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The Drought Hazard: Risk Perceptions and Educational Actions that Promote Resilience in the Cuban Population

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Abstract

Context: The study of subjectivity in face of natural dangers is being conducted in Cuba as part of the Studies of Hazard, Vulnerability, and Risk by the Environmental Agency of CITMA in Cuban provinces. Droughts require control plans that reduce the negative effects of droughts and the repercussions on the population exposed.
Aim: To characterize perceptions and groups, according to the risk perception levels (high, medium, low), of the Cuban population before the occurrence of droughts, to design educational actions that lead to adaptation and resilience of the population affected.
Methods: This paper relies on the quantitative method, using the analyses of the data recorded in the following sources of information: Reports on Hazard, Vulnerability, and Risk Analysis (HVA), 2011-2018), and the Survey on Risk Perception on the Hazard of Droughts (2011-2018).
Results: Drought risk perception characterizes by the recognition of drought intensity and their dangerousness in relation to other natural hazards.
Conclusions: The perception that prevailed throughout the study was the medium. Most of the population recognized the role of the government and state institutions and their concern about the consequences of droughts and the confidence of the population in these organizations to fight these conditions. The action proposal permits organizing and materializing the educational work objectively, to promote proper resilience in the Cuban population in relation to droughts.

Keywords: *droughts, risk perception, disasters, education, resilience*.

Introduction

The United Nations Convention to Combat Desertification (UNCCD, 1995) ratified in 1996, states that a drought occurs when rainfall has been below the normal levels recorded, causing a water unbalance that harms the resource production systems or the whole production system (Part I, Introduction, Article I DPCSD/CCD/95/2).

In Cuba, the climate change scenario created suggests an intensification and expansion of aridity processes and greater drought processes. The National Defense Council (2005), Directive No. 1, of the deputy president of the National Defense Council of the Republic of Cuba argues that the decline of in the number of potential water resources will be remarkable. Besides, the rainfall records are below their historical values, which causes the depletion of the water table and the drying of rivers and dams that supply the water to the major cities and towns, also causing economic problems, especially food production, with the appearance of endemic pests and diseases that influence the health of people, animals, and crops. The main problems have taken place in Camagüey, Las Tunas, Holguín, Granma, Santiago de Cuba, and Guantánamo; while the central provinces (Villa Clara, Cienfuegos, Sancti Spíritus, and Ciego de Ávila) have been affected to a certain extent, like the western provinces (Pinar del Río, Artemisa, Mayabeque, Matanzas, and special municipality Isla de la Juventud.).

This paper examines the concepts associated with the terminology used.

According to Favier *et al* (2009), droughts are a multidimensional phenomenon and it can be evaluated from different methodological perspectives, with a diversity of parameters to calculate it and different ways of embracing this issue by the population. The Hazard, Vulnerability, and Risk analyses (HVRA) in terms of droughts, according to the Cuban methodology, entail, hydraulic drought and integrated drought[1], which includes the weather drought and the crop drought.

A significant aspect in these studies is people's subjectivity on the danger of droughts. The concept of risk perception (Rohrmann, 2008; cited by Mikulic et al., 2011) refers to the opinions and evaluations made about the dangers people exposed, goods and environments. Meanwhile, the risks are theoretical schemes constructed from different contexts. In turn, Cassullo (2008; cited by Mikulic, et al., 2011) noted that risk perceptions are world interpretations based on experiences and beliefs, within a set of standards and values in the cultures and societies.

In Cuba, risk perception is seen as the result of the effect of economic and social factors, personal experience, information available, the media, and cultural specificities, idiosyncrasy, beliefs, myths, values, and the level of knowledge and lack of it about the dangers. It is also necessary to consider the current content where people live, which generates a particular risk notion. (Perera, 1998; cited by Núñez et al., 2008).

The Risk Assessment Group (2014) conceives risk perception as part of the social vulnerability context. It also refers to opinions as the assessment made by individuals on the danger they are exposed to. These assessments or opinions are based on experiences and beliefs included in the standards, the systems of values and the cultural idiosyncrasy of societies. Accordingly, risk is assessed according to the social psychology of individuals and cultures.

The novelty of this paper consists in the new vision offered by risk assessment of disasters undergone by the Cuban population during droughts. It also provides an approximation and better understanding of risk perception, based on the results of the Risk Perception Survey on the Drought Hazard.

