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SOCIAL PERCEPTION

OF THE CLIMATE CHANGE PHENOMENON: A CASE STUDY IN THE COASTAL COMMUNITY OF O'BOURKE, CUBA

PERCEPCIÓN SOCIAL SOBRE EL FENÓMENO DEL CAMBIO CLIMÁTICO: ESTUDIO DE CASO EN LA COMUNIDAD COSTERA O´BOURKE, CUBA

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ABSTRACT

The phenomenon of climate change has attracted an unprecedented level of attention and has generated an international mobilization in the search for strategies to address and mitigate it. In order to confront it, research in which multiple sciences interact and there is a dialogue of knowledge are increasingly necessary. This work analyzes the social perception of the phenomenon of climate change among key social actors in the coastal O'bourke community, in central-southern Cuba. A semi-structured interview, questionnaire, participant observation and drawing technique were used to identify social perceptions. The results showed that the different social actors have insufficient knowledge about the environment and the phenomenon of climate change, have a low perception of risk in the face of this problematic and of the socio-environmental problems that most affect the community.

Keywords: social perception, climate change, environmental, social actors, coastal community

RESUMEN

El fenómeno del cambio climático posee un nivel de atención sin precedentes, y ha generado una movilización internacional para la búsqueda de estrategias destinadas a enfrentarlo y mitigarlo. Para su enfrentamiento se hace cada vez más necesario de investigaciones en las cuales interactúen múltiples ciencias y exista un diálogo de conocimientos. Este artículo analiza la percepción social sobre el fenómeno del cambio climático en actores sociales claves de la comunidad costera O´bourke, Cuba. Para identificar las percepciones sociales se utilizó la entrevista semiestructurada, el cuestionario, la observación participante y la técnica del dibujo. Los resultados muestran que los diferentes actores sociales poseen un insuficiente conocimiento acerca del medioambiente y del fenómeno del cambio climático, poseen una la baja percepción del riesgo frente a este fenómeno y de las problemáticas socioambientales que más les afectan.

Palabras clave: percepción social, cambio climático, medioambiente, actores sociales, comunidad costera

INTRODUCTION

The sixties of the twentieth century marked several milestones in the history of humanity, including the emergence of an environmental movement in response to the growing environmental problems. That became increasingly evident in those years. The publication of the book Silent Spring (1962) by Rachel Carson and the publication of the First Report to the Club of Rome on the Limits to Growth (Meadows, Meadows, Randers, and Beherns, 1972), contributed greatly to the development of this environmental movement and specifically to the emergence of an interdisciplinary field of study that has been enriched over time.

Currently, there are multiple and growing global environmental problems, including ozone layer depletion; air, water and soil pollution or degradation; desertification and drought; biodiversity loss; and climate change. However, in the last decades it has been more strongly perceived and recognized by the international scientific community that these environmental problems are not independent, but form a network of relationships among them.

THEORETICAL BACKGROUND

In recent decades, the problem of climate change has attracted an unprecedented level of attention, and this has generated international mobilization for concerted actions to mitigate it. A dynamism in terms of technological innovation to have the tools to alleviate its causes and a growing concern about its possible negative consequences/adverse effects on the development of countries. According to the IPCC, the climate change is interpreted as:

> ...a modification in the state of the climate that through the use of statistical tests can be identified by changes in the mean and/or variability of its properties and that persists for an extended period, typically decades or longer. These changes may be due to natural internal processes, external forces, or persistent anthropogenic impacts on the composition of the atmosphere or in land uses. (IPCC, 2001)

Article 1 of the United Nations Framework Convention on Climate Change (UNFCCC) defines the climate change as "a change of climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere and in addition it is due to natural climate variability observed over comparable time periods" (UN, 1992). Given the importance of this definition elaborated and adopted in 1992 by the United Nations, and corrected at the UNFCCC held in Nairobi in 2006, to which Cuba is a signatory. Then, this concept is assumed in the present research.

