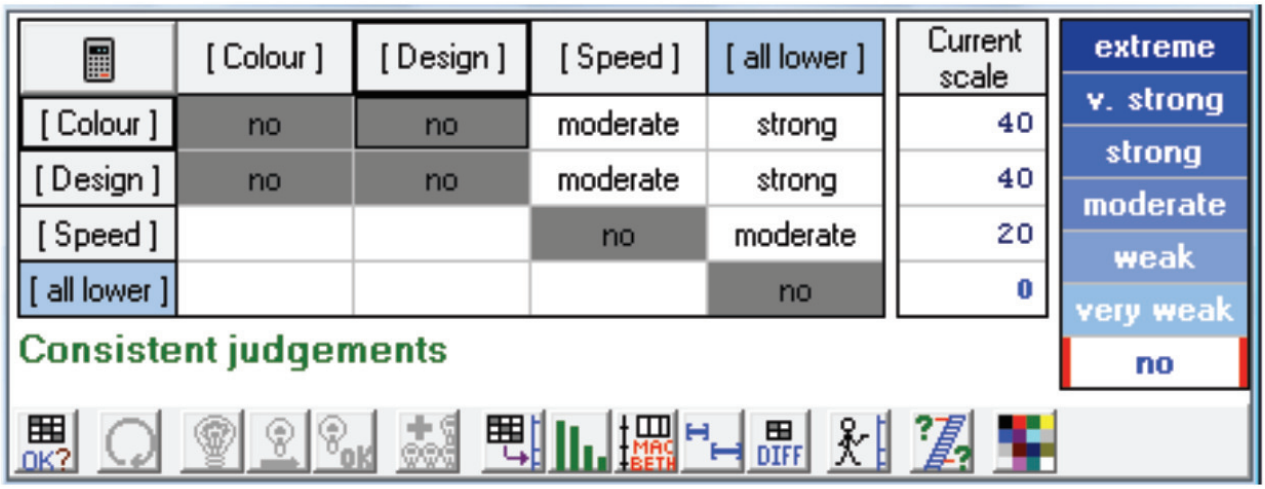

Fig.3 - The Categories of Activity of software M-MACBETH Academic.

rios in relation to the environment where decision-making will be shown the feasibility of the model. The composition of the scene was performed with different types of images, including the satellite LANDSAT-TM, aerial photographs digitized, in which generates a mosaic to provide an overall picture of the study area and photographs conventional horizontal landscapes where the study was performed.

Because they have been identified the scenario that are the most affected by outbreaks of heat, there was the need to establish panels representing the compositions of the figure. These panels are used as inputs for an evaluation site, and also work as an information base for the generation of matrices semantic value judgment for each PVF for each figure.

For better progress in the work and construction of the profiles of impacts, the figure were identified, selected and validated by Representative of the decision maker to the three areas of interest: physical environment, aspect manmade and the biotic environment.

Due to the complexity of the environments, the area chosen for analysis and those who suffer constantly with the forest fires and direct interest to the management model of the fire that correspond to a portion of the territory of easy accessibility and common use of the people in the Valley of the Cuiabá River.

The framework of each figure was also used as supplementary information a spreadsheet containing information extracted from the application of MCDA-C. For each figure was applied to the function of additive value corresponding to each PVF, as shown in the Tables and charts as below.

The pictures with their charts were agglutinated in tables for a better understanding. For the ranking of the figure (Fig. 4, 5, 6, 7, 8) is a comparison of the profile of the impact of each scenario in relation to another and the profiles in a matrix. It was observed that the higher the altitude in the matrix, the more likely to fire Forest. The charts below show the scenes from the Point of View.

The pictures, this region is affected each year by forest fires caused by factors anthropic, coming from the beach resorts of local rivers, the park road, occasional visitors or small properties located in the region. This region is located within the area of environmental protection, with interest for the biotic environment and tourism activities.