In that sense, this study characterizes perceptions and groups, according to the risk perception levels (high, medium, low), of the Cuban population in face of droughts, to design educational actions that lead to adaptation and resilience of the population affected by droughts.

Materials and Methods

This paper relies on the quantitative method[2], using the analyses of the data recorded in the following sources of information:

- Reports on Hazard and Vulnerability, and Risk Assessment Studies (HVRA, 2011-2018)
- The Survey on Risk Perception on the Hazards of Droughts (2011-2018)[3].

The purpose of the survey was to measure risk perception on drought hazard, and it was conducted in the 15 provinces[4], and comprised 16 856 subjects. It contained closed questions (multiple and single selection), as well as open questions. The latter was intended to get the subject's opinions freely, favoring qualitative analysis.

The perception level was evaluated as follows: **1st)** Each answer was given a score, and three groups were made (groups I, II, II) to create a perception window for each variable. **2nd)** All the variables were added, and the three groups were made again (Groups I, II, III). **3rd)** A total perception level was set up regarding the drought hazard, according to the score reached by the subjects, the municipalities, provinces (political-administrative level), engaged in the design of natural disaster risk reduction plans.

The groups were,

- Group I (high perception): Higher opinionated level and values about the

[1]Integrated drought hazard consists of the crop-meteorological hazard, with record of two seasons: the rainy season (May-November) and dry season (December-April).

[2]The methodology designed by the Center of Psychological and Social Research (CIPS) was adjusted for this study. This institution has conducted studies on social aspects associated with the environment, especially the environmental perceptions requested by CITMA. The research studies deal with socioeconomic characterizations, whose main topic has been the socio-environmental perceptions, related to aspects like environmental management, communicators, coastal community management, hazard and vulnerability studies and risk assessment.

[3] The information was collected between January 2010 and August 2018. It was done by the provincial CITMA offices along with the Environmental Agency (AMA) of CITMA.

[4] Pinar del Río, Artemisa, Mayabeque, Matanzas, Villa Clara, Cienfuegos, Sancti Spíritus, Ciego de Ávila, Camagüey, Las Tunas, Holguín, Granma, Santiago de Cuba, Guantánamo; and special municipality Isla de la Juventud.

environment and the danger of drought. The individuals knew how the hazard can affect them and their locations; and they know what to do when affected by the drought hazard, and trust the kind of protection offered by the institutions.

- Group II (medium perception): Intermediate opinionated level and values about the environment and the danger of drought. It comprises individuals with some cognitive deficiencies as to the drought hazard, and trust the institutions that offer them protection.

- Group III (low perception): Null opinionated level and values about the environment and the danger of drought. These individuals have no knowledge of how the hazard can affect them, or their response in case of being affected by these dangers. It is the most visibly exposed sector, and therefore, the most vulnerable.

The structured sample was proportionally gathered in the people's councils, depending on the inhabitants of the councils. In this particular case, one or two people out of a thousand were interviewed.

Meanwhile, the sample selection process was started by structuring the population in three categories, according to age: **a)** Category I- young (15-39); **b)** Category II- adult (40-64); **c)** Category III- the elderly (+64).

The sex was selected at random, dividing the sample according to three levels of instruction **a)** Level I- (0-primary); **b)** Level II (secondary-high school); **C)** Level III (university).

To enhance data interpreting, the analysis relied on the following dimensions: **a)** hazard recognition; **b)** hazard occurrence factors; **c)** problem identification; **d)** preparation to confront the hazard; **e**) critical capacity of people's performance before, during, and after the hazard, assessment on hazard impact; **f)** confidence level about the institutions and organizations in charge of confronting hazard; **g)** the capacity to suggest preventing and minimizing the negative effects.

Results and discussion

Socio-demographic data

The surveyed individuals totaled 16 856 subjects, of which 49.1% were men (8 269) and 47.7% women (7 993). However, 3.5% of the participants did not correspond to this category.

An analysis of sex by province showed a similar behavior; that is, men prevailed, which may be mediated by the fact that upon the survey, the number of men was slightly higher than that of women.

According to age, even when 2.8% of the sample did not declare their age, the percent distribution places the age groups as follows: 20-39 years old (34.8%); 40-59 (31.2%); +60 (22.9%); and 15-19 (8.3%). The age of 30 (4.6%) was the most represented age in the survey.

As to the educational level accomplished, there were three groups: secondary-high school (37.8%), and higher (26.3%), which show the characteristics of the job profiles.