At present, climate change has become a global emergency, which has generated great concern and awareness on awareness by the scientific community, international organizations, and social and religious movements. These and other processes have led to the development of multiple international forums and institutions, organizations and scientific publications that have promoted the study of this environmental problem. Among them, it is important to highlight the United Nations and its network of institutions, which has played a key role in the development of this issue. Also noteworthy is the role of the United Nations Framework Convention on Climate Change (UNFCCC), which seeks to achieve stabilization of greenhouse gas concentrations in the atmosphere. At a level that prevents dangerous anthropogenic interference with the climate system and within a time frame sufficient to allow ecosystems to the climate change, ensuring that food production is not threatened and allowing economic development to continue in a sustainable manner. However, it should be pointed out that the meetings held by the UNFCCC in recent years have not produced achievements with positive impacts on the reduction of global greenhouse gas emissions.

Other international initiatives have had a positive impacts on the study of climate change, including the Millennium Development Goals (MDGs) approved by the United Nations during the Millennium Summit in 2000, whose goal seven was aimed at ensuring environmental sustainability; and the Sustainable Development Goals/Agenda 2030 approved in 2015 (UN, 2015a), whose goal 13 is linked to climate actions. In turn, the Intergovernmental Panel on Climate Change (IPCC), as an organization created at the request of UN member governments, whose work provides unquestionable reports based on scientific evidences.

According to García (2018), Cuba as an Island State does not escape of this environmental problem; on the contrary, over the last years it has become increasingly evident. Consequently, the country's natural resources are affected to varying degrees, both in terms of their availability and quality, and there is a significant degree of pollution and environmental deterioration (PCC, 2017). Hence the need for the Cuban State to implement policies for the achievement of more effective solutions to minimize and mitigate the environmental situation and to continue strengthening and consolidating the operation of comprehensive environmental protection programs based on confrontation and adaptation actions such as the State Plan to face the Climate Change in the Republic of Cuba ("Life Task" in Sp. "Tarea Vida") (CITMA, 2017). This state policy recognizes the value and importance of protecting natural

resources, particularly coastal areas; and pays special attention to their various environmental problems. Coastal areas house diverse ecosystems, numerous human settlements, and support different socioeconomic activities of significant importance for the development of the country. However, they present different levels of affectation in various parts of the national territory, which endangers the natural, cultural and economic heritage (Garcia, 2020).

Taking into account that climate change represents a threat with potentially irreversible effects for human societies and the planet (and so-called as "a common problem of humanity") (UN, 2015b); so its research and understanding have a great interest for researchers from various branches of science. It should be noted that within environmental studies, natural and technical sciences have a higher hierarchy compared to other sciences, as is the case of social sciences. Therefore, studies on the adverse phenomena of climate change from the social sciences also play a fundamental role in the knowledge, confrontation and mitigation of this problem; and from the sociological point of view, they contribute to break the asymmetries expressed in environmental research.

Within the social sciences, social perception studies are considered as one of the most important tools that can contribute to the study of climate change and its adverse effects from the community point of view. This kind of studies represents a socio-environmental tool to evaluate at the social level how people perceive, understand, and/or are aware of the occurrence of certain phenomena (their manifestations, impacts, consequences, etc.) and on that basis, adopt strategies, policies, make decisions, among others in relation to their confrontation. In addition, they seek to make them participatory, on the basis of democratizing science and establishing a dialogue of knowledge, based on the recognition of "the other".

Perception studies were originally based on social disciplines such as philosophy and psychology. According to Fernández (2008), from Descartes times until the mid-twentieth century, the subject of perceptions had its privileged field of analysis in philosophy, where there was a certain consensus in pointing out that perception is the exercise of the human senses that contributes to a great extent and in a fundamental way to knowledge. Thus, the first theoretical current of perceptions emerged in the sixties and seventies of the last century, which conceived perceptions as the response of the senses of sight, taste, smell, touch and hearing in human beings.

