Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.5, No.4, 2014

Environmental Awareness of the Young in a Rural Community in the Sierra Tarahumara, Chihuahua, Mexico

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Abstract
With the aim at exploring the environmental awareness of the young sector in a predominantly indigenous community, fifty structured street interviews were applied to young individuals, aged 14 to 21, attending schools at Turuachi, a distant undeveloped rural community in the Sierra Tarahumara, in the State of Chihuahua, Northern Mexico. The data were analyzed by the software SPSS® (Statistical Package for Social Sciences). Most of the interviewees showed a good knowledge of basic ecology concepts. However, their perception of environmental problems appeared to be more influenced by everyday experiences. Despite forest being a major natural resource in the area, the group studied viewed cropping as the main economic activity. The main environmental problem was garbage pollution followed by deforestation and drought. The Chi^2 test showed that women had a stronger perception than men about the garbage issue ($p<0.057$) and a clear disposition ($p<0.001$) to participate in municipal cleaning campaigns. Nearly all the participants were willing to engage in activities to preserve environmental quality; community action and specific workshops were selected as viable organization alternatives.
Key words: environmental education, community participation, environmental problems.

Introduction

The negative impact of the current lifestyle on the environment makes it necessary to pay more attention to the analysis of human environmental behavior and its social interaction (Correa y Rodrigo, 2001; Mabee, 2004; Olsson *et al.*, 2004; Sosa *et al.*, 2008). The inclusion of the environment as a topic in the economic and social development schemes creates the need for monitoring the environmental quality and awareness of the population (Alcalá *et al.*, 2006). Research intended to obtain information about what a particular community's inhabitants know, think and feel about their environment is necessary to design public programs and policies that foster the participation of citizens (Starr et al, 2000). Therefore, the community has to be consulted, both individually and collectively, about their values, thoughts and behavior towards their quality of life and the solution to their environmental problems (Kos *et al.*, 2003). In the state of Chihuahua, environmental policies have gradually become a topic of public interest (Alcalá *et. al.*, 2006). Surveys and interviews are efficient ways to obtain the opinion of human populations (Kerlinger, 1988).

Although the perceptions of human populations in Chihuahua have been addressed in previous studies (Alcalá *et al.*, 2006; Alcalá *et al.*, 2007, Sosa et al, 2008), there is little information about rural communities, in particular those further away from big population centers. In the Alta Sierra Tarahumara, in Northwest Mexico, there are many communities of predominantly indigenous origin, whose value system gives them a particular vision of its natural environment. Age and education are socio-demographic variables that have been positively associated with concern for the quality of the environment (Van Liere and Dunlap, 1980). Formal education has been a driving force for the economic and social development of the new generations in such remote mountain communities. Young people are a sector of special interest, given their great dynamism and opportunities to access education. Hence, it is relevant to document their perception of the processes of the ecological deterioration at the local level. The opinion and participation of young people, as potential agents of change, can be very useful for the implementation of programs and projects by government institutions and social groups interested in tackling environmental issues. Balderrama et al (2012) found that young people attending school on an indigenous mountain community, had a positive influence on their mothers, in terms of knowledge about on environmental issues. The objective of this study was to know the perception of young people from the *sierra* in the community of Turuachi, Guadalupe y Calvo, about the prevailing environmental issues.

Materials and Methods

The study was conducted in the community of Turuachi, Municipality of Guadalupe y Calvo, Chihuahua, located in the Alta Sierra Tarahumara, 400 km southwest of Chihuahua City. The population is divided into three main towns, which together account for 2,371 inhabitants (INEGI, 2005). The municipality is one of the country´s most undeveloped, with a 21.5% illiteracy rate in 2010 (SNIM).

Fifty structured interviews were performed on the young people sector of the community, who were approached

by an interviewer at the town´s main streets and square. Data collection was carried out in a three consecutive day period in August 2008. The questionnaire included socio-demographic data (sex, age, and schooling) and questions about: ecology and environmental education concepts; knowledge of their area´s natural resources; economic activities and community services; causes of environmental degradation and strategies for community participation. The questions and answer options are presented in Tables 1.

The statistical package SPSS was used for data processing and analysis which included frequency, percentage distributions and crosstabulations.

Table 1. Description of items evaluated in the community to know their environmental awareness.

