Community diagnosis of the environmental problematic: an example from Chihuahua City, Mexico

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Diagnóstico comunitario de la problemática ambiental de la Ciudad de Chihuahua, México

Abstract

In the urban systems, the studies related to the population perception on the quality of life and environmental problematic are a must for environmental management. The environmental diagnostics of Chihuahua City were developed for three years during the municipal government 2001-2004. The present study reports the results of the community diagnostic of the environmental problematic derived from the essay given to the urban area. These results allowed us to know the opinion of the community regarding the natural system or environment, social system, economic system and the vision of the community to know and to participate in the strategies of sustainability. The conclusions are centred in the population's interest concerning the environment, as well as on the preoccupation of factors that socially and economically affect the satisfaction of basic needs and the local development. Furthermore, strategies to maintain an informed and participative community are identified. The results contribute to the local knowledge and support the basic information for the environmental proceeding policies for the different sectors of the City.

Resumen

En los sistemas urbanos, los estudios relacionados a la percepción que tiene los habitantes tanto de la calidad de vida y como de la problemática medioambiental son necesarios para la gestión ambiental. Durante tres años se desarrollaron diagnósticos ambientales en la ciudad de Chihuahua durante la Administración Municipal 2001-2004. En este trabajo, se reporta el diagnóstico comunitario de la problemática ambiental derivado de la aplicación de una encuesta en la zona urbana. Los resultados permitieron conocer la opinión de la comunidad acerca del medio ambiente, sistema social, sistema económico y la visión de la comunidad para conocer y participar en estrategias de sustentabilidad. Las conclusiones se centran en el interés de la población sobre el medio ambiente, así como en la preocupación de aquellos factores que repercuten social y económicamente en la satisfacción de necesidades básicas y en el desarrollo local. Asimismo, se identifican estrategias para mantener a la comunidad informada y participativa. Los resultados contribuyen al conocimiento local y apoya con información básica para las políticas de gestión ambiental a los diversos sectores de la comunidad.

Keywords: Environmental proceedings, perception, environmental problematic, participation, sustainability

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Introduction

The environmental proceeding policies must be reinforced by the using of variables and environmental indicators and the public participation, in order to establish mitigation measures for the urban and rural environmental problems. In the last two decades, the environmental preoccupation has been noticeable at the world level, generating a consensus between the economical development and the environment (Belausteguigoitia, 1999). That is why nations require the appropriated indicators, with the purpose of having information to know about the presence or absence of human society maintenance, and to be able to understand the situation that holds the maintenance of the social environmental development (Ray and Pandey 1995; Bossel 1999; Olsson et al. 2004). The environmental problematic may give birth to a social vulnerability, favouring the incorporation of impact theories, and the perception of environ-mental changes and it can be examined in the space, economic and social dimensions (Adger and Brown 1998; Starr et al. 2000). The public opinion trend about environment was considered as a measure of the awareness, from the 70´s until the beginning of the 90´s (Dreier 1996; Swaffield and Foster 2000; Simioni, 2003). Urban areas put on a special importance and are the key characters of the economic and social cohesion and the protection to the environment (Colmenar 2002; Wali et al. 2003). Therefore, attention on the sustainable city development of the cities and the urban settlements where 80% of the population is clustered will be one of the main priorities for the land use in the next few years. Nevertheless, in the evaluation of the urban and rural sustainability, three dimensions must be considered; referred to the dimension of the natural environment, dimension of the built environment and the socioeconomic dimension of the environment (Dominguez, 2004; Luján et al., 2004; Córdova et. al., 2006). In Mexico, particularly in the municipal area of Chihuahua, since around 97.5% of the population lives in an urban area, the constant demand of services to satisfy the basic needs favours that the environment is directly or indirectly involved in the quality of life. This way, environmental policies have advanced and the environmental issue has become of public interest, supporting a scenario for the development of studies within this field. Due to this, a community diagnosis of the environmental problematic was developed taken as a reference point the participation of the community and its perception of the most basic aspects of knowledge and interest about the environment, social and economic, as well as the possible participating strategies of the community. This reveals basic information for the environmental proceeding policies, and the sustainable planning of Chihuahua, City.

