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Full Length Research Paper

Public demands, environmental perceptions, and natural resource management in Mexico's tropical lowlands

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The study was carried out to elicit the will of inhabitants of grazing areas in coastal lowlands of East Mexico regarding their values and preferences for actions of conservation or economic development. A comprehensive structured questionnaire was developed to collect data from 199 rural and urban inhabitants of lowlands in central Veracruz, Mexico. Several environmental policy scenarios were proposed and respondents ranked their preferences. Mean age was 41.6 ± 17.0 years- old. Mean annual income was USD$ 4,530.2 ± 4.953. Rural residents were indifferent to urban landscapes, but urban residents considered the quality of life in urban environments as good. Both groups graded as good rural landscapes, quality of natural resources, and abundance of natural resources. Policies of previous governments were graded as bad, but recent government efforts received a better grade. People think (52%) that cattlemen ignore environmental problems and often act by economic instead of ecologic criteria. Urban population (65%) favored potential approval of legislation to regulate the use of natural resources in grazing areas, but rural residents (15%) did not. Proposed mechanisms to enforce environmental laws were to subsidize livestock producers (82%), rangeland appropriation of areas of ecological value (33%), environmental education (25%), and severe fines to offenders (14%).

Key words: Public policy, Latin America, natural resources, livestock production systems, sustainability.

INTRODUCTION

In recent times, one feature of public policies in several countries of Latin America, including Mexico, has been decentralization and democratization by introducing reforms to promote social participation, flexibility in operations, and empowering (Carey, 2007). However, it is clear that the role of governments in these countries is still central for the design, planning, approval, and execution of public policies through their legislative powers. People representatives (that is, Senators and Deputies), even though chosen by popular vote, are not in touch with the constituents who elected them (de Jesse and Larson, 2005). As a result, society receptiveness and participation is scarce and diffuse.

This is particularly the case of environmental conservation of goods and services provided by nature, because of their intangible character. However, community initiatives for environmental conservation are not lacking in Mexico, but many have been promoted for government agencies (Bovenberg et al., 2008). Hence, government responds to observed needs, but that not necessarily implies an active and voluntary social participation. One example of this is the Payment for Environmental Services (PES) Program in the municipality of Coatepec, Veracruz (Fuentes-Pangtay, 2008). This program started in 2002 as a response to deforestation and water shortage. At that time, the municipal government, the municipal water management board, the National Forestry Commission (CONAFOR), the Environmental Protection Council of the state government (COEPA), and other private donors created a trusteeship for water management (FIDECOAGUA). Trustees' contributions and

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charges to population for water use (about USD$ 0.1 /m³ of water) were used to create a fund administered by FIDECOAGUA. The money is given to owners of higher lands to take care of forest cover (Manson, 2004). However, to operate this program it was necessary to enforce citizen participation, even though it was tagged as "voluntary".

Mexico's National Forestry Commission (CONAFOR) is the branch responsible of operating government policies on forestry and national resources for sustainable development. In 2003, CONAFOR created and executed PROARBOL (formerly PSA program), a comprehensive flagship federal PES program encompassing all the economic support given to land owners for taking actions on protection, preservation, restoration, and sustainable use of forests and other natural resources. Applicants for the benefits of the program must meet the requirements described in the annual call. In 2008 the Program enrolled about 15 000 producers from all Mexico and pay them the equivalent of US$ 34 per ha/year (CONAFOR, 2009). This PES program has changed the operating rules since its inception, but relies only on federal funds. Furthermore, as Fuentes-Pangtay (2008) points out, CONAFOR has not changed its approach, as the payment is really a subsidy coupled to passive preservation of forest areas, and it does not help to improve the quality of life of society, nor creates a market for environmental services.

An additional weakness is that the success of the program is only evaluated by some ecological criteria, such as vegetation coverage and forest density, but not for social and economic indexes. Since the PES program is focused on preserving forest canopy, the Program still does not benefit livestock producers taking reforestation actions, or people located at strategic areas such as hydrological basins or where wildlife species abound. Extensive livestock systems, by the use of aggressive practices against nature's preservation such as paddocks burning to promote uniform pasture re-growth, soil compaction, contamination of aquifers resulting from constant application of herbicides, and use of surface bodies of water for cattle drinking purposes, resulted in a simplification of the original ecosystem (Nasi et al., 2002; Sodersqvist, 2003), and lack of sustainability, not only ecological, but also social and economical, creating international migration as an alternative to the reduced income that can be obtained working locally (Del Angel and Rebolledo, 2009).

