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Article

Conservation of Cuabal from Community Environmental Education: Results of an Implemented Proposal

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Abstract: The spiny xeromorphic shrublands on serpentine (cuabales) constitute outstanding plant formations for the conservation of Cuban biodiversity, due to their floristic richness, high number of endemic species and local endemism, as well as their economic, social, cultural value and functions environmental. In the Callejón de Los Patos of Santa Clara, there are relicts of cuabal, although they show a high level of deterioration due to human activity. This article presents the main results of an investigation, which focused on implementing actions for the development of Community Environmental Education, with emphasis on the conservation of cuabal, in Callejón de Los Patos. For the intervention process, the Community Self-Development Methodology was used, which is qualitative par excellence, and the investigative methods: document analysis, participant observation, in-depth, group and structured interviews, drawing directed, the reflective group, techniques group and triangulation of data. The main results of the research are: the diagnosis and implementation of actions, designed from the process of Community Environmental Education, which was developed at the Carlos Manuel de Céspedes National Rural School, of said settlement. During the intervention process, the development of cognitive, procedural and attitudinal knowledge for the conservation of cuabal was verified in the schoolchildren, contributing to the strengthening of the school as the most important cultural center of the community, as aspired in the Cuban National Education System.

Keywords: Spiny Xeromorphic Shrublands on Serpentine; Conservation of Cuban Biodiversity; Callejón de Los Patos of Santa Clara; Community Self-Development Methodology

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1. Introduction

The conservation of biodiversity, as an invaluable asset for present and future generations, constitutes a recurring concern of Science due to its gradual deterioration as a result of human activity. Given which, [1] state that environmental education is a fundamental tool to overcome the biodiversity crisis. Since, the conservation of biodiversity is presented as a collective challenge, which must be addressed from a global and local perspective, with an inclusive approach of all social sectors that includes community participation [2].

To contribute to this conservation and the leadership of the communities towards this objective, the implementation of Community Environmental Education (EAC, by its acronym in Spanish) is proposed, from the theoretical-methodological conception defended by [3], who presents it as:

A non-school educational process that constitutes a dimension of the comprehensive education of all citizens, aimed at the appropriation of knowledge, habits, skills, attitudes,

values and behaviors, which promote the harmonization of relationships between human beings and theirs with society and nature to promote the orientation and conduction of economic, social and cultural processes towards Sustainable Development. This process is eminently humanist, emancipator, developer and enhancer of the critical conscience of community subjects through the promotion of participation and cooperation processes, which will materialize in community self-development projects. (p.26)

Several authors [1-30] agree in highlighting Community Environmental Education as a strategic factor towards sustainability, among other elements, due to:

- Express a transcendental expression of environmental education [13].
- Constitute a way for the development of an environmental culture, which conditions the leadership of the population and their conscious participation towards environmental conservation [2].
- In it, the formative process of the subject is permanent, oriented towards the future and adjusted to the context. In addition, the prominence of the individual and collective subject around a project consolidates the holistic conception of the environment, and at the same time becomes an expression of the interaction processes between human beings with nature [3].
- Helps the community deal with its own problems and organize itself to solve them, developing its own resources and potential and using those of others [28].
- It is characterized by respect for their autonomy in the community, translated into the determination of their own needs. These educational influences must have a conscious nature, an adequate orientation of their objectives, as well as an environmental perspective that has as its task motivation and commitment from the community itself [15].
- Promotes the development of capacities to modify their space in a sustainably way with individual and social responsibility, and consolidates citizenship with a view to consciously participating in decision-making for such modifications [21].

Likewise, the need to influence the environmental education of the new generations for the conservation of biodiversity has been highlighted, and several studies have been carried out that demonstrate its effectiveness. [10, 29, 31-57].

In relation to the conservation of Cuban biodiversity, it is worth noting that the spiny xeromorphic scrub on serpentine (cuabales):

- Present great floristic richness and high endemism [58-60].
- Their environmental functions, economic and social uses have been identified [61].
- It alerts about its vulnerability [62] and about its threats, derived mainly from human activity [61-68].
- A scientific vacuum is noticed regarding its conservation, from the social point of view [69].
- It is considered that the work of awareness and education about its importance for the population that lives near it should be intensified [2].

In Santa Clara, there are several spaces where serpentine soils predominate [59]. One of these places is the Callejón de Los Patos, where there is an area of cuabal vegetation, which is highly fragmented and presents a high level of deterioration [69].