Meanwhile, from psychology, particularly environmental psychology, the perception of the environment is studied from the individual, where studies on the relationship of the individual's response to his environment through sensory stimuli standout a significant importance. It is in this discipline where the concept of environmental cognition arises from the knowledge and behavioral response of the human being towards the environment; which is drawn, formed and communicated by other humans. This concept, associated with the sensory perception of the environment, was a precursor of the concept "environmental perception" or environmental perception that was used later in geography, another science that also contributed to the development of perception studies.

According to García (2020), investigations on climate change and its impacts have been a priority for several decades in Cuba. The geographical location of Cuba in the Caribbean Sea and its archipelago status make the country highly vulnerable to events associated with climate variability, with high impact on economic, social and cultural sectors. These studies have also emphasized on measures of adaptation to climate change, recognizing the economic and infrastructure limitations. Studies on climate changes were initiated by the Cuban Academy of Sciences (ACC) in 1991 with the creation of the Climate Change Commission, and the National Climate Change Group was formed in 1997. The so-called "Macroproject on coastal hazards and vulnerability for the years 2050-2100" was launched in 2007 by the Ministry of Science, Technology and Environment (CITMA) with the participation of five agencies of the Central State Administration (OACE); and finally was approved in 2011 by the Council of Ministers of the Republic of Cuba. Since 2013, a national science, technology and innovation program linked to climate change has been implemented, which was redefined in 2020 as "Adaptation and Mitigation of Climate Change" and in 2017 the "Life Task" was approved. Particularly, in Cienfuegos province, investigations related to climate change have increased in the last years. For example, between 2013-2016 it was developed a project associated with a national program entitled "Study of the socioeconomic and cultural impacts of climate change in coastal areas of the province of Cienfuegos: problems, social perception and predictions in the construction of tools for public participation (SOCLIMA)". Despite this, there are still difficulties related to the lack of knowledge and non-compliance of key social actors related to environmental legislation; low social participation, and decision-making processes, especially in coastal communities (Garcia, 2018). There are also low perception of environmental risks in coastal communities in the face of the negative effects of climate change (Miranda, 2013).

In recent decades, social perception studies linked to environmental issues have increased, and several

researches have devoted efforts to it at the international level (Altschuler y Brownlee, 2015; Aguilar, Merçon and Silva, 2017; Callo-Concha, 2018). Meanwhile, in Cuba, several studies have been directed toward the social/ environmental perceptions of communities (Núñez, 2006; Pérez and Milanés, 2019). Similar studies have been carried out in coastal communities from Cienfuegos province (SOCLIMA project). These studies have noted the low social perception in the coastal communities related to the threat of certain socio-environmental factors (Guirado, 2012; Soriano, 2015; Ramos, 2017). However, the use of social perception studies looking for confrontation of environmental problems and to break with asymmetries in the environmental sciences themselves, are insufficient in the Cienfuegos province.

The coastal communities from Castillo de Jagua, Las Minas and O'bourke have been among the most studied in the Cienfuegos province. O'bourke community in particular, have the fishing as traditional activity for family sustainability and other group of institutions and companies of importance for the community. In overall; activities in this coastal community are threatened by climate change, but also exists insufficient research on the perception of climate change impacts by community members and workers.

MATERIALS AND METHODS

The research process was based on a mixed methodology, combining qualitative and quantitative techniques. The study followed the interpretative paradigm, since it attempts to make sense of certain social phenomena and events. This research was also based on the phenomenological method which assumes the analysis of the most complex aspects of human life, allowing to explore, describe and understand the verbalizations and meanings of different social actors of the community. Document analysis, participant observation, semi-structured interview, questionnaire and drawing technique, and triangulation were among the research techniques used.