Material and methods

The study was realized in the municipality of Chihuahua (population: 671,790 inhabitants), located between lat. 28°06´ and 29° 47´N, and long. 105°47´W. It's proper to mention that only the area of Chihuahua City was considered for the study, and it represents 97.5% of the municipal population (about 671, 790 inhabitants; INEGI, 2005). The population of the Municipality of Chihuahua, up to the year 2000, has registered a total number of 671,790 inhabitants, making up 22% of the state population (INEGI, 2005). Geographically speaking, the area of the Municipality consists of 40.24% rangelands, 20.73% forestland, 28,15 brushlands, 7.94% dedicated to croplands and 2.94% represent other type of vegetation (INEGI, 2004). The City of Chihuahua concentrates 97.5% of the municipality population and according to the territorial distribution (Fig. 1), 26.7% is urban development, 36.19% belong to road network, 14.7% equipment, 8.95% industrial use, 6.53% faro areas, and 3.8% of services and others (Secretaría de Desarrollo Social del Gobierno del Estado de Chihuahua, 2001). The population participation in the economy is highlighted as following: 5.1 in the industry of transformation, 18.9% in commerce, 12.9% in social services, 10.7% in diverse services and 9.6% in construction, 6.9% in professional and financial services, and 6.6% in restaurant and hotels. Only 1% is dedicated to activities such as crop production, cattle, timber, hunting and fishing. As to the Water Treatment Plants, the city has 3 for

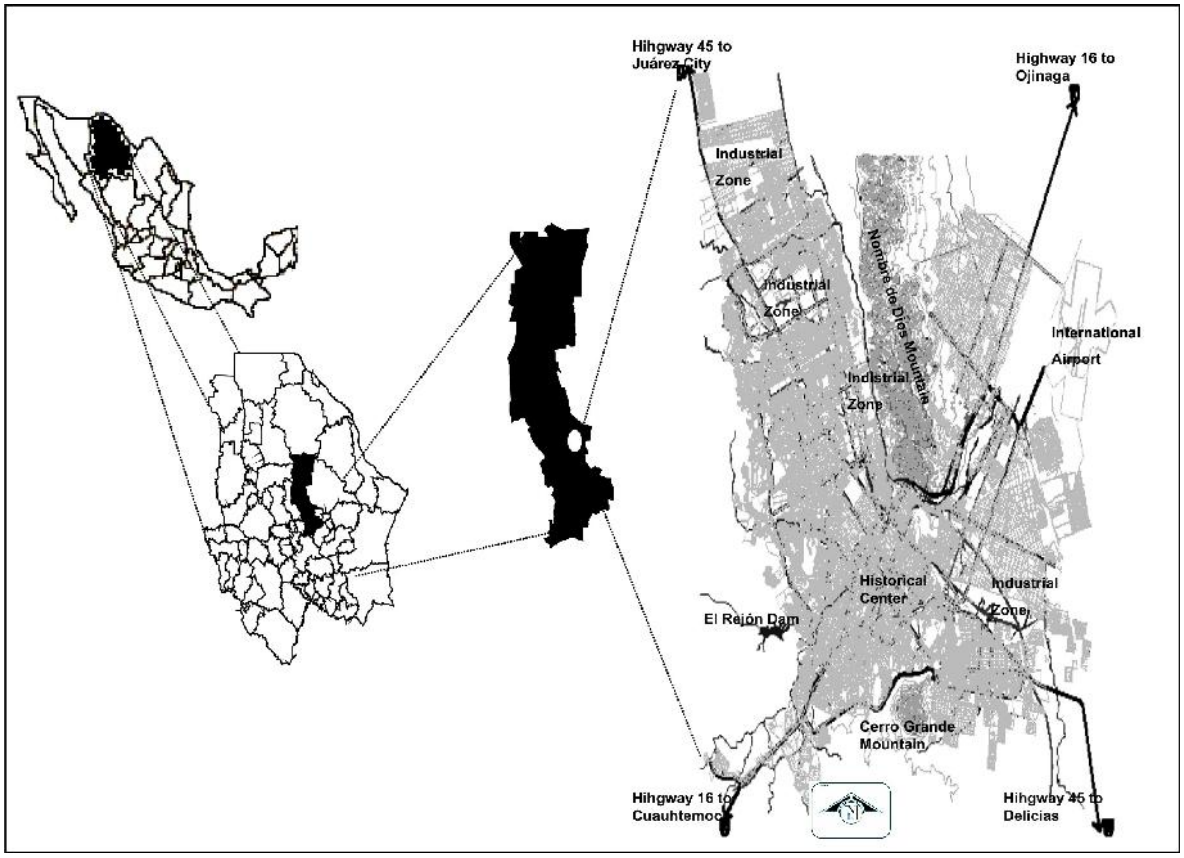


Fig. 1. Location of the City of Chihuahua (source: Subdirección de Catastro, 2004).

public use and 16 for private use. In the year 2003, the environmental department registered a total of 790 accusations regarding the bad use o fair, water, soils flora and fauna, among others which were given solutions by the government agencies. (INEGI, 2005).