Following the same analysis, there was a high presence of workers (53.3%), retirees (14.6%), housekeepers (12.0%), students (9.2%), farmers (6.0%), and unemployed people (2.9%). In the worker group, 42.8% is employed by the state, 8.5% belongs to the private sector, 6.2% work for cooperatives, and 1.4% are in the mix sector.

A necessary element for the implementation of prevention measures in the disaster risk reduction cycle is to know the type of household. Households, according to the percent value, have the following order: households of more than 4 members (33.6%); 4 members (28.7%); 3 m3mbers (24.0%), 2 members (11.6%, one-person households (2.1%). Considering the above data and information about the aging of the Cuban population, these households comprise 1 or 2 people over 59 years old.

Although the above might seem disadvantageous, it is thought of as a strength, considering that the composition of households and the social, educational, and family environment intervene decisively in the formation of values. Intergenerational exchanges can contribute to the consolidation of risk perception through knowledge and standards assumed throughout the social formation. An individual's comprehensive development is in accordance with the education of the active, human, and solidarity-driven citizens, concerned about the social problems associated with disaster risk management of drought events.

Another type of analysis tackles the number of household members who are employed. In that sense, two workers (41.6%), one worker (22.7%), three workers (19.3%), four workers (6.6%), and more than four workers (2.4%).

Interestingly, the residence time of the subjects in the survey in the province was more than 3 years (94.8%), so they have the knowledge and experience of the occurrence of drought hazards in the location.

According to the survey, the individuals were pooled in households, namely, 357 (2.1%) one-member families; 1958 (11.6 %) two-member families; 4041 (24%) three-member families; 48 33 (28.7%) four-member families; 45 667 (33,6%) + four-member families (the major group). The social, educational and household environment of children play a key role in the formation of values; the relations established are indispensable in the consolidation of risk perception through knowledge, standards, and behaviors assumed along the social formation. An individual's comprehensive development is in accordance with the education of the active, human, and solidarity-driven citizens, concerned about the social problems associated with disaster risk management.

Upon the analysis of the housing conditions in accordance with the size of the household, 46.0% (7 746 subjects) live in households of + 4 members in not so good conditions. Meanwhile, 41.1% (6 936) of the subjects live in good conditions, though 9.0% (1 518) declare that their housing conditions are under the average.

Perception of the Cuban population of the drought hazard (2011-2018)

Overall, 70.3% of the surveyed population refers to the drought hazard as the one affecting the people most, and acknowledge the existence of drought events in the locations. This phenomenon occurs in a mild and moderate manner (72.6%), even when others consider it intense (20.6%). Likewise, they point out that the damage caused by this event could be repaired in the long-term (38.8%), or in the mid and short-term (49.8%).

The individuals referred to the growing significance of natural factors (49.8%) that worsen the effects of droughts. To a lesser extent, human behavior (37.0%) through water wasting at home and in the industry, deficient water use, and the loss of traditional water conservation practices, which aggravate water scarcity in the communities.

Another important result is that the inhabitants understand the negative effects of droughts on the environment (87.4%). Meanwhile, they acknowledged that their main impact is on the soil (51.9%), population (51.7%), and animals (50.0%). In turn, the population feels the effects of lower water levels in lakes and dams (72.8%), an increase in soil dryness (72.3%), less drinking water for humans (72.3%), changes in plant coloring (65.5%), and a decrease of precipitations (65.2%). However, the experts found that the population (41.3%) acknowledges the existence of meteorological droughts.

Most of the population recognized the role of the government and state institutions and their concerns about the consequences of droughts and the confidence of the population in these organizations to fight these conditions (66.5%), which was another significant finding of this research. The measures adopted by the corresponding bodies to combat droughts was deemed by 54.0% of the population as appropriate.

As to drought prediction, 61.5% noted that it can be predicted or are unable. This criterion indicates that one part of the population assumes and believes to have information about the onset of an event of this type, and that there is time enough to prepare.

The population that referred to not having the conditions to fight droughts in the future reached 54.3%, whereas 45.7% said they did. In a 1-5 scale on the level of exposure of these families, 3 was the prevalent value. An interesting finding was that 71.1% did not make any propositions or recommendations that led to a reduction of the negative effects of droughts on the location, which indicated this is a population without the proper knowledge about droughts or the need to be prepared for such events, since they did not perceive it as a threat in the future.