Document analysis contributed to the collection and interpretation of information related to the community, the coastal contexts to be studied and the regulations related to climate change and its adverse effects. The semi-structured interview was applied to 15 people (youth and adults between 14 and 80 years of age), to obtain information and data on perceptions about the environment, climate change and community socio-environmental issues. The questionnaire was applied to 20 community representatives (between 15 and 64 years of age) and made it possible to determine the state of knowledge about the environment, climate change and its main adverse effects at the community level, as well as proposals for community actions to confront and mitigate this phenomenon. The drawing technique was applied to a total of 10 children (between 8 and 11 years of age) and the main theme was how to take care of the environment and knowledge about climate change, identifying social perceptions about the environment, climate change and its adverse effects from the children's imaginary.

Study area

The O'bourke community is one of the coastal communities belonging to the Cienfuegos city, municipality of Cienfuegos. It is located to the north of Cienfuegos Bay, 3 km from the Cienfuegos city, bordered to the north by the CEN highway and to the northwest by the Pastorita Popular Council; to the east and south by the interior coast of Cienfuegos Bay (Figure 1). It is located very close to the Cienfuegos Industrial Zone and near the "Carlos Manuel de Céspedes" Thermoelectric Power Plant.

The community has a population of 936 inhabitants, 500 men and 436 women, distributed among 300 families according to data provided by the Primary Public Health Care System in the community.

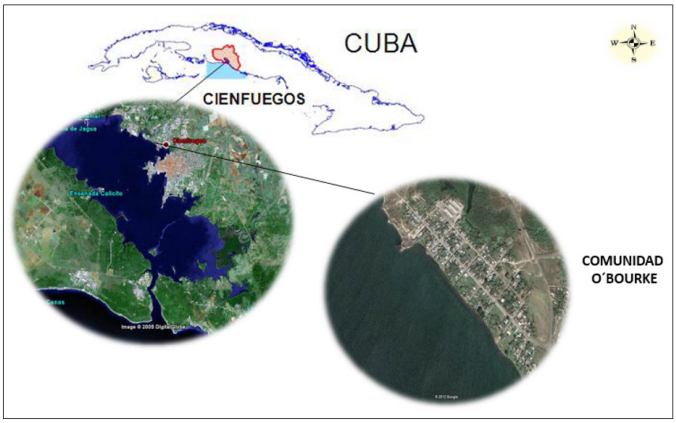

Figure 1. Location of the O'bourke community

The town was founded at the end of the independence war, end of the 19th century and beginning of the 20th century, in a distribution of lots made by Don Miguel O'bourke y Ramos, who came from a wealthy Irish family with the surname O'bourke.

It was founded around an old roofing tile factory, on flat and not very fertile land, which produced small fruits, especially bananas, but being coastal, it conditioned artisanal fishing as a fundamental activity. According to data obtained, the previous name was Barrio Manacas.

The community of O'bourke has a flat terrain bordering the entire southwest coast of the bay of Cienfuegos with abundant coastal vegetation.

RESULTS

Socio-cultural aspects of the O'bourke community

Bathing in the coastline and local fisheries are among the main socio-cultural characteristics of this community. It is important to point out that fishing activities are carried out using different ways, for example by owning boats and fishing gear, which can be industrial or artisanal. But, most of the boats are rustic and built by the fishermen themselves with various recycled materials, including polyfoam, wooden planks and metal sheets (zinc or aluminum). They use popular and vulgar language in their formal communication. Religious syncretism is a fundamental religious practice, with a strong tendency towards Santeria, which is reflected in the presence of religious pictures and images in their homes.

The community's main services include a recreational center, an elementary school under repair, a polytechnic center, a thermoelectric plant, and religious institutions (Methodist and/or Catholic), which are key players in the community.

Based on the analysis of documents and the community assessment, the main socio-environmental problems are thermal contamination of water, heavy metals, and hydrocarbons and detergents from pipe cleaning. The emission of noxious gases, atmospheric contamination from suspended dust, and dumping of urban liquid and solid waste, particularly those produced directly by community members, most of which are dumped on the community's coastal shoreline due to the inefficient garbage collection system.