The greatest affectations to the cuabal of the Callejón de Los Patos are the result of human actions. What was corroborated in the execution of the "Parque Cuabal" Project, which was developed until 2017, by the Botanical Garden of the Central University "Marta Abreu" de las Villas, and in a diagnosis on its environmental management [69] that constitute antecedents of the present investigation.

From this problem, the general objective of the research was outlined: Implement actions for the development of Community Environmental Education, with emphasis on the conservation of the cuabal, in the Callejón de Los Patos.

2. Materials and Methods

Callejón de Los Patos belongs to the Popular Council (PC) University (local government structure); it is a rural settlement and is located on the Highway to Camajuaní, km 6 ½, next to the Universidad Central "Marta Abreu" de las Villas (UCLV, by its acronym in Spanish).

The population selected for the investigation were the inhabitants of Callejón de Los Patos. The following 115 people were intentionally chosen as a sample: 12 teachers and 28 fourth and fifth grade schoolchildren, from the Carlos Manuel de Céspedes Normal Rural School (ENR, by its acronym in Spanish) of the PC University; 18 housewives, 12 retirees, 6 farmers, 32 inhabitants with different professions and 7 key informants (the researcher of the Botanical Garden that was developing the "Parque Cuabal" Project, 3 Specialists from the UCLV Botanical Garden, the delegate of the PC (the highest government authority at the PC level), a forest worker and a peasant, who lives adjacent to the cuabal vegetation).

The selection of the subjects those make up the sample is based on the following indicators:

- That they live in the settlement.
- That they have leading roles in the settlement (teachers, doctors, PC delegate, or those who can become community managers)
- Schoolchildren who, due to their ages, have potential for the EAC process.
- That they are willing to participate in the EAC process.

To determine the school grades that make up the sample, the analysis of normative documents from Primary School was carried out, with the aim of clarifying the peculiar characteristics in that age group, such as bio-psycho-social-historical and community; as stated in the Bases for the improvement of the National Education System.

The 115 people were intentionally chosen as a sample, by:

- key informants, for the relevant information they provide to the investigation;
- housewives, because they are predominant among the female sector of the settlement and because of the knowledge they, generally, possess about the usefulness of plant species that develop in the spaces where they live;
- the elderly, due to the wealth of knowledge they possess and transmit to other generations;
- the peasants, because the research is carried out in a rural settlement and because of the knowledge about the biodiversity of the area that these people have;
- the teachers for their social incharge as trainers of environmental culture in the children who live in the Callejón de Los Patos;
- the schoolchildren, for the commitment of the Cuban Primary School Model, which aspires that the school becomes the most important cultural center of the community.
- Finally, the rest of the sample used responded to the willingness of the subjects to participate in the research.

The Figures. 1, 2 and 3 below express the composition by gender, age, and occupation of the residents of Callejón de Los Patos involved in the process, which demonstrate the diversity of the sample chosen in the research. The contribution of the elderly stands out, because they are a predominant age group in the settlement and because of the wealth of knowledge they possess.

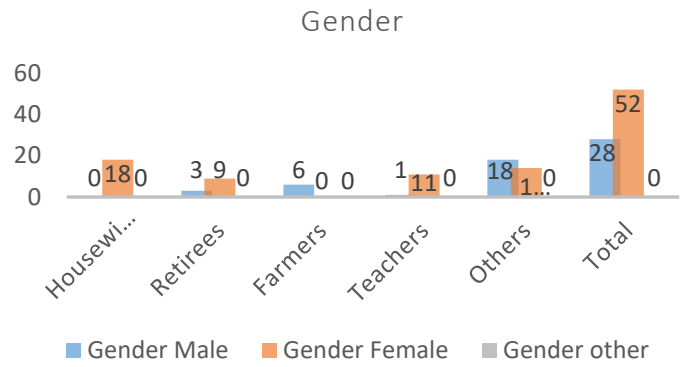

Figure 1. Gender of the residents of Callejón de Los Patos involved in the process

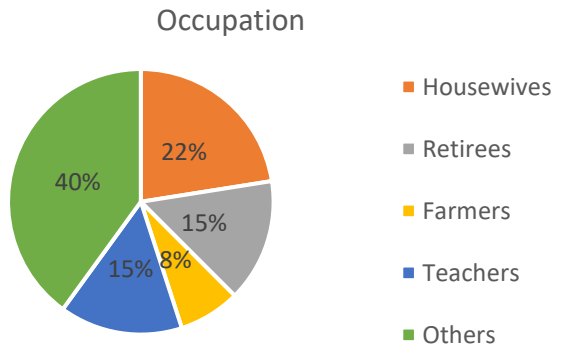

Figure 2. Occupation of the residents of Callejón de Los Patos involved in the process