Question	Answer options
What do you understand by Ecology?	1. Working for the community. 2. Changing manners of the population. 3. Studying the relations between living beings and their environment. 4. Getting people involved 5. I do not know about the topic.
What is environmental education?	1. Loving nature. 2. Process through which natural resources are protected by the population. 3. Management of ecology groups. 4. Permanent process of value formation and fostering. 5. I do not know about the topic.
Number from 1 through 7 the importance of the topics in an environmental education program.	Water, deforestation, garbage and recycling, energy, flora and fauna of the municipality, rivers and streams, drought.
How many courses or talks on environmental education have you attended to?	None, one, two, more than two.
Choose two activities that you consider should be done to promote environmental education.	Celebrating the World Environment Day; celebrating the World Water Day; municipal cleaning campaigns; conferences and lectures.
Number from 1 through 6 the relevance of the topics for the Municipality.	Vegetation, air quality, waste, medicinal plants, plagues, deforestation.
Which resources from the municipality do you consider more characteristic?	Temperate forest, prairie dog, rocky formations, deer, oaks, pines.
What do you consider are the causes of environmental degradation?	Population growth, felling of vegetation, garbage pollution, deforestation, lack of rain, poverty, lack of water.
Out of the following activities, which do you consider help fostering the participation of the community in solving problems?	Neighbors' meetings, talks in schools, tours to rivers and streams, community activities.
Which services do you consider most important for the municipality?	Health, potable water, housing, agricultural production, telecommunications, urban sanitation, electricity, sewage.
Out of the following economic activities, which do you consider the most characteristic of your municipality?	Cropping, mining, livestock, crafts, tourism, forestry.
How do you get aware about the social, economic and environmental problems of your municipality?	Television, conversations, newspapers, personal experience, others.

Results and discussion

Forty six percent (23) of the subjects were women and 54% (27) were men. Age ranged from 14 to 21 with a mean of 16 years old with. Eighty four percent was doing or had concluded high-school while 10% and 6% were attending middle-school and elementary school, respectively (Figure 1).

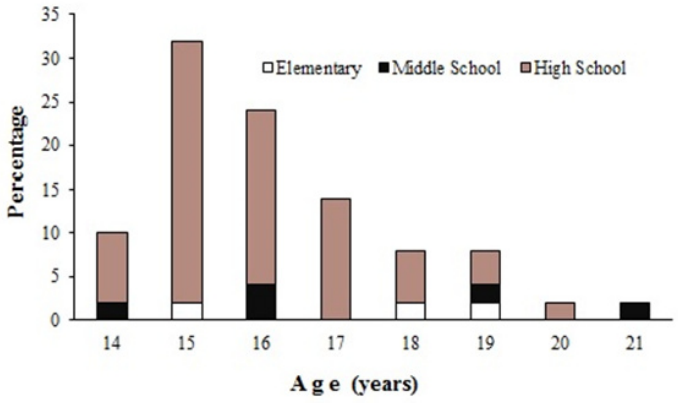

Figure 1. Age and educational level of the young interviewed

The knowledge of basic concepts relative to the environment is shown in Table 2. More than half (58%) selected

the concept considered most adequate about the meaning of environmental education. This level of awareness was relatively high, considering the population's rural origin. The exposure of the young population to technical concepts of ecology and environment is relatively high, given that the majority of the participants had already taken at least one specialized course. This would explain in part the good level of basic knowledge found in the group of surveyed young people.

Table 2. Level of familiarity of the interviewees with basic elements about environmental education.

Question	Number	Percent	Notes
What do you understand by Ecology?	19	38%	Proportion that selected the proper concept.
What is environmental education?	29	58%	Selection of the proper concept among four answer options.
How many courses or lectures on environmental education have you attended to?	29	58%	Proportion that has taken at least one course/lecture on environmental education.

There was not a consensus on the main environmental problem. However, garbage disposal appeared to be the most important issue for a third of the interviewees. The youth preferences for programs and activities on waste recycling and municipal cleaning campaigns denotes a community concern. The perception of waste disposal as a source of pollution and a major environmental problem is consistent with findings in other studies in the rural environment, such as those found by Carrillo (2005) in rural communities in the State of Chihuahua. Such a perception has been associated to everyday experiences rather than to knowledge gained through formal education. Since there is not a town´s landfill, free garbage disposition makes it an evident problem.

The Chi-squared test results in Table 3 showed that women had a higher perception of the environmental problem caused by the urban solid residues. Again, the perception may be associated to the proximity of the female sector to the household chores. This finding gives young women a strategic value for implementing initiatives towards management of environmental issues, such as waste residues.