Other socio-environmental problems in the community include poaching using massive fishing gear; illegal logging of the mangrove forest; inappropriate construction and land use planning. Other problems include: drinking water leaks due to deterioration of the water system; poor road conditions; lack of sports and recreational centers; insufficient gastronomic services; insufficient collection and treatment of liquid and solid waste.

Approach to social perceptions on climate change and its effects in social actors of the O'bourke coastal community.

- Perceptions about the environment and the causes of climate change occurrence

From the methodological triangulation and data collected by the instruments applied, it was possible to confirm that the level of knowledge and the perception that social actors have about the environment were variable (Table 1), although 100% recognize that they know its meaning. For example, the definitions provided varied among the participants, demonstrating their personal experiences and specific knowledge related to how they perceive the environment.

Table 1. Knowledge about the environment.

Do you know what the environment is?	Total	%
Yes	20	100
No	0	0.00
Total	45	100.0

Based on the analysis of the drawing technique children from the community perceived the environment as the set of living (biotic) and non-living (abiotic) elements with which man interacts. Natural elements of the community such as vegetation and marine and terrestrial fauna played a fundamental role in the children's observation. These criteria are of great value, as they are evidence of the effectiveness of the formal education system in the new generations.

Among the abiotic elements that were highlighted by the children in the drawings were sunlight, wind, rain and soil (Figure 2, 3 and 4). Similarly, the built elements also had hierarchy such as dwellings and certain community technologies (for example rafts and boats that can be made of different materials). These elements endorse their great importance as conditioners of community life, also recognized as fundamental physical structures according to researcher Ander-Egg (2000).

Figure 2

Figure 3

Figure 4

Knowledge about climate change was also variable, although all the informants surveyed (Table 2) claim to know about this term.

Table 2. Knowledge about climate change.

Do you know what climate change is?	Total	%
Yes	20	100
No	0	0.00
Total	45	100.0

It is important to point out that the knowledge on climate change provided was scarce and the elements offered by the participants were far from most of the elements that define this phenomenon and that make it a major global, national and local concern.

These criteria are in correspondence with Table 3, which shows the opinion of the participants about the requested information on climate change.

Table 3. Information received on climate change.

Information received on climate change	Total	%
None	1	5.0
Little	13	65
Fair	6	30.0
Sufficient	0	0.00
Very much	0	0.00
Total	20	100.0

The social perceptions about climate change in general were scarce and lack of precise elements, which demonstrate the insufficient clarity in the ideas exposed by the informants of the O'bourke community. When contrasting the ideas provided with the theory related to the subject, there is a great disparity, since the definition of climate change assumed in the research suggests that it is produced by human activity and that it alters the composition of the global atmosphere by varying temperatures in comparable periods of time.

When analyzing these results, with data obtained by other instruments, it was possible to verify that there are other perceptions about climate change in personal imaginaries. Such is the case of two of the interviewees, who perceived this phenomenon as:

- "The affectation that nature has due to environmental pollution. The dumping of waste into the sea, polluting gases..."

- "Change of the environment due to toxic gases, chemicals, and industries. Climate change is the expression of the deterioration of the environment due to human activity".

Regarding the social perceptions about the possible causes of climate change, all the representatives of the companies selected in this research and the members of the community of O'bourke exposed diverse possible origins of the occurrence of this phenomenon. Most of the main causes mentioned were: environmental pollution, deforestation, the release of greenhouse gases into the atmosphere, the development of large industries and population growth.

In general, all of these causes are linked to the anthropic action of man and the excessive use of natural resources, which has brought about an imbalance in the relationship between society and nature.

However, one of the interviewers belonging to the "Carlos Manuel de Céspedes" Thermoelectric Power Plant issued an interesting criterion and that no other informant expressed:

- "One of the causes of the occurrence of climate change are the wars and the harmful substances contained in the bombs especially those of nuclear cut. This element is very important and I think that almost nobody takes it into account when it comes to say the causes of climate change and I believe that this is fundamental".