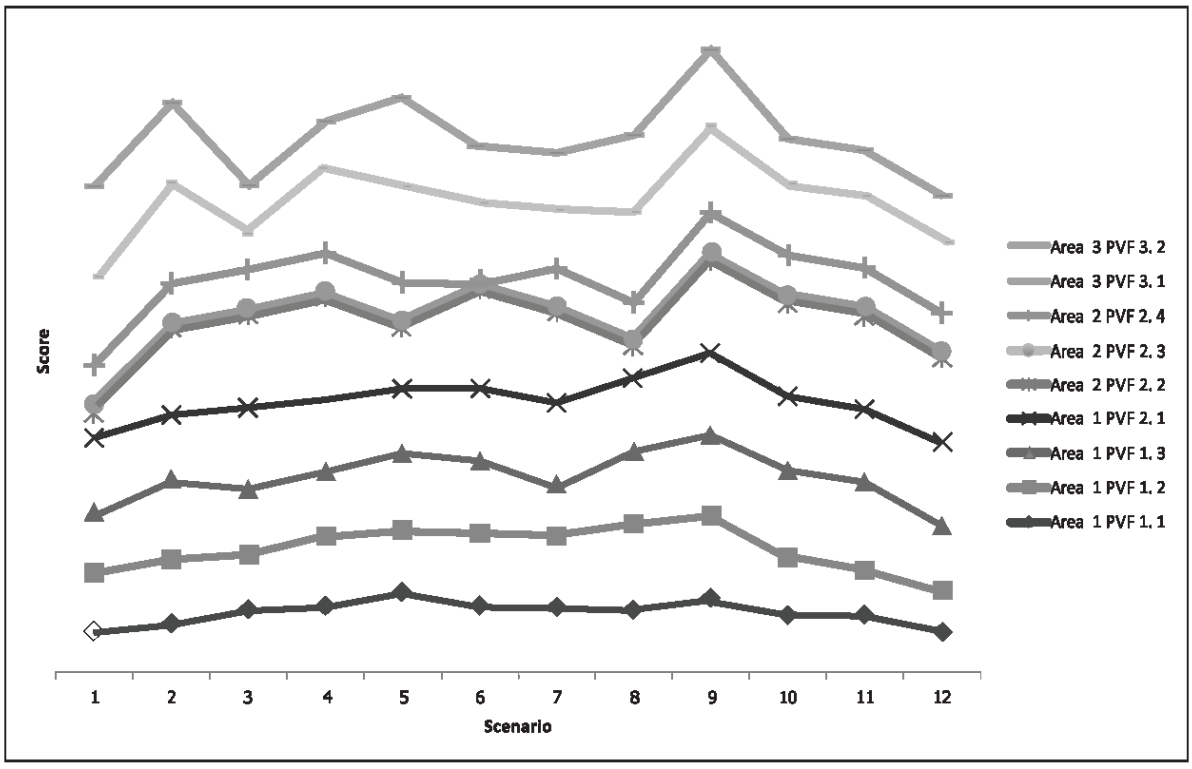

Fig.4 - General Score of Scenario per PVF

Scenarios	Susceptibility	Score
9		72,8
5		69,6
8	+	66,1
6		64,9
4		61,81
2		58,41
7		57,43
3		57,17
10	-	54,40
11		51,7
12		45,3
1		40,8

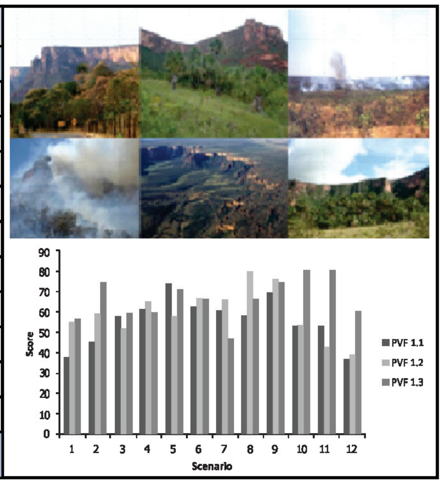

Fig.5 - Regions of the cliffs / Footpaths / Buritis. Hierarchy in the PVF's in the Scenario in the Area of Interest of Anthropic Aspects.

Scenarios	Susceptibility	Score
9		56,98
4		56,69
3	+	56,51
7		56,02
12		54,53
10		55,18
11		55,18
6		49,37
2	-	49,05
5		41,68
8		36,36
1		34,83

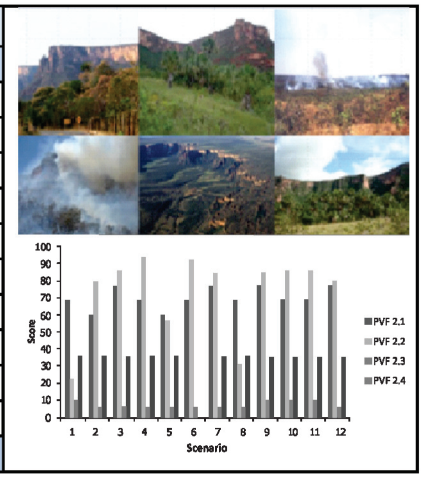

Fig.6 - Regions of the cliffs / Footpaths / Buritis. Hierarchy in the PVF's in the Scenario in the Area of Interest of the Physical