A questionnaire integrated by 16 questions and divided into: general data sections, natural system or environment, social system, economic system and the community participation. Variables such as sex, age, time living in Chihuahua, origin, occupation, and the place of the survey, were considered in the general data or sociodemographic attributes of the person answering the inquiry. The section of natural system or environment was integrated by three questions. The first one with 18 options to choose from refers to which are the natural resources that characterize the municipality. The second one with 15 options pointed out which environmental topics you consider necessary to know more in a municipal ambit. The third question queries the factors that contribute to the environment degradation and it included 18 options to answer. The social system was integrated by two questions. The first one referred to which social topics you consider to be a priority for the municipality. It had 17 answer options. The second question was on which strat-

egies you think will contribute to inform and promote the participation of the community in the solution for the environmental problems. It included 12 answer options. Three questions were included in the economic section. The first one with 8 options, referred to which economic activities characterize the municipality. The second one was on the economical activity that will have more impact in the generation of jobs in 20 years. The third question included 8 options, was on the economic activity that has had a greater impact in the environment in the municipality. There were two questions integrated in the community participation section. The first question was integrated with 12 options and it was on the strategy that is used to know about social, economical and environmental problems in the municipality. In every question, only two options were to be chosen and categorized with values of 1 and 2, (1 meaning very important and 2 important). The survey application started in the month of November, 2002 and finished in April of 2003. The survey locations and sampled people were selected at random in Chihuahua City, giving priority to locations with a concentrated and diverse population such as: the downtown area, parks, malls, educational institutions, among others. All the information once captured was analyzed and interpreted by the Statistic Package SPSS version 9.0, under the descriptive frequency analysis procedure (Visauta, 1999). Once the in-formation was analyzed a proper document was elaborated.

Results

The results are supported by 909 inquiries which were applied from November 2002 until April 2003. The data input of the final document was elaborated in the month of July of the same year. In the general data case, 56.7% (516) were from the male gender and 43.3% (393) female gender. From the grand total, only 903 people provided their age, therefore the average age was 25 years old. Based on this figure, the minimum age inquired was 11 and 78 the maximum. As for the age range, the highest proportion was in those who fluctuated between 18 and 29 years old with 46.6%. In this social attribute, 72.8% of the participants were older than 18. Regarding the occupation, 54.2% (493) were working, 45.2% that is 411 people indicated that they were studying, and only 13.5% (135) belonged to the house shores. Related to the time of residence in Chihuahua, from the 909 inquired, only 887 provided this information. The result was an average of 18 years, the minimum time was lower or equal to a year and 73 years as a maximum. As for the origin of the inquired 56.5% were born in the municipality of Chihuahua, 32.4% were born in other parts of the State of Chihuahua, and 8% from other states of the country.

Natural System or Environment

In reference to the question: which natural resources do you consider the most characteristic of the municipality? From the 18 options, 28.4% was for the rocky formations, 24.4% semiarid vegetation, 11.4% for rivers and streams, 6.6% for temperate forests, 5.8% for Chihuahua dog and 12% for the Hereford cattle. The rest of the options presented percentages of less than 5.8%. In regards to the environmental topics considered as necessary to know more in the municipal ambit, 36.5% mentioned the quality and the amount of water, 11.8% urban development, 11.45% Chihuahua municipal area vegetation, urban cleanliness 9.4%, air quality 7%, city dispos-als (garbage) 4.7%. Relative to the question: which factors do you consider that are contributing to the degradation of the environment in the municipa-lity? The results fluctuated: 20.8% for the pollution of rivers and streams, the pollution by garbage 19.4%, and 17.8% to the growth of the population, the lack of rain 12.4%, and the lower of lack of information on the knowledge and environmental education 8.8%.

Social system

In reference to the question: which issues do you consider to be a priority to be attended in the municipality? Health reached 23.7%, employment generation 19.3%, public safety 13.5%, environment 11.1%, education 10.1%, drinking water 9.7% and community support 2.9%. We observed that the environment is in the 4th place in percentage terms, i.e. 99 people considered it important in social policies, with only a 2.4%

difference between the public safety topic. In the case of the strategies that encourage the participation of the community in the solving of environmental problems, 38.9% indicated that lectures at schools are a viable alternative, television programs 18.6%, park activities 8.7%, neighbours meetings 6.7%, tours by the rivers and streams 5.6%, and the rest of the options were diluted in little percentages lower than this last one.