Certainly this view agrees with Linsley (1996), who acknowledges that there has been renewed interest in the context of radionuclides in the environment.

- Social perceptions of environmental problems

Table 4 presents the results on the social perception linked to the phenomenon of climate change (or that contribute to its increase) that the social actors of the O'bourke community had about the main environmental problems which affect them. These data showed that the perceptions of the actors on the main community problems were focused in the contamination of the sea waters bordering the community (23.5%), both by solid and liquid waste, and strongly linked to the garbage dumps that swarm along almost the entire coastal coastline of the community. It should be pointed out that studies have shown that the organic contamination contributed by the drainage and sewage system exceeds the industrial and fluvial contributions to the bay's watershed, especially due to the growth of the population without the corresponding expansion of hydraulic and sanitary networks, as well as waste treatment systems.

Table 4. Main socio-environmental problems.

Socio-environmental problems of the community	Total	%
Water pollution	16	23.5
Garbage dumps	16	23.5
Mangrove deforestation	12	17.6
Destruction of the beach	8	11.7
Drought	16	23.5
Total	68	100.0

The sea, for example, is one of the main natural resources for coastal communities, but it is also one of their main economic and sociocultural elements. However, the high degree of contamination by liquid and solid waste in the marine waters of the coastline of the O'bourke community represents a danger not only for human health, but also for marine life such as mangroves, seagrasses, mollusks and fish.

Community's traditions, including fishing have also been affected due to contamination of waste and in the area. According to interviews, some community members state that fishing volumes are decreasing, as well as the presence of less marine diversity in the area. From the sociocultural point of view, the loss or modification of this traditional practice would bring about affectations or changes to the cultural, technoproductive and socioeconomic system of the community, which is one of the most coastal and fishing communities from Cienfuegos city.

From the identified perceptions, it was possible to determine the insufficient intersectoral work at the community level and in particular with the Services Enterprise, which triggers a group of problems related to the collection of waste in the community of O'bourke. This in turn causes such waste generated by community members to be thrown into the sea; to which several interviewees expose:

- "We have to vote the garbage on the shores of the beach so as not to have them in the middle of the street because here there are no baskets anywhere..."

- "If they would put, even if it were a basket every two blocks we wouldn't have the need to throw garbage on the beach..."

However, in the surveys carried out, one of the environmental problems that received the lowest percentage of recognition was the loss of marine species. This element is very striking, since national and local scientific evidence is demonstrating the decrease and/or loss of marine biodiversity species in Cienfuegos Bay. This ecosystem is fundamental for the O'bourke community, as a high percentage of the members obtain their resources and income from the bay, since fishing is a fundamental economic activity.

In the analysis of the interviews with the residents, the main problems identified in relation to previous years are the increase in sea level; the destruction of the mangroves; deterioration of the beach; the increase in garbage; the increase in temperatures due to the intense sun; the drought; the decrease in rainfall; the loss of marine species and sea pollution.

The second environmental problem most recognized by those surveyed was drought (23.5%), which was also identified in community tours. This problem is closely linked to data from the Provincial Meteorological Center, which indicates that meteorological drought is one of the problems that most affects the territory.

The third environmental problem most recognized by the stakeholders was deforestation (23.5%). It is important to note that this phenomenon, present in the O'bourke community, is caused mainly by extreme natural events and anthropogenic action. Among the natural phenomena that most affect the community's forest heritage are tropical storms and hurricanes. The intensity of the winds and the penetrations of the sea that they cause destroy the plant populations of the territory and salinize the soils, which results in the loss of soil fertility.

On the other hand, population growth and internal migration to the community has brought with it deforestation, essentially of the mangrove forest in order to use the land for the construction of houses and patios, without taking into account the ecosystem services and goods that this natural ecosystem provides to the community and the environment in overall.