From the previous description it is clear that current public policies for environmental conservation in Mexico exclude very valuable potential areas, clearly evading social participation. Such policies must be accompanied of institutional development which must include changes in the social structure and the current ways of working, thus redistributing power and recognizing public will. By the same token, it is evident that the application of market mechanisms to consolidate social participation – understood as the clientele or consumers -, has not been intended (Driesen, 2009). The expression of opinions and preferences might contribute to improve quality and effectiveness of policies, and might also have a positive impact on society welfare and environmental conservation.

History of regional development

The state of Veracruz has a great biological diversity. In spite of that, its 3.6 million ha of rangelands (about 50% of the state surface) places it as one of the leading states in Mexico for extensive livestock production. Veracruz is ranked as the first beef cattle state producer and the fifth dairy cattle producer in the country (SIAP, 2009). In the sixteenth century, as a result of Spaniards arrival, coastal lowlands of Veracruz were occupied by cattle farms. The animal species introduced were foreign to these lands, but the abundance of flood terrains and forage favored their growth. Likewise, profusion of trees provided material enough for building corrals (Sluyter, 2003). Archeological evidence found by Siemens (1998) showed the possible existence of luxuriant vegetation around 1500 B.C. This was corroborated by the same author from sketches and descriptions of the nineteenth century, where abundant water bodies and springs are depicted, some of them now gone forever. Currently, livestock systems in the area are based on prairies simple ecosystems, created by slush and burn and the selection of some vegetal species. Cattle feeds on large prairies composed of exotic and native pastures, sometimes supported by the use of herbicides. These production systems provided the foundations for transforming structural elements of the ecosystem and changing natural landscape. Diverse economic studies have determined the low profitability of the systems (Espinosa-Garcia et al., 2000; Espinosa-Garcia, 2001; Vilaboa-Arroniz et al., 2009).

The social efficiency of these livestock production systems has not been a priority to design technological alternatives for cattle production. Also, the principles of sustainable agriculture with economic, ecologic and social viability, and a socially responsible production are still limited, even though pasture sustainability problems and the quest for a solution derive in public utility (Macmillan et al., 2006). On the other hand, from the current demands of society, it is evident the concern for land use, as well as the contradictions among state of knowledge, availability of technology, and the practices in livestock production systems, and the need to develop basic research on how these systems are affecting natural resources, and the magnitude of such an impact, including the deterioration in the well-being of people (Nasi et al., 2002; Sodersqvist, 2003; Lewan and Sodersqvist, 2000). The social cost usually appears in the form of a subsidy that society pays to livestock producers, but this implies that, in doing so, it reduces the quality of life of future generations because they are

deprived of options for use and consumption resulting of an oversimplification of the grazing ecosystem.

The massive scale of changes in land use is a relatively recent phenomenon, but since the time the so-called "growth with stability" economic policy was predominant (middle of the 20th century), environmental problems have scaled-up (Corry and Holtham,1995) and must be a motive of concern for those institutions developing regional policies. From this point of view, the valuation that society makes of natural richness (Zhongwei et al., 2001) and livestock landscapes, as well as their perception of their own quality of life is an indication of their satisfaction of demand for a modification of land use, is of paramount importance for decision-making in matters of public policies for environmental management.

The imminence of climatic change and the sudden reduction in the quantity and quality of natural resources only adds pressure to this subject. Hence, this study aims to elicit the public will of inhabitants of livestock areas in coastal lowlands of the Gulf of Mexico regarding a series of values showing preferences expressed for actions of conservation or economic development, and as a function of the quality of life or well-being they perceive is provided for landscapes in the coastal lowlands. This information may help to formulate public policies for environmental conservation and livestock production systems, taking into account the dynamic of current social demands in Mexico.