Tables 1 and 2 show the proportion of the population that acknowledges positive and negative practices before, during, and after the drought. The negative practices before the occurrence of the events are presented slightly, rather than the positive practices. It might mean that the negative behaviors are seen at a faster pace than the positive and/or preventive conducts, which are less often identified by the population. Although the percentage of subjects that do not show their criteria say not to know.

Table 1. Knowledge of negative practices before, during, and after the drought hazard (Group I) in Cuban provinces

	Before Group I Before the drought	During Group I During the drought	After Group I After the drought
Pinar del Río	36.6	38.6	15
Artemisa	29.8	14	7.5
Mayabeque	32	24.8	19.3
Matanzas	33.5	32.9	32.3

Villa Clara	26.8	23.9	12.5
Cienfuegos	2.8	0.7	0.2
Sancti Spíritus	15.6	15.6	6.5
Ciego de Ávila	71.3	63.3	45.1
Camagüey	15	8.6	11.4
Las Tunas	50.9	46	40.5
Holguín	2.3	1.7	2
Granma	41.3	37.4	22.6
Santiago de Cuba	76.2	72.1	39.1
Guantánamo	19.1	12	5.2
Isla de la Juventud	35.3	2.9	0
TOTAL	**32.9**	**28.2**	**18.7**

Source: Made by the authors based on the findings of the Survey on Risk Perception on the Hazards of Droughts (2011-2018).

Table 2. Cuban provinces Knowledge of positive practices before, during, and after the drought hazard (Group I)

	Before Group I Before the drought	During Group I During the drought	After Group I After the drought
Pinar del Río	35.2	28.1	9.8
Artemisa	23.3	16.2	11.6
Mayabeque	26.2	20.1	16.1
Matanzas	39	38.4	37
Villa Clara	17.6	15.5	7.6
Cienfuegos	1.4	0.5	0.2
Sancti Spíritus	13.4	14.8	4.8
Ciego de Ávila	53.6	50	43.1
Camagüey	11.6	10	10.8
Las Tunas	42.8	42	33.4
Holguín	1.0	1.0	1.0
Granma	41.5	31.1	18.2
Santiago de Cuba	69.8	67.3	34.7
Guantánamo	5.8	4.2	4.4
Isla de la Juventud	28.4	5.4	0
TOTAL	**28.3**	**25**	**16.8**

Source: Made by the authors based on the findings of the Survey on Risk Perception on the Hazards of Droughts (2011-2018).

To determine the coherence of the scales to measure the perception level of every variable and the general risk perception level in the presence of droughts, Cronbach's statistical coefficient was calculated. In this particular case, the result was 0.801, and it was based on the standardized elements that showed the reliability of the test and its appropriateness, as the final product neared 1. Then 73.0% of the population has a moderate perception, which means that some ideas stated by the inhabitants about the drought, were inadequate. Again, a medium perception (Group II) pooled individuals with some cognitive and practical deficiencies as to the drought hazard, even when they trusted the institutions that offered them protection.

One critical aspect in these studies is to acknowledge the relation between the socio-demographic characteristics of the population and risk perception, which will include variables instruction level accomplished, household size, number of people employed, and residence time.

Risk perception over drought hazard associated with the instruction level evidenced that medium perception reached the highest percent values among the individuals with a secondary-high school level (38.4%), and university education (25.4%).

Risk perception over drought hazard associated with the household size, the number of members employed, and residence time evidenced that medium perception reached the highest percent values among the individuals who live in households made of 3 members (23.0%), 4 members (28.9%), and +4 members (34.4%). Likewise, the number of workers per household with a medium perception was shown as follows: 2 employees (41.8%), 1 employee (22.5%), 3 employees (19.2%).

The residence time is an important element to consider in drought hazard risk perception. If the surveyed individual has been living for over 3 years in the same people's council, the possibilities of high perception (96.0%) and medium perception (94.5%), are high. However, the results of the study showed that 94.9% of the 3-year residence time had a low perception.

One of the non-parametric tests used was Chi-square, which permitted the validation of the work hypothesis, and relied on the law of probability. The non-parametric X2 theoretical distribution (Chi-square or Ji-square), named the Independence Test, consists of checking if two qualitative features are interrelated. As an illustration, it can be used to determine the possible relation between demographic variables and risk perception. Berlanga & Rubio (2012) claimed that the utilization of non-parametric tests is frequent, as there are variables that do not meet the conditions of parametricity. Besides, they recommend their use in case this requirement is unmet, especially when the normality of the variable distribution is uncertain, this type of test is applied.