Table 3. Significant Chi^2 gender comparisons

Gender	Frequency	Percentage	Chi^2 Value
Causes of environmental degradation: Pollution by garbage			
Female	12	48 %	0.057
Male	5	22 %	
Activities to promote environmental education: Municipal cleaning campaigns			
Female	27	100 %	0.001
Male	14	17 %	

The results in Table 4 show that deforestation was perceived second in importance although it had the highest (42%) preference as a topic for release in the municipality. This is consistent with the majority (74%) of young people perception of pine trees as the most distinctive natural resource of the region. Nevertheless, rather than forestry, the youth perceive agriculture as the most characteristic economic activity.

As for the public services, health (58%) and drinking water (28%) were by far the most important. These perceptions may be associated to the community´s state of economic deprivation, where the satisfaction of the most basic services is still of overriding importance.

Most of the young people interviewed (>80%) appeared to be receptive to environmental education in conferences and talks, and willing to participate in communal activities. Direct communication involving the whole community was a preferred way to tackle the environmental problems in the community. These would be mainly in the form of general community activities (36%), lectures and workshops in schools (28%) and people meetings (20%).

Table 4. Results of the interview applied to young people.

Question	Answer options	Frequency	Pctg.
Number from 1 through 7 according to the importance of the topics in an environmental education program.	Deforestation	10	20 %
	Garbage and recycling	7	14 %
	Drought	4	8 %
	Municipality's flora and fauna	3	6 %
	Rivers and streams	2	4 %
	No response	1	2 %
Choose two activities that you consider should be done to promote environmental education.	Lectures and workshops about environmental education.	42	84 %
	Municipality cleaning campaigns.	41	82 %
	Celebrating the World Environment Day.	5	10 %
List from 1 through 6 according to the relevance of the topics to be promoted in the Municipality.	Deforestation	21	42 %
	Vegetation	12	24 %
	Air Quality	5	10 %
	Waste	3	6 %
	Medicinal Plants	2	4 %
	Plagues	2	4 %

Table 4. (Continued)

What are the municipality's natural resources that you consider more characteristic?	Pines	37	74 %
	Holm oaks	16	32 %
	Rocky formations	3	6 %
	Deer	2	4 %
	Prairie dogs	1	2 %
What causes do you consider are contributing to the environmental degradation?	Garbage pollution	17	34 %
	Deforestation	11	22 %
	Population growth	7	14 %
	Poverty	6	12 %
	Vegetation felling	5	10 %
	Lack of rain	2	4 %
	Lack of water	1	2 %
Out of the following activities, which do you consider help fostering the community participation in problem-solving?	Neighbor's meetings	14	28 %
	Community activities	18	20 %
	Talks in schools	10	12 %
	Tours to rivers, streams	6	36 %
What services do you consider are more important for the Municipality?	Health	29	58 %
	Potable water	14	28 %
	Housing	2	4 %
	Agricultural production	1	2 %
	Telecommunications	1	2 %
	Urban cleaning	1	2 %
	Electric service	1	2 %
	Drainage and sewage	1	2 %
Out of the economic activities, which do you consider characteristic of Guadalupe y Calvo?	Agriculture	26	52 %
	Forestry	15	30 %
	Mining	4	8 %
	Cattle-raising	2	4 %
	Crafts	1	2 %
How do you find out about the social, economic and environmental problems of your municipality?	Comments	21	42 %
	TV/Radio	10	20 %
	Personal experience	10	20 %
	Newspapers	3	6 %

Conclusions

Most of the young people interviewed showed a good background on the basic ecology concepts. This level of awareness may be associated to the effectiveness of formal education programs in the local schools. However,

perception of environmental problems appeared to be more associated to immediate everyday experiences than knowledge gained in school. There was not a consensus about the main environmental issue in the community but pollution by garbage mishandling was the most frequently pointed out. Statistically (Chi^2), women were more sensitive to the garbage problem and showed higher disposition to participate in municipal cleaning campaigns. Pine trees were perceived as the most distinctive natural resource but forests were second to cropping in the local economy and deforestation was second to garbage pollution as environmental issue. The knowledge of the social-demographic attributes will allow for the application of different conservation strategies according to the work group. The participation of the different levels of government to solve this problem is paramount through the implementation of community campaigns for improving the environment.

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