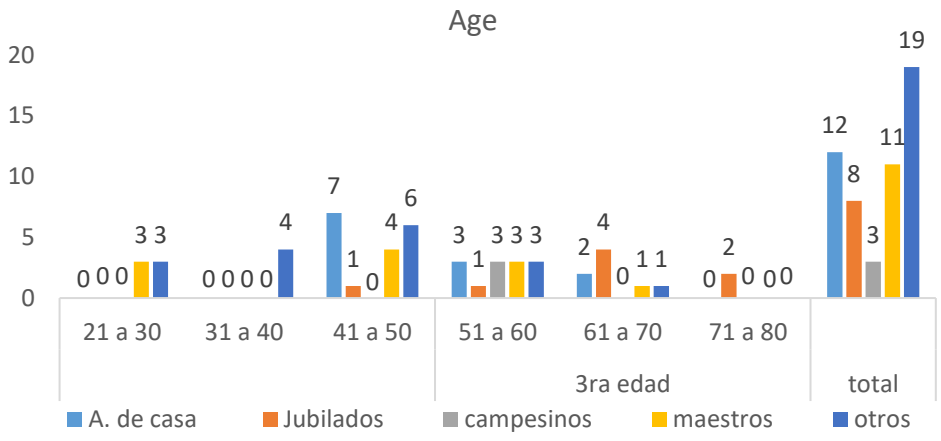

Figure 3. Age of the residents of Callejón de Los Patos involved in the process

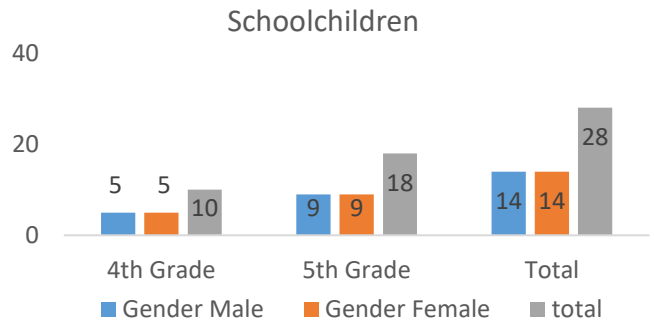

Figure 4. Gender of the schoolchildren involved in the process

The methodological perspective that predominates in the research is qualitative, although the percentage analysis of the data was incorporated to better visualize the trend in the analysis of the results. For the intervention process, the Community Self-Development Methodology (MAC, by its acronym in Spanish) was used, proposed by [70]; it is a work tool that has its genesis in Research Action Participation Transformation (IAPT, by its acronym in Spanish).

The arguments that define the selection of MAC as a tool for the intervention process are:

- makes it easier to know and interpret reality.
- integrate subjects into a group that participates and cooperates.
- part of the diagnosis to project actions for the transformation of reality.
- uses essentially group methods and techniques: group interviews, training group, reflection group, workshops, participant observation.
- strengthens the community conception, which goes beyond space, to consolidate the links between subjects, their protagonism and critical consciousness.

The MAC has five stages. The first two contribute to the diagnosis. The third to the proposal of actions, the fourth to the evaluation and the fifth to the systematization. In the present investigation, the first three were used. The methods, techniques and, procedures used are presented below, by stages:

First stage: Initial exchange with the subject in need of professional action.

Objective: Approach of the professional to the context where the intervention will be carried out to confirm the demand made and draw up the operational plan.

Methodological guidelines for the stage: It is characterized by the exchange with the president of the Popular Council, and with groups of subjects who express their opinions in relation to the problem (partial groups).

It is obtained as a product: the explicitation of the demand.

The method used was the in-depth interview, which was carried out with:

- the researcher of the Botanical Garden that was developing the "Parque Cuabal" Project, who made the demand for research explicit, after identifying the progressive deterioration of the cuabal;
- the delegate of the PC University (Appendix A), to confirm the demand made and find out their opinions on the environmental problems that affect Callejón de Los Patos;
- the director of the ENR Carlos Manuel de Céspedes and a teacher, who lives in Callejón de Los Patos (Appendix A), to know their opinions in relation to the problem to be investigated and the potential of the school to participate in actions aimed at the conservation of the cuabal.