In this research study, Chi-square was used to determine whether there is a relation between variables instruction level accomplished and risk perception of drought hazard. Table 3 shows the Chi-square results of the 16 856 subjects in the

survey, with a linear association of 67 369 and verisimilitude ratio of 690 607 (0.000 significance). In this case, the significance value was, .000 with a linear relation; one variable is dependent on the other. The lower the perception score, the greater the risk perception in face of hazard and the greater instruction level accomplished. Hence, the hypothesis of the existing relation between the variables instruction level accomplished and risk perception score, is accepted.

Table 3. Chi-square test Instruction level accomplished depending on the total risk perception score over drought hazard

	Coefficient value	Freedom degree (gl)	Asymptotic significance level (two-sided)
Pearson's Chi-square	1 106 553	195	,000
Verisimilitude ratio	690 607	195	,000
Linear by linear association	67 369	1	,000
Number of valid cases	16 856		

Source: Made by the authors based on the findings of the Survey on Risk Perception on the Hazards of Droughts (2011-2018).

Summarizing, the results achieved have demonstrated that risk perception depends on several indicators, such as sex, age, household income, social group membership, individual experience, residence area, geographical location, climate, education, resilience, etc.

Resilience is one of the components that produced variations in the level of perception. According to Turnbull et al. (2013), it consists in the capacity of a system, organization, community, or society exposed to a threat to withstand, absorb, adapt, and recover from their effects timely and effectively, which includes the preservation and restoration of its structures and basic functions.

Upon presenting the concept of resilience, on which this study relies, in relation to droughts, it would refer to the capacity of human systems to endure huge changes derived from that natural hazard. A resilient system must adapt to the changing circumstances and develop new forms that describe the capacity of natural systems to recover their balance following adaptation to change.

Following the same order, natural disasters encourage collective resilience (regardless of the historic moment they occur, and what science and/or scholars have advanced in describing phenomena. It is a moment when people and societies are forced to use resilience as an adaptation tool. The more satisfactory the attention to people and communities is implemented, the easier the recovery.

The Latin American Society of Social Sciences (FLACSO, 2020) defines that community resilience has been affected by sociocultural variables like,

Territory: It permits contrasting local management by territory according to the characteristics and potentialities.

Community: Processes are born, developed, and terminated. It is socially constructed, and determined by a cultural heritage that legitimates the social dynamic taking place.

Culture: It transversalize every social phenomenon, taking place in exchanging and learning space, with the transmission of knowledge, attitudes, and future projection.

Engagement: It entails a more active participation of the local actors in the conception of their development. Participating is, firstly, to belong to, to take part, and to be part of something. Especially, social actor engagement in the creation of capacities and education.

Meanwhile, the Public Society of Environmental Management, Department of Environment, Territorial Planning, and Housing of the Basque government (2019) suggests several dimensions to determine resilience in the cities. However, it must be noted that these dimensions have been adapted to the needs of this paper, namely,

Preparation: It refers to the capacity to anticipate to the future needs and adapt their services and functions to these needs. It encompasses knowledge, procedures, and technical means found in the community and its infrastructure to face the unexpected by raising their flexibility and adaptative capacity.

Leadership: It entails community commitment to the construction of resilience and its capacity to promote and consolidate a culture, attitude, and values based on it. It is essential to develop strategies and conduct inclusive decision-making processes that involve every relevant actor in the society. In this dimension, capacities such as commitment, awareness, adaptative capacity,

innovation, or creativity to manage a crisis, are encouraged. Moreover, the proper and stable regulatory context and frame that ensures and enables the improvement process.

Technique: This dimension stresses the capacity of community infrastructure to adapt to the threat of climate change, and confront its effects. How to withstand the impact of an unleashing event, and guarantee the community utilities, as well as the return to normal conditions in the least possible time. Accordingly, infrastructure should be part of a proper risk management that entails preparation to reduce vulnerabilities. Furthermore, they must have the necessary resources to face and manage unexpected situations successfully. These resources include facilities, staff, skills, information, technology, supplies, and systematic information available when necessary.