MATERIALS AND METHODS

Study design

A Contingent Valuation (CV) approach was used to quantify expressed preferences and changes in well-being for a modification or continuity in land use (Holmes et al., 2004). CV is a survey-based economic technique that allows the valuation of non-market resources, such as environmental conservation (Tisdell, 1993; Hanemman, 1994). The method is based on expressed preferences; for this study, that implied to record increases or decreases on the perception on life quality provided by different landscapes existing in the studied area (Whittington, 1996). Methodologically, the study was based on people ordering their hierarchy of preferences and aligning them with the desired quality standards for their personal life, considering that only one of the proposed scenarios might eventually take place. Such changes would imply to apply sustainable production systems and technology of lesser environmental impact (Hanemman, 1994; Hannon, 2001; Faber et al., 2002).

This methodological approach has the purpose of making a valuation of good and public services with no market value (Farber et al., 2002). Selected values appear as relative units, not necessarily associated to an economical value, but consistent and placed in hierarchical position, following a theoretical order in the actual economic value that public opinions attribute to a particular scenario (Chiesura and de Groot, 2003; Zhongwei et al., 2001).

Population and sample

Population in the state is estimated in over 7.1 million, but the central zone of the state of Veracruz has 1.36 million inhabitants and some 22 000 registered cattle producers (INEGI, 2009). A random stratified sampling was used considering a sample structure similar to that of the population regarding socio-demographic variables (that is, sex, age, education, place of residence, and income), established from the results of the municipality population's profile provided by the last 2000 Census, according to the methodology described by Turpie (2003). Urban residents represented 60% of the total sample size. The field study was carried out in the coastal lowlands of the state of Veracruz, Mexico. The study included rural and urban residents. The rural communities were Paso San Juan, Vargas, Loma Iguana, José Ingenieros, Pureza and Hatillo. The urban area was the conurbation of Veracruz City and Boca del Río.

Questionnaires and survey

A referendum type survey was conducted by means of personal interviews preferably at the residence of the respondents. A comprehensive structured questionnaire was developed to collect data from 199 individuals over 16 years-old. It was assumed that they were mature, independent, and informed on environmental issues, land use, and local circumstances. The questionnaire was pre-tested with 10 individuals in two of the studied communities before its final application. The survey included questions on factors deemed to affect WTP such as age, gender, and monthly household income. The questionnaire contained questions with alternative answers previously indicated to the respondents (stimulated/closed), using Likert type scales. Respondents selected their opinions, uses, preferences, values and perceptions on public policies related to environmental issues, natural resources, and land use, according to their own personal point of view. Several hypothetical scenarios for environmental conservation and economic development were proposed, primarily as opposite categories, but susceptible of convergence if land use is eventually modified. Of course, this last scenario implies shifting current production system into another of sustainable management. The new system would keep and improve the quality of the natural values, mainly of vegetal coverage connected by biological corridors, as well as the protection on land and water bodies. For this purpose, photographs of common landscapes in the zone were shown to the respondents and graded from one to ten in a Likert scale. Grades from one to four were considered variations from worst to bad. Five and six grades were considered indifferent. Seven was regular, and from eight to ten were variations from good to excellent. Respondents were informed that their voluntary economical support would be required as a way of expressing their positive disposition to environmental conservation.

Compilation of WTP data

Mean WTP and median WTP were calculated with respect to each scenario. Variable Y denoted each value, while the number of individuals who are willing to pay more than the presented price (that is, marginal value) denoted the number of individuals willing to pay an extra money unit (X). The values were plotted on an *X*-*Y* plane and approximated on the basis of the following exponential function.

$Y = \alpha e^{\beta X}$ (*)

where: *X*: Value, X: Number of tolerant individuals, α, β: Constants

Constants α, β in the formula above and the coefficient of determination adjusted for the degrees of freedom R^2 were calculated. Price values were plotted on the vertical axis, while the number of individuals willing to pay a higher price than the presented price was plotted on the vertical axis. This made it possible to visually represent how WTP varied within the population. In order to adjust various factors at the same time, logistic regression analysis was

conducted assuming that WTP is a dependent variable and that gender, age, education, residence, and income are independent variables. The dependent variable has a binomial distribution (0 for no, 1 for yes). Independent variables were gender (0 for female, 1 for male), respondent's age, number of years of education, place of residence (0 for rural, 1 for urban), and monthly household income expressed in Mexican pesos.