Second stage: Exploration of the scenario. Pre-diagnosis.

Objective: Capture empirical data to compare them with the formulated demand and the starting theoretical referents.

Methodological guidelines for the stage: To form the participatory diagnosis, methods and techniques are used such as: document analysis, participant observation, group interviews, among others.

Product: the conformation of the Operational Plan or Matrix for the participatory diagnosis.

The methods used:

Observation was used during visits to the Callejón de Los Patos (Appendix B) and on excursions to the cuabal relict (Appendix B1) to verify the deterioration that it presents, the vegetal species that predominate in it) and the demand made.

Document analysis was used in:

- the characterization and diagnosis of the PC University (Appendix C), because the Callejón de Los Patos belongs to that PC;
- the Programs and Methodological Orientations of the subjects: The world we live in (fourth grade) and Natural Sciences (fifth grade) (Appendix C1), to know the contents of these subjects and their contribution to the EAC of schoolchildren (Appendix D);
- the documents for the Improvement of the National System of Education (PSNE, by its acronym in Spanish);
- the Environment (MA, by its acronym in Spanish) brochure for Improvement and the Elementary School Model, to know the demands of the curriculum and the developing didactic procedures that are consistent with the conception of EAC assumed in the research.

In-depth interview was conducted with a partial group:

- the PC delegate (Appendix A1), to learn about the characteristics of the population settlement;
- elderly people who were knowledgeable about the cuabal species, to determine the uses that the population makes of this species; a forestry worker and a farmer, who lives adjacent to the cuabal vegetation (Appendix A2) who identified existing species in that plant formation and their usefulness.
- Specialists from the Botanical Garden of the UCLV were also interviewed on topics for research purposes, to learn about the studies and background projects carried out in relation to cuabal, and its conservation, its results and limitations (Appendix A3 and A4).

Structured interviews were applied a partial group:

- peasants, housewives and older adults from Callejón de Los Patos, as well as teachers (Appendix E), to learn about the environmental problems they identify in the CP, possible actions to develop to contribute to its sustainability, and verify his knowledge about the cuabal, the damages that affect it and possible ways for their conservation.

Third stage: Diagnosis itself and proposal of actions (diagnosis-transformation)

Goals:

1. Participatively draw up the work sessions for the development of the EAC aimed at the conservation of the cuabal in the Callejón de Los Patos.
2. Build, by the group, the proposal of EAC actions aimed at the conservation of the cuabal, based on the results of the work sessions.

Methodological guidelines for the stage: Presentation of the operational plan or matrix for the participatory diagnosis, prepared as a result of stages one and two. Then the work sessions are organized, the topics to be worked on and the structure of the sessions are determined, based on the results of the diagnosis. The proposal is presented to the group and critical reflection is encouraged.

The work sessions are developed in the form of workshops and with the use of group devices, as a premise for participatory construction of the action proposal from a community conception. Closing processes are developed in each session to evaluate the achievements and shortcomings.

Product: Community Environmental Education Actions to contribute to the conservation of cuabal in the population of Callejón de Los Patos.

The methods used were:

The **participant observation** was carried out in the workshops developed in the Circle of interest (CI) on biodiversity conservation (Appendix B2), which was carried out with the fourth and fifth grade students of the ENR Carlos Manuel de Céspedes.

Group interview, was used with:

- fourth and fifth grade teachers (Appendix F), to consult the treatment of the environmental issue that they do in their classes and incorporation of the biodiversity of the area (example: the cuabal), taking into account that the Primary Model is conceived as flexible and contextualized; as well as, the projection of possible actions to be developed, inside and outside the school, to work the EAC with the population, aimed at the conservation of the cuabal.
- fourth and fifth grade students (Appendix F1), to verify their knowledge about the MA and the cuabal, the damage that affects it and possible ways for its conservation.

Structured interviews were applied:

- students of fourth and fifth grade (Appendix E1 and E2), to learn about the environmental problems they identify in the CP, possible actions to develop to contribute to its sustainability, and verify his knowledge about the cuabal, the damages that affect it and possible ways for their conservation.

In addition, the reflective group method [71] (conformed by the students of fourth and fifth grade) was used in some sessions, to inquire, think, analyze, create new positions, value and learn together about the importance of environmental conservation, with emphasis on cuabal and possible actions to contribute to these objectives, achieving the participation of the residents of Callejón de Los Patos.