Cooperation and communication: It describes the capacity to work and act jointly to achieve a common purpose. Cooperation develops inside the community in the municipalities and provinces, engaging social actors: local, regional, the civil society, and self-employed workers. Cooperation develops at a community scale, engaging social agents as volunteer groups with the capacity to organize. In this dimension, policies that favor collaboration and agreements among the different social actors, and these with the community, are implemented. These actors are also engaged in development processes, learning, and decision-making. The relations with other stakeholders should be strengthened as well in the municipalities, provinces, and the nation to improve the resilience construction process in face of droughts.

To achieve greater resilience and adaptation to droughts requires the HVA studies due to droughts, to tackle the preventive and mitigation aspects, reduce the economic and crop losses to a minimum, and maintain the vitality of the local functions, and raised responsibility of the water management capacity, and crops. Likewise, it is necessary to determine the most vulnerable areas and municipalities in case of droughts, which will lead to decision-making. Another critical element is the detailed guidelines in the plans of key sectors and businesses to later discuss the results in the community.

Rolo (2019) claimed that to strengthen resilience in communities, it is necessary to pay special attention to the social vulnerabilities, the people, actors, social groups, and their participation and education during the rebuilding process, as key factors to limit the disaster risks and adaptation to climate change in face of drought events. Moreover, the key actors in the territories must strengthen their knowledge about gender and their bonds to resilience from droughts. Working to activate communication and community work, to promote efficient water management, saving, and gender equality. Promoting new knowledge and modifying the perception of women and men on efficient water use in communities.

The accomplishment of resilience is fundamental to provide people with knowledge and resources so that the producers can support the household economies, and meet the nutritional needs of children, elders, pregnant women, and lactating mothers. However, communities often pose challenges associated with the isolation of settlements, the presence of high buildings, absence of cisterns and wells, the lack of reservoirs and tanks for safe water storage.

An integrated approach on resilience, according to Rolo (2019), must be to strengthen the Early Alert Systems (SAT) for droughts. Its function is to maintain a systematic surveillance and monitoring of droughts (meteorological, agricultural, hydrological, or hydraulic). Likewise, resilience must maintain control, distribution, and supply of water during shortages, as well as the creation of capacities for safe water access, and the continuation of food production in drought conditions, based on efficient water use, and crops that demand little water.

To promote resilience, education is the most important structural component. Education is a process that helps reduce vulnerabilities in view of the consequences of climate change. School is the institutional space that facilitates the acquisition of knowledge, skills, habits, and attitudes for proper relation with the environment. Hence, environmental education for sustainable development must be directed by schools to the family and the community. Optimum use of this triad (school-family-community) might contribute to satisfactory education, and ensure just and equitable behavior by all, to learn to live with hazards and risks as fast as possible. Education has an environmental consciousness, an essential topic today.

Núñez et al. (2008) reflected on the need of changing the relation between the environment and the social sciences depending on the reciprocal contribution between these two areas. The idea is to foster a vision of sustainability that focuses on the elements involved in the new scheme of desirable development, that stems from its initiatives and projects.

A good example would be the idea of taking care of the environment and protect the people with an educational perspective to offer new conducts through attractive material actions and easy to understand at any age and social group.

Accordingly, Table 4 shows a series of actions directed to children, the young, workers, executives, people in the households, and those who are part of the media. These actions must be implemented by different social actors (the municipal government, scholars, the community, and educational institutions), to ensure satisfactory education in terms of droughts, adaptation and resilience to the Cuban population exposed to this hazards.

Table 4. Actions proposed and social actors responsible

Actions for children	Responsible actors
To design and perform games based on children's songs.	MINED[5]
To promote activities like planting trees, through interest groups and the primary school students.	MINED
To conduct plastic arts and poetry contests, among others, that tackle the drought hazard.	MINED, MINCULT[6], INRH[7], CITMA
To design and promote educational campaigns that encourage water saving at home.	MINED, INRH
Actions for the young	Responsible actors
To conduct reforestation activities in the vicinity of deforested hydrographic basins.	The municipal government, community, MINED, CITMA
To conduct special meetings in which the main topic focuses on efficient water use in the community and homes.	MINED
To conduct community workshops on rational water use.	MINED, MINCULT, INRH, CITMA
To conduct diffusion actions (triptychs, ads, radio and television programs, etc.), which tackle water use.	MINED, CITMA, Radio, TV
Actions for people at home.	Responsible actors
Awareness creation actions for rational water use.	FMC[8], INRH, the municipal government
To design and implement educational programs on droughts and water saving activities on radio and television.	MINED, CITMA, Radio, TV
To design, diffuse, and promote measures to be implemented for proper water collection at homes, and to prevent leaks.	FMC, INRH, CITMA
To help with the mobilization and participation of the people to design risk maps on the drought hazard, and to elaborate a document that records the history of the community in face of droughts. It will help identify community vulnerabilities more accurately, and encourage the participation of everyone with the TVC method (threats, vulnerabilities, capacities).	Municipal government, the community, the academy