Statistical analysis

For choosing the best landscape, responses were compared by use of the Kruskal-Wallis test. Preferences for environmental conservation policies in grazing areas were analyzed by correspondence analysis (Hair et al., 2006). The variables considered in the perceptual map were income bracket, opinion on passing legislation regulating grazing lands, and attitude toward rangeland appropriation. Statistical significance was defined as $p < 0.05$. Statistical analysis was done with p values of less than 0.05 were considered to be statistically significant. All statistical analyses were performed using the statistics software SPSS ver.15.0 (SPSS Ltd., Chicago, USA).

RESULTS

Descriptive statistics

The mean age was 41.6 ± 17.0 years old. As for age distribution, the percentage decreased as the age increased. The mean annual income was USD$4,530.2 ± 4.953.4 (Table 1). Representatives from all levels of education were also included, but most people had an elementary education.

Opinion on environmental quality, abundance and quality of natural resources

Rural residents were indifferent to urban landscapes (median grade of 5). On the contrary, urban residents considered the quality of life in urban environments as good (median grade of 8). Both groups graded rural landscapes as good, the quality of natural resources and the abundance of natural resources (median grade of 8). Interestingly enough, interviewed rural residents were not very attracted for urban settings, but value the most those landscapes where they live in. Moreover, it seems that those significant features of the landscape (grazing lands and livestock) are considered as everyday scenery and in their mind as "natural landscape".

Choosing best landscapes

Overall, the landscape which was considered having the best landscape for economic development was cattle confinement (median grade of 9), followed by induced pasture (median grade of 8). Also, in the opinion of the respondents, the worst landscape was natural prairies (median grade of 4). Difference was significant by Kruskal Wallis test (chi square value 251.9, df 9, significance 0.00).

Coincidentally, the landscape which was considered having the best landscape to live in (best life quality provider) was cattle confinement (median grade of 8), followed by induced pasture (median grade of 7). Vegetation islands, Riparian vegetation, and mixed natural prairie/induced pasture received the lowest grades (median grade of 4). Difference was significant by Kruskal Wallis test (chi square value 227.4, df 9, significance 0.00).

According to the respondents, the best landscape for conservation and stabilize ecosystems was cattle confinement (median grade of 9). The lowest grades were for natural prairies, mixed prairies, open Riparian areas, and prairies/forest. Difference was significant by Kruskal Wallis test (chi square value 219.3, df 9, significance 0.00).

Opinion on grazing lands

Rural residents were indifferent to the appearance of regional grazing lands (median grade of 6), but they perceived the quality as regular (median grade of 7). On the contrary, urban residents graded the appearance of regional grazing lands as regular (median grade of 7), but were indifferent to their quality (median grade of 6). Information from interviews showed that a great deal of the population have noted environmental changes in the region. Such changes have accelerated in the last 15 years with activities as increased deforestation, increased surface for cattle production, reduction of freatic layer water, swamps desiccation, and urban growth. Noteworthy is that according to the respondents, such changes have supported economic development in the region, even though they cannot provide examples of a positive impact on their life quality or on a better job. This finding may mean that the population internalized media spots promoting government achievements for regional development at the expense of destruction of natural resources.

Opinion on environmental policy and legislation

Policies of previous governments were graded as bad (median grade of 4), because they had not real concern for the environment. However, efforts from recent government received a better grade (median grade of 7), but people ignore what such policies deal with. People pointed that current different governments (federal, state, and municipal) have been unable to carry out joint activities for an adequate management of natural resources, to protect the environment, promote more sustainable production systems, impact positively the environment, and increase the quality of life of population. From the interviews, bad polices of the past, such as scarce promotion among livestock producers of preservation and maintenance of vegetation with multiple structure (such as shrubs and trees) resulted in clearing of the ground. A

Table 1. Personal characteristics of respondents to a survey to determine environmental perceptions and management of natural resources in the tropical lowlands of Mexico.