In the interviews conducted with workers of a group of companies selected for the research, the criteria were similar to those issued by the villagers, although it is necessary to highlight the criteria of Dionel Domínguez, design and engineering specialist of Enterprises of Project and Engineering of the Electricity, which expressed:

- "The existing environmental problems are mostly caused by the burning of fossil fuels generated by thermoelectric plants, emission of CO_2 into the atmosphere by means of transportation and waste from industries, the poor environmental education of the people..."

Based on the analysis of the drawing technique, it was corroborated that within the children's imaginary there is a group of environmental problems that the children recognize and evidence, such as solid waste pollution (land and marine), being this problem a frequent theme within some of the drawings. This contrasts with the criteria collected by other instruments applied, and particularly from the field work carried out, which shows contamination by waste as one of the environmental problems of the community.

Another environmental problem identified from the drawing technique was deforestation, a problem associated with the indiscriminate cutting of the mangrove forest by members of the community for various uses, but especially for the availability of land for housing construction, since the tradition of building very close to the sea is still maintained, despite the consequences of meteorological phenomena.

All this generates other difficulties for the community and for the environment in overall, because the mangrove forest acts as a reservoir of species, provides nutrients to the environment, is an ecosystem that provides protection to juvenile marine species and acts as a natural barrier against meteorological phenomena such as tropical storms, cyclones and hurricanes; and influences the containment of intrusion from inland, thus helping to prevent the salinization of soils.

Another of the environmental problems related to climate change that was identified by the children in the drawings was the drought, which is manifested in the community through the scarcity of rainfall, lack of soil moisture and insufficient vegetation cover.

However, based on the drawing technique it was possible to verify the existence in the children's imagination of a set of community actions that contribute to the confrontation of the negative effects of climate change such as the collection of solid waste, particularly those present on the beaches and in the seas (Figure 5, 6 and 7), which demonstrates among other elements the importance of these natural resources and ecosystems for the socio-environmental development of the community of O'bourke.

Figure 5

Figure 6

Figure 7

The analysis of these actions also corroborated the important role that the care and conservation of the sea bring to children, since this is a coastal and fishing community, and marine pollution is endangering artisanal fishing as a traditional socio-cultural practice of the community. In an interview, it was possible to verify these elements, since according to a fisherman with more than 20 years of experience, fewer and fewer marine species are being fished.

- I have been fishing for more than twenty years and there are not as many specimens as before, only small fish that are not easy to catch, in order to catch something good you have to do wonders and it is not very common...".

Based on the analysis of the children's drawings as mentioned above, it was possible to determine the drought as another of the environmental problems present in the O'bourke community as effects of climate change, and for which they imaginatively propose irrigation (Figure 8) based on techniques that contribute to saving water in the face of the lack of this vital liquid for people, animals and plants; that is, an adequate and sustainable management of water. This demonstrates in a way how different programs linked to formal and non-formal environmental education are contributing to the formation of new generations.

Figure 8

- Social perceptions on actions related to confronting and mitigating the effects of climate change in businesses and the O'bourke community

Among the main socio-environmental perceptions linked to the confrontation and mitigation of the negative effects of climate change among the workers of the companies located within the O'bourke community were:

- Reduction of CO_2 emissions to the atmosphere through good combustion within the boiler.

- Adequate wastewater treatment (the water used is treated so as not to contaminate the environment; wastewater is treated and periodically analyzed).

- Total recycling of materials such as paper and cardboard.

- Implementation of actions within the Plan Task Life, as well as their verification and compliance.

- Existence of an Industrial Safety and Environment department in certain companies.

- Existence of environmental management plans and management plans for hazardous waste

- Implementation of waste treatment measures in certain companies.

The analysis of the interviews conducted with members of the O'bourke community showed that very few actions are taken to address and mitigate the effects of climate change. Among the main actions that are most perceived are volunteer work with a long period of time between one and the other, as well as beach cleaning.

It is important to point out that the inhabitants of this community recognize that when the community delegate calls for these activities only a small group of neighbors participate, which demonstrates the lack of environmental awareness among community members, the lack of call from the formal leaders of the community, and the lack of call from informal leaders to these socio-environmental actions.