[5] Ministry of Education (MINED)
[6] Ministry of Culture (MINCULT)
[7] National Institute of Hydraulic Resources (INRH)
[8] Federation of Cuban Women (FMC)

To conduct community interventions so that the population takes actions like not felling or depleting the forest, protecting the vegetation and plantations, and preventing forest fires. Methods like discussion groups, brainstorming, interviews, and participatory observation will be used.	The community, the academy
To use the participatory action research (PAR) as a methodological process of research in the diagnostic and development of actions to ensure disaster risk reduction in face of droughts. The relevance of education to conduct participatory workshops with institutions and the population.	The academy and institutions deemed necessary, depending on the topic to be dealt with in every action.
Actions for the workers	Responsible actors
Worker training actions on water saving	INRH, CITMA
Special briefings that tackle the hazard of droughts, and reports on the water consumption indexes by the company.	Business administration.
To conduct agricultural and/or productive activities with information on the weather and early drought alert systems (EAS)	Administration, the provincial meteorological facility.
To guide private or associated farmers (cooperatives) and stakeholders, such as decision-makers, local leaders, croppers, and others, to prevent damage caused by droughts.	CITMA, INRH, MINAGRI[9], The People's Council of Urban, Suburban, and Household Agriculture.
Actions for the executives	Responsible actors
To implement and observe the rational water consumption standards.	Administration leaders.
To design and implement a training plan to help reduce social vulnerability and raise the perception of drought.	Administration leaders, INRH, CITMA.
To work in coordination with several institutions on reducing disaster risks so that the population and workers feel confident in their institutions when preventing possible damage caused by the drought hazard.	The Provincial or Municipal Defense Council, CITMA, INRH, MINAGRI, The People's Council of Urban, Suburban, and Household Agriculture. The mass media.
Actions for the communicators.	Responsible actors
To create awareness on the link between gender and resilience against droughts through the contributions of women and the promotion of equality and resilience for development through community meetings, and meetings at the Basic Production Cooperative Units (UBPC) in the location.	Representatives from Education, the university, radio and television broadcasters, and programming specialists (men and women). Women who lead community work from their base organization (FMC), delegation secretaries, block secretaries, community activists, cooperative presidents (UBPC), CITMA.
To design communicational products that deal with drought hazard, gender, resilience, etc. to influence the different social actors and the general population.	Reporters, designers, script writers, radio and television broadcasters, and programming specialists (men and women).

Conclusions

Overall, 69.6% of the surveyed individuals recognized the existence of drought events, while 72.6% considered their incidence as mild and moderate. Moreover, 70.3% said that the people are the most seriously affected side. Meanwhile, 87.4% understood that the affectations of the environment caused by droughts, especially the soil (51.9%), the people (51.7%), and animals (50%), whereas, the natural causes (49.8%) were given some relevance, as they worsen the effects of droughts.

Throughout the study, the medium perception prevailed (73%) in their judgement and appraisals of the phenomenon.

Most of the population recognized the role of the government and state institutions and their concern about the consequences of droughts (66.5%), and the confidence of the population in these organizations to fight these conditions (61.8%). Likewise, the measures adopted by the corresponding bodies to combat droughts was recognized by 54% of the population as appropriate.

[9] Ministry of Agriculture (MINAGRI)

Undoubtedly, achieving drought resilience is necessary to integrate the fundamental elements of the actions presented in this paper, and to achieve the best possible articulation of the school-family-community triad, which might contribute to satisfactory education, and ensure just and equitable behavior by all, to learn to live with hazards and risks as fast as possible.

The action proposal permitted organizing and materializing the educational work objectively, to promote proper resilience in the Cuban population in relation to droughts.

Author contribution statement

Elizabet Godefoy: Conception of the research, template mounting, analysis of the results, redaction of the manuscript, final review.

Sahilí Cristiá Lara: Research planning, analysis of the results, redaction of the manuscript, final review.

Conflicts of interest

There are no conflicts of interest.

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