Variable	No.	%
Age (Years)		
< 30	59	30
31-45	60	30
46-60	48	24
> 61	32	16
Gender		
Male	126	63
Female	73	37
Education		
None	9	4
Elementary school	89	45
Middle school	31	16
High school	33	17
College	37	18
Residence		
Urban	121	61
Rural	78	39
Annual income (USD$)		
> 18201	12	6
9801 - 18200	27	14
4901 – 9800	48	24
< 4900	112	56

general opinion (52%) is that cattlemen ignore environmental problems because they often rule their actions by economic instead of ecologic criteria. Raje et al. (2002) pointed out that private income is the main determinant for use of land and technology.

According to respondents (98%), the government is responsible of modifying public expenses to promote environmental conservation and improvement of natural resources in grazing areas using federal funds. Conversely, a different opinion exists regarding the potential pass of legislation for livestock regulation and improvement of natural resources in grazing areas, even at the expense of turning the current production system into another of less environmental impact and probably less profitable. Urban population (65%) favored this proposal, but rural residents (15%) did not.

Since, legislation is the foundation for environmental protection it was deemed appropriate to identify social demands for viable mechanisms ensuring environmental protection by enforcing law application. The most proposed mechanisms were to subsidize livestock producers observant of that law (82%), rangeland appropriation of areas of ecological value (33%), environmental education (25%), and impose severe fines to people breaking environmental protection laws (14%).

Environmental policies scenarios

Three different scenarios that may happen in the region and may be included in environmental policies were proposed. Such scenarios were: 1) to maintain the current situation, keeping livestock production systems unmodified; 2) to change for a sustainable production system, including improvements on vegetation cover, soil and conservation; 3) change in land use by exclusion of livestock production. Respondents graded using values equivalent to those that governement would include as public expenses for conservation in livestock areas. Grading was based on the assumption would include the implementation of some legislation, and the inclusion of the activities as a part of public expenses. The scenario selected by the respondants as the most favorable for the region is the one that allows for a continuity in livestock