The analysis of the surveys conducted with members of the O'bourke community also corroborated the insufficient community actions related to confronting and mitigating the effects of climate change identified in the interviews. This singularity has a negative impact on the community, since the actions are insufficient and unsystematic in the face of the existing problems in the community environment.

It is important to point out that the triangulation of the instruments applied made it possible to identify that in spite of the scarce socio-environmental actions carried out in the community to confront and mitigate climate change, the inhabitants of the O'bourke community, based on personal initiatives, determined a set of proposals (Figure 9) that would contribute to the improvement of the environment in their community.

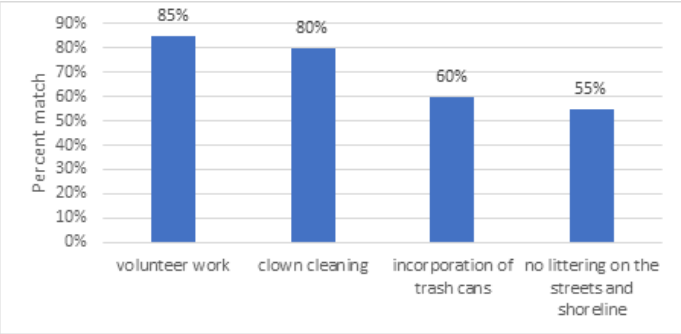

Figure 9. Main proposals for socio-environmental actions by the O'bourke community.

In overall, among the main socio-environmental actions proposed by the members of the O'bourke community are the following:

- the call for more frequent and more precise volunteer work,

- frequent beach cleaning,

- placement of garbage containers within the community,

- monitoring companies in terms of taking measures to improve the environment,

- incorporating the socio-environmental situation of the community in the Committees for Defense of the Revolution (CDR) and district meetings,

- not littering in the streets and along the coastline.

These proposals are similar in some of the techniques used, although 85% of the proposals coincided in that community volunteer work in which all community actors participate is a fundamental action to improve the environment and the quality of life of the inhabitants of the O'bourke community. Actions such as these contribute from sustainable socio-cultural practices to the mitigation of the effects of climate change.

Other proposed actions are those carried out by workers of the companies located in the community, among which the following stand out:

- improving people's discipline in terms of actions and measures related to environmental care,

- call for voluntary work within the companies for environmental purposes,

- contributing to the cleanup of coastal areas,

- increase the use of renewable energy sources, use wind energy, use tidal power,

- provide continuous maintenance to the waste treatment plants for wastewaters that discharge into the bay, as well as create new ones,

- develop strict control of environmental legislation within companies.

CONCLUSIONS

Social perception studies on climate change and its adverse effects represent a socio-environmental tool to evaluate at the social level how people perceive, understand and/or are aware of the occurrence of certain phenomena (manifestations, impacts, consequences) and, on that basis, adopt strategies, policies and make decisions in relation to their confrontation, mitigation and adaptation. In addition, seeking to make these decisions participatory, on the basis of democratizing science and establishing a dialogue of knowledge, based on the recognition of "the other".

After processing all the data obtained through different applied techniques to social actors of the O'bourke community, a group of important elements were determined for

the subsequent work of coastal community environmental education, such as insufficient knowledge about the environment and the phenomenon of climate change, the low perception of risk in the face of climate change and its adverse effects, as well as the socio-environmental problems that most affect them, such as drought, contamination of marine waters, dumping of liquid and solid waste, atmospheric contamination, deforestation of the mangrove ecosystem and the reduction of marine biodiversity.

The usefulness of the results from this research are diverse, especially for the management and conservation of coastal resources and the improvement of the integrated community work that is developed by multiple actors in Cienfuegos province. The use of knowledge and social perceptions of the communities on climate change and its negative effects are elements that express social and environmental symmetry and inclusion within the environmental management processes.

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