Economic system

As for the economic activities that the population considers to be characteristic of the Chihuahua municipality; 34.5% pointed out cattle, 22% industrial activities, 15.8% agriculture, 11.3% commerce and 6.2% tourism. The other options were gradually selected by lower percentages to the last one. In relation to the economic activities with higher relevancy for the generation of employment in the municipality and the City of Chihuahua in a 20 year vision it resulted that 58.1% considered that the main source will be the industrial activities, 20% didn't answer or didn't make any reference of any economic activity, 13.9% made sure that commerce, agriculture and cattle were chosen by a 1.7% of the participants respectively, 0.9% indicated crafts and only 0.2% forest activities. Regarding the economic activities that are considered of great impact on the environment, 49.3% (448 people) attributed this to industrial activities, 11.6% to cattle activities, 10.8% to agriculture, 8.4% to commerce. Moreover, the other choices were gradually selected in lower percentages to this last one.

Community participation

To know or be aware of the social, economic, and environmental problems in the municipality of Chihuahua; 55% of the inquired considered that through the television programs strategy, 17.2% local newspapers, 11.8% pointed out personal experiences, and 5.6% the radio. The rest of the options presented lower percentages to this last one. With respect to the strategy that may achieve the social participation in the solution to environmental, social, and economic problems of the municipality, a 28.6% said it could be through television, 20.1% school programs, through surveys, and 4.6% looking up in magazines and newspapers. The rest of the options presented lower percentages. The result formerly described is summarized in Table 1.

Discussion

According to these results we identify the Chihuahua dog and the Hereford cattle as natural resources; however, technically speaking they are domestic animals which don't represent a natural distribution inside the municipal territory, however, they were mentioned as a natural resource by 162 people (17.8%). It was noticeable that some of these topics directly involve the basic services and infrastructure for the city, meaning that the 62.4% of the inquiries or 564 people are worried about these aspects. Likewise, we identified that 20.8% (181 people) related the topics focused on the knowledge of the problematic of the natural resources, such as the municipality vegetation, medicine plants, hills and the lost of habitats, resulting in the need of information in the community. Relative to the question: which factors do you consider that are contributing to the degradation of the environment in the municipality? this may indicate that the community maintains an interest and perception of the environmental problematic when it is directly or indirectly involved in any of these issues. Likewise, the population can do its own analysis from the lack of environmental culture, and from the need of major infrastructure in certain sectors of the population to determine the possible causes that generate the river and streams pollution, as well as the origin of the garbage contamination. In this question, only 5.4% of the inquired, that is 49 people had the opinion that the industry is having an impact in the environment but not discarding the possibility that some issues like streams and rivers contaminated by city wastes might be immerse in the industrial activities, and that the population assumes certain responsibility.

In reference to the question: which issues do you consider to be a priority to be attended in the municipality? this result is interest-ing due to the multiple issues of social character and the percentage trends, however when considering the

Table 1. Summary of the applied inquiry to know the community perception about the environmental problematic of the City of Chihuahua (n= 909 inquiries).

Components	Questioning	Results of the survey (% respect to the total)
Natural system or environment	What natural resources do you consider the most characteristic of your municipality?	28.4% rocky formations, 24.4% semidry vegetation, rivers and streams 12.0% Hereford cattle 6.6% warmed up forests 5.8% Chihuahua dog <5.8% the rest of the options
	What factors do you consider to contribute to the municipality environmental degradation?	20.8 river and stream pollutions 19.4% garbage pollution 17.8% population growth 12.4% lack of rain and low diffusion of knoledge and environmental education
Social system	What issues do you consider a priority for the municipality?	23.7% health 19.3% employment generation 13.5% public safety 11.1% environment 10.1% education 9.7% drinking water 2.9% support to the community
	Which strategies do you consider will contribute to inform and encourage the participation of the community in solving the environmental problems?	38.9% school talks 18.6% television programs 8.7% park activities 6.7% neighbours meetings, and river and stream tours.
Economic system	Which economic activity do you consider characteristic for the municipality?	34.5 cattle 22.0 % industry 15.8% agriculture 11.3% commerce 6.2% tourism
	Which economic activity will have more impact on employment generation in 30 years?	58.1% industry 20.0% did not answer or did not make any reference to economic activity 13.9% commerce 1.7% agriculture 0.9% crafts 0.2% forestry
	Which economic activity has had more impact in the municipality environment?	49.4% industry 11.6% cattle 10.8% agriculture 8.4% commerce
Community	Which is the strategy used to know about the social, economic and environmental problems of the municipality?	55.6% television programs 17.2% local newspapers 11.8% personal experience 5.6% radio programs
	The strategy that may achieve the participation of the community in the environmental, social and economic problems of the municipality...	28.6% television programs 20.1% school programs 11.9% surveys 4.6% looking up in magazines and newspapers