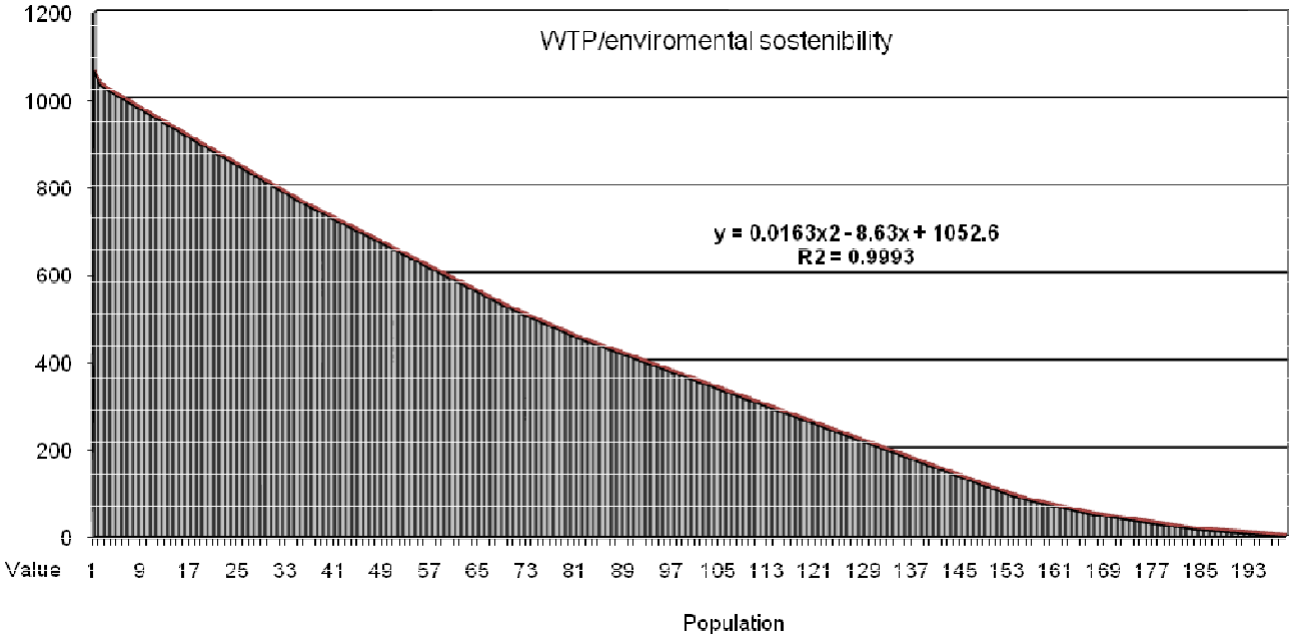

Figure 1. WTP for environmental sustainability policy preferred by 199 participants in a survey conducted in the tropical lowlands of Mexico (amount in Mexican pesos).

Table 2. Variables in the equation for WTP for preservation of natural resources in the tropical lowlands of Mexico.

Variable	β	S.E.	Wald	Sig.	Exp(B)
Gender	-0.133	0.436	0.093	0.761	0.876
Age	-0.010	0.013	0.578	0.447	0.990
Education	-0.015	0.060	0.065	0.799	0.985
Residence	-0.614	0.481	1.630	0.202	0.541
Income	0.000	0.000	3.907	0.048	1.000
Constant	1.991	0.871	5.226	0.022	7.324

activities (91%), but including some mechanisms for sustainability and conservation.

WTP for preservation of natural resources

In the final model, only income resulted significant for the WTP for the preservation of natural resources (Table 2). Income, theoretically considered the most important value for WTP, shows tan people in the high income bracket (> USD 1,310/month) were more prone to pay. This group also favored the appropriation of grazing lands for conservation purposes and support passing laws to regulate the environmental impact of livestock systems. On the contrary, people with a negative dis-position for payment, are against lands appropriation and enacting laws for controlling livestock ecological impact.

In general, this second group are from the medium (USD 581-1300/month), low (USD 291- 580/month), and marginal income brackets (<290/month).

In Figure 1 it is observed that only 41 % of respondents considered to pay more than the average (the equivalent of USD$ 5.27) Noteworthy is that livestock production is an important activity for the res-pondents, rural and urban. They argue that this activity provides milk and meat, but also job to people living in rural areas. This vision is unrelated to reality since in recent times there has been strong migration out of rural communities because the expectations of finding a job in agriculture related activities is scarce (Del Angel and Rebolledo, 2009).

Preferences of respondents regarding their individual WTP for environmental conservation are shown in the perceptual map of Figure 2, where 76% of the variance