For its development, the necessary conditions for the success of this work device were taken into account:

- The group members must handle all the necessary information of the group process that is developed.
- It is not enough to give the members the floor, it is necessary to create the conditions for a total exercise of that enunciation.
- Freedom and autonomy characterize the work of this research device.
- The work techniques with the reflective group contribute to the fundamental objective (necessarily assumed by everyone) of undertaking a knowledge process, aimed at making its members aware of their needs and demands, based on their interests and desires. that the group is capable of assuming during the time it operates.
- We work so that the group produces alternative, transformative projects that contemplate and satisfy the needs discovered by the group in the reflection processes.
- It is essential that the group works with great freedom and involvement and that it reflects on the relationship that the subjects maintain with their real life process, their daily lives.

The reflective group was used with fourth and fifth grade schoolchildren, organized in the Circle of interest "The stars of the environment", coordinated by the researcher, since

the circle of interest modality contributes to the education that develops the Model from elementary school.

In addition to the investigative methods, group techniques were applied that, from didactics, can contribute to group work and favored the dynamism of the sessions, dialogue, reflection and joint creation of EAC actions.

Drawing directed towards the environmental theme, made by the fourth and fifth grade students, to assess their perception of the MA. This technique was used because thematic drawings provide a wide range of exploration possibilities in different investigations and non-verbal explorations.

Triangulation of data was used to corroborate and analyze the information obtained through the aforementioned methods, because it provides a holistic, multiple and highly enriching vision of the phenomenon to be investigated; greater confidence and validity of the results, more interpretive flexibility and creativity in the approach to the study; productivity in data collection and analysis; proximity of the researcher to the object of study and capacity for innovation in conceptual and methodological frameworks

In the community conception that is applied, group processes prevail, because the subjects establish linking processes among themselves from participation, cooperation, identification of contradictions and the proposal of actions; aspects that typify the essence of that conception.

3. Results and Discussion

In the first stage, exchanges were carried out with key subjects of Callejón de Los Patos. The methods used provided the following results:

The in-depth interviews, applied to the delegate of the Popular Council (PC) University, the director of the ENR Carlos Manuel de Céspedes and a teacher who lives in the settlement, provided interesting data that evidenced the value of the participation of the subjects in EAC processes, such as:

- We proceeded to plan the operational plan for the development of the intervention process and the exchanges with the reflective group.
- The interest of the school in the formation of a Circle of Interest was known, and the agreements were drawn up for the Collaboration Agreement between the ENR Carlos Manuel de Céspedes and the Department of Sociocultural Studies (ESC, by its acronym in Spanish) of the UCLV.

In the exchange, a positive attitude was appreciated, shown in the willingness of the subjects to participate in the EAC process (director and teachers), acceptance that a professional with knowledge of the Environment (MA) and biodiversity, accompany them in the process; as well as, interest on the part of the participants in carrying out actions for the conservation of the cuabal. This corroborated the value of the MAC to develop community processes, defended by [70].

In this exchange, the interest of the school in being the protagonists of the process was highlighted, since it becomes an opportunity and strength for the EAC work of the teaching institution, contributes to the training of schoolchildren and overcoming teachers; which is consistent with the Primary Education Model, the bases for the improvement of the National Education System and the Primary Education Study Plan (2016).

The interest of the school also supported the statement of [72] about the need for EA to encourage actions from homes, schools, and communities that contribute to the implementation of environmental policies.

- Confirmation of the demand, made explicit by the researcher of the Botanical Garden that developed the "Parque Cuabal" Project.

Demand that confirmed the criteria of [73-75], regarding the transformations of natural characteristics that are caused in territories occupied by population settlements and the incidence of anthropization in said territories.

Based on the criteria of [76] in correspondence with the second stage of the MAC, a participatory analysis of the social and environmental context was carried out from two lines: an external one, in which the socio-environmental problems and the possibilities of environmental sustainability and an internal or school one where institutional documents were examined.

The results of the second stage were:

The observation made in space:

It allowed to corroborate the main problems of the PC, identified by the interviewees in the previous stage, and their causes; as well as ratifying the demand presented by the Botanical Garden researcher, assessing the state of conservation of the cuabal and knowing the threats that affect it [69].