environment, it may include other topics that presented low percentages in these questions, such is the case of drinking water, drainage and sewer systems. In this case adding all the options environmentally related, they would add up to 22.4%, it means that almost 200 people from the 909 inquired consider knowing about the environment basics, narrowing it to the health issue in percentage terms. The last trend may indicate that educational institutions are an important and strategic nucleus to establish a series of sustainability programs where not only the teacher and the students would benefit to be involved in the environmental programs, but the parents of the family would be the central axis to start the integrated development programs in the health, public safety, environment issues among others, as much local as regional, state and nationally.

We observed that according to the inquired people's opinion, 50.3% i.e. 454 people related primary activities (cattle and agriculture) as the economic image of the municipality. This trend can be given due to the territorial magnitude appreciation of the municipality or by a socio-cultural appreciation that has reflected the development of these activities through time. However, the inquired people's opinion might be leaving out the appreciation of how much of the population is involved in these two economic activities?. The discussion is focused on the fact that only 20% of the inquired, unknown to about 182 people what will be the prevailing situation in 20 years, which possibly creates uncertainty in the opinion and affirming of which activity might be the employment generator. Likewise, the industrial activity is acknowledged, it is considered by 527 people as the employment backbone for the municipality in a 20 year span, being conceived by the economic and social dynamic that this aspect has had through the years. The group of the 448 people who indicated that industry has caused the greatest negative impact to the environment, is of great importance at the moment of discussing, based on the perception that the community con-sidered this perception, i.e. it arises the question of which indicators of the environmental perception is the population considering to attribute the industry the greatest impact to the environment in the municipality?. The former might be given due to different ramifications, as it would be the preoccupation for the air, water, soil pollution among others. This can be tied to the perception that industry is the meaning of pollution, discard-ing the possibility that some efforts or achieve-ments are being made in the use of instruments and regulations in the environ-mental issues, involving different sectors of the population as this sector is.

The community participation trend might mean that television is an important mean where the population is informed directly about economic, social, and environmental aspects of the municipality which means that 500 people receive information through this mean at a local level. It could be identified that as a strategy, television programs hold the most viable alternative to attain the participation of the community. Additionally, it represents a great issue in the school programs for the community participation, probably because for being a social nucleus, and its infrastructure favours the implementation of any program of social, economic, and environmental character through this sector.

Conclusions

In regards to the Natural system or environment, we concluded that an acceptable level of the urban population knows or identifies the natural resources that characterize the Municipality. Otherwise, it is identified that it exists an interest in knowing more about the issues that might be influencing directly or indirectly in the quality of life that are the amount and quality of the water, urban development, vegetation, urban care, causing the community to demand information about these issues. In the Social system, there are important aspects, such as health, employment generation, public safety, and also the environment were considered as priorities to be attended at the municipality level. In addition, socially talking, television programs and school activities are recommended to encourage participation in the environmental problems. In the economic system, in spite of perceiving that cattle and agriculture are characteristics of the Municipality, the industrial activity is identified as the employment generation

detonator in a 20 year span, which is also considered as the most negative impacting activity on the environment. In the participation trends for social, economic, and environmental problems the media and the education sector were considered the most strategic to stimulate the interest of the community. In first place, it is recommended to spread the results of the study in different sectors with the purpose of motivating collaboration and to develop actions which aid in the knowledge of social and economic, and environmental programs in the community, and to strengthen the environmental proceedings. The economic and social planning of the Municipality and the City of Chihuahua should gradually incorporate environmental criteria and the community participation to make decisions in an integrated way. The development of new studies, as in the social, economic, and environment aspects, as the combination of these focused on the opinion of the community will allow monitoring the changes in time and space about the inhabitants' environmental perception. This will be integrated in the environmental proceeding policies, and in the fulfilment of principles and objectives of the sustainable urban development.

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