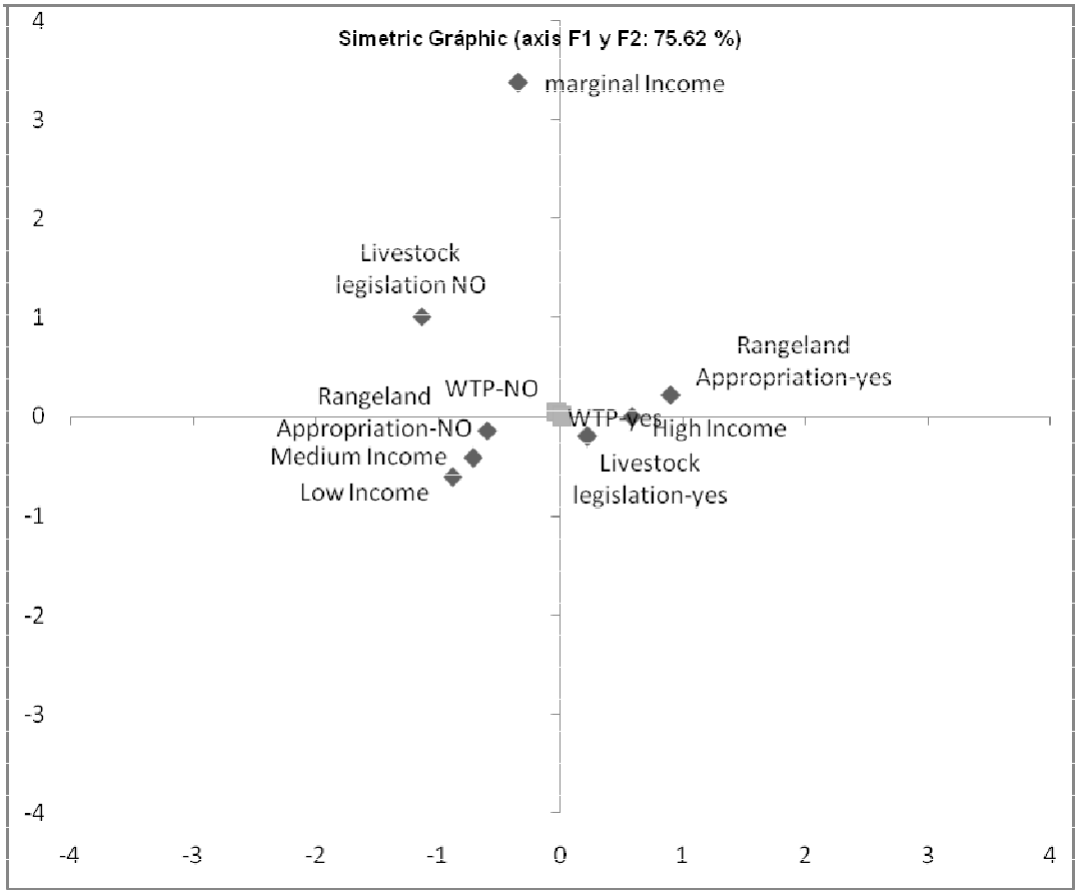

Figure 2. Preferences for environmental conservation policies in grazing livestock areas of coastal lowlands of Veracruz, Mexico. WTP = 0.46 USD 0.in average bimonthly in water invoice.

was explained by the model. In this figure, positive WTP and negative WTP appear in different planes representing different trends. High income is near to a positive attitude towards rangeland appropriation and to passing laws for regulating livestock activity impacts on natural resources. On the contrary, people in the medium and low income brackets were in favor of preventing the appropriation of lands and passing laws to regulate livestock activities.

DISCUSSION

Information obtained from the survey show the need to consider people demands into policy-making regarding environmental conservation and natural resources management. The public is no longer a passive spectator of official initiatives, but a necessary and avid interlocutor for dialog in search of social disposition and collaboration regarding livestock related issues (Clark et al., 2000). Media overloads population with information on environmental problems and demands now represent actual needs for giving continuity to livestock production frameworks (Klesner, 2007). Environmental legislation is a challenge to the government, because of the traditional opposition between development and conservation.

From the data collected, population is conscious of clearance of lands and water and soil problems resulting from livestock continuous presence. People are comfort-table with cattle but also appreciate the benefit of having policies for regulate land management and production systems currently in use and ensure sustainability. Their willingness for increase public expenditure for conservation purposes provides a chance for mitigating deforestation problems and to promote citizen involve-ment. Nevertheless, it is palpable some disinformation of the population regarding environmental policies, especially of those laws regulating agriculture activities. In recent years, some sound laws have been passed in Mexico on sustainable rural development (LDRS, 2001) and ecological equilibrium and environ-mental protection (LGEEPA, 1988, last reformed in 2008). Both laws provide a framework for soil and water management in crop and livestock production, but are not known for livestock producers neither for the rest of the population. This lack of awareness and enforcement results, at least

partially, from scarce integration between government and society, as well as inadequate feedback mechanisms for needs, demands, solutions, and collaborative opportunities.

About a quarter of a century ago, participation of population in politics represented “a dark area of ignorance” as stated by Kinder and Sears (1985). At the time, the topic of politics was considered irrelevant for most people, since they were more concerned for their own personal life problems and activities. Nowadays, the globalization process speed up information that use to circulate slowly and restricted to part of the population. Media brought environmental problems to the forefront in the Western Hemisphere, and with that, the issue of public goods (Ruijgrok, 2001; Farber et al., 2002).

This situation is a point for discussion and academic concern. The problems of climate change, water, erosion, desertification, environmental contamination, and natural disasters converge into reduction of vegetation cover, loss of forests and biodiversity. The effect of this problems is directly proportional to the quality of life and well-being that society perceives to receive from the ecosystems they live in (Mansky, 2000; Van Rensburg et al., (2002).