Scenarios	Susceptibility	Score
5		85,06
1		83,02
2	+	82,17
8		76,23
9		74,9
6		61,24
4		56,17
10		51,12
11	-	51,12
12		51,12
3		39,86
7		35,47

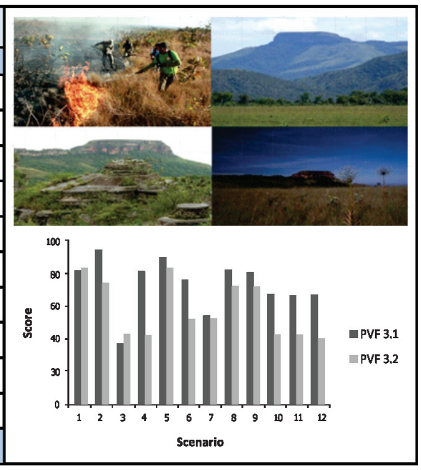

Fig.7 - Hill of Saint Jerome. Hierarchy in the PVF's in the Scenario in the Area of Interest of the Biotic Environment

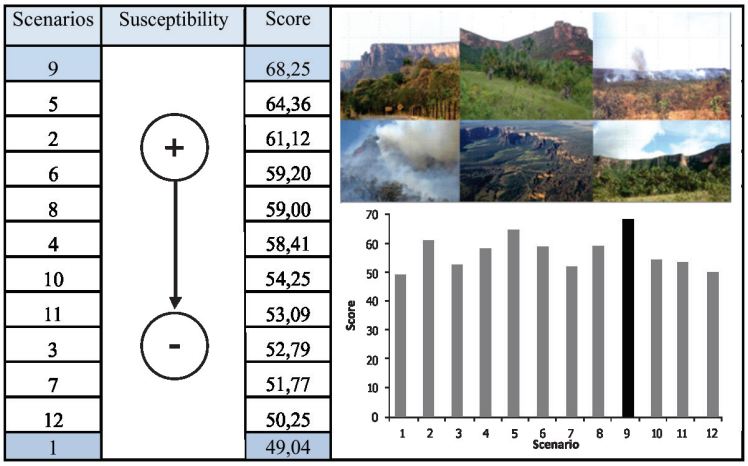

Fig.8 - Regions of the cliffs / Footpaths / Buritis. Ranking of Scenario by Overall Score more likely

The pictures had a behavior to score very close to the other scenarios; it is a hill region with strong interest cultural and tourist. However, this region is located in an area with full protection, with a strong significant for the biotic environment.

9. RESULTS

Analyzing Multicriteria model integrated with GIS and MTC in this case study, there are some concern that the decisions have a significant weight in comparison to other aspects of the problem considered in fire management. The model explains relevant aspects, but unavailable in the decision context.

Integrating three approaches, the scenarios have been applied to the development of this work, using credit information available, which allowed sorting and prioritizing action on the field of individuals analyzed (in this case, the fire management).

Such integration occurs through knowledge about important aspects of innovation management context of performance and can be applied in other regions of Mato Grosso. This allowed a greater general knowledge, giving players a detailed view of the insertion of the figure.

The indicators in the case study show that the proposed methodology is consistent with the research proposal. For this reason, attempts to organize and systematically identify the action to be made for continuous process improvement of technological innovation in Fire Management. They are also useful to consolidate the decision-making.

This provided information essential for decision-making more accurate and efficient. The hierarchy provides strategies that allow a (re) analysis of the current picture, within a multicriteria perspective, through a series of PVF's deemed relevant by actors in the process.

The innovative work to search for alternative paths to the current model of Fire Management sponsored by the Committee, which acts only in emergency actions. This new way of acting value to human subjectivity of the actors, with their knowledge in the decision context. The methodology (validated at the operational level) was proposed to be applied in technological processes in fire management within any organizational level.

Multicriteria model (considered private) conjugate to the MTC and GIS was built to applied to the context of Chapada dos Guimarães Environmental Protection Area - State of Mato Grosso, and its indicators can not be generalized and used in another process. This model represents the perception of the relevant actors in a given context. The indicators, however, could be used as suggestions in the construction of other models Multicriteria operational level.

As already stated, the SCMF is an important benchmark for the management Fire Administration, is responsible for preparing and enabling public

policy environments that can impact the severity of forest fires /burns.

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