The environmental problems identified in the PC allowed us to corroborate [77] criteria on the urgent need to rethink and design strategies that promote a more harmonious relationship between man and the MA, oriented towards its conservation and sustainable use. The assessment of the state of conservation of the cuabal and the threats that affect it were validated in the diagnostic investigation prior to this [69].

For its part, the analysis of the characterization of the PC Universidad, demonstrated the certainty of the statement of [73] about the non-existence, in the local government structure created, of a preparation for the rural population to assimilate the knowledge, assessment, and solution MA problems in their territorial framework. This contradicts the need raised by [78] that current conservation strategies assume the intimate relationship that exists between societies and ecosystems; relationship that is defended by [79].

Through the analysis of the Programs and Methodological Orientations of the subjects: The world we live in (fourth grade) and Natural Sciences (fifth grade), it was found:

- The governing function of EA for the formation of knowledge, attitudes, values and behaviors; ideas that are consistent with the EA objectives proposed by [3] and Law 81 of the MA of 1997.
- The analysis of the Elementary School Model: a developer proposal evidenced, in its content:
- The didactic procedures that develop: observe, investigate, determine what is essential, discuss, describe, explain the cause and effect of what is observed. Therefore, there is coherence between that document and the conception of EAC exposed by Castro [3, 13].

Through the analysis of this document, it was confirmed that reflective analysis is possible in fourth-grade students (9 and 10 years old), because they have already developed greater potential for procedures that contribute to the development of thinking, allowing them to gradually show greater independence when executing learning exercises and tasks that contribute to developmental education.

Another important element for the development of the EAC, which can be seen in the Primary School Model, is the possibilities of fourth and fifth grade students to develop their imagination, allowing them to freely create their own stories, drawings, as well as, exercise their imagination in role plays and dramatizations, aspects that can enrich the EAC process.

The results obtained through in-depth interviews enriched the diagnosis made, prior to this investigation [69]:

- The one made to the delegate contributed to the identification of environmental problems and potentialities of the rural settlement for the sustainability of cuabal.
- Those carried made to the forest worker and the peasant who lives adjacent to the remnants of xerophytic vegetation, allowed the identification of cuabal species and the use that the population makes of them.

- The information obtained from the elderly people of the settlement, contributed the uses that the population gives to species of cuabal.

However, these results coincide with those of other studies [80] that have found that traditional knowledge about plants is still alive, however, it is the exclusive heritage of older people and often only in one or a few informants. In fact, many practices are no longer in use and will not be transferred to new generations.

- Meanwhile, in-depth interviews with specialists from the Botanical Garden of the UCLV with research related to the subject, corroborated the information obtained on the importance of cuabales, assumptions that support their conservation and the effectiveness of Environmental Education projects aimed at that interest.

The results obtained from the structured interviews, applied to residents of the Callejón de Los Patos contributed to diagnosing the current state of environmental management aimed at the sustainability of cuabal, based on the knowledge, skills, values and behaviors of the residents towards the conservation of biodiversity, with an emphasis on cuabal [69].

Interestingly, most of the interviewees stated that they did not know the cuabal, not even when its characteristics and location in the settlement were explained to them. In addition, they do not recognize it by the name of cuabal. Among their species, they only identify cactus and the aroma, or they point out that they do not know the names; they also do not recognize cuabal plants that have disappeared. Another interesting result is the absence of answers about the importance of the cuabal.

It is significant in the results that, regarding the state of conservation of the cuabal, the interviewees, for the most part, did not answer the question or show a difference of opinions that evidence a lack of recognition of the affectations that this plant formation presents; as can be seen in the following Table 1.

Table 1. Considerations about the affectations of the cuabal.

Correct answers	Acceptable Answers	Wrong answers
The community harms him, mistreats him / cuts him off (by unknown).	Environmental pollution; environmental impacts.	The weather
The ignorance of people about this plant and its importance.	They do not give them due maintenance.	Drought, water shortage.
They throw trash on it.	Some plague, bacteria or parasite that affects it.	They do not water the plants, nor do they add organic fertilizer.
Fires and logging.		
The animals[1]		

These elements demonstrate the criteria regarding the little identification of the population with their natural environment.

It is considered positive that, despite the lack of knowledge about the cuabal, most of the interviewed residents recognize the need for its conservation. This demonstrates a positive environmental awareness, pointing out the need to preserve all species of flora. Regarding the importance of its conservation, the inhabitants argued that (Table 2):

[1] They refer to grazing

Table 2. Considerations about the importance