Developed countries have appealed to the concept of public goods searching for options and answers for decision making related to conservation (Scarpa, et al., 2001; Pouta, et al., 2002; Raje et al., 2002; Lewan and Sodersqvist, 2002; Carpenter and Seki, 2006). However, in many developing countries where natural resources abound, the mechanisms for bringing together government and society have not been consolidated. In Mexico, public recognition of environmental problems is the spearhead for strengthening actions for conservation (Chiesura y de Groot, 2003; Zhongmin, et al., 2003). Indeed, the participation of society in generating alternatives, programs and public policies is unclear. Most initiatives are looking for population support for their application, but little advance has been achieved in terms of social participation, probably because the initiatives are vertical in nature, coming out of official agencies (Akpabio and Ekanem, 2009).

Official internet portals, blogs and discussion sites are increasingly used for proposing initiatives and ask for feedback from the public, but it must be recognized that most of the population in developing countries have not access to these resources and even ignore its existence. Formulation of integral plans and development of sustainability and environmental quality programs must respond to the changing needs of a now more informed population (Costanza et al., 1997). Here is where the possible social participation starts its fracture. In order to achieve this, power redistribution must occur, but until now, spaces allowed are reduced. Society’s willingness to be a part of the solution is encouraged by the emergence of a series of autogestive private initiatives for conservation, mainly in ethnic areas where communities live in the middle of valuable natural resources (Klooster, 2003). These initiatives are at the opposite side of official initiatives. However, such initiatives must ideally result from a co-participation between Government and private organizations.

During last year’s, social and cultural dynamics in society have accelerated but cannot keep the pace with economic and technological changes. Paradoxically, returning to basic universal values seems necessary to respond to inequalities and exclusions, but the process of integrating the public into new paradigms should not include the same contents and be done in the way it used to. In such situations, Huda et al. (2009) emphasize the relevance of an adequate feedback between public offer and social demands. Public policies must not be limited to ensure continuity in environmental programs nor to inertial budgetary and management services. Cultural and economical changes impose new challenges. Current population demands are beyond the coverage of basic needs, oriented by the constant flux of information that media send to the public about environmental problems and climatic change.

Because of the previous discussion, in the case of Mexico, in order to hasten conservation programs and rightful fulfillment of environmental legislation, it must be considered that land opportunity costs are usually higher than those estimated for subsidies. Consequently, the amount paid by preserved hectare is usually very low (Fuentes-Pangtay, 2008), and unattractive for land owners. Hence, social recognition to conservation activities, as a mechanism of participatory compensation, is important to finance programs and promote environmental laws observance. Mutual recognition of government and society for creating spaces and redistribute power and resources must be achieved. If spaces for an effective social participation are lacking, the official monopoly in decision-making and use of public resources cannot be expected, even when efficient environmental public policies are developed. In summary, political elements (such as redistribution of power and resources, creation of political space), organization ele-ments (such as development of institutional mechanisms and response capability), or even population elements (such as willingness or organization), must concur to achieve an effective social participation in public policies of conservation and adaptation to threats such as climatic change.

Conclusions

Rural and urban groups graded as good rural landscapes, quality of natural resources, and abundance of natural resources. Policies of previous governments were graded as bad, but recent government efforts received a better grade. People think (52%) that cattlemen ignore environmental problems and often act by economic instead of ecologic criteria. Urban population (65%) favored potential approval of legislation to regulate the use of natural resources in grazing areas, but rural residents (15%)

did not. Proposed mechanisms to enforce environmental laws were to subsidize livestock producers (82%), rangeland appropriation of areas of ecological value (33 %), environmental education (25%), and severe fines to offenders (14%).

In conclusion, inhabitants of seven rural communities and two cities in grazing areas of coastal lowlands of East Mexico considered cattle presence as everyday scenery and in people's mind it is a "natural landscape". Results suggest that these types of studies are basic for designing public policies related to current social demands. The need of more openness and public participation is clear. At least in Mexico, it is contradictory that government relinquish to society part of its responsibility, as in the case of the PES program, but at the same time evades the creation of open spaces and redistribution of power for an effective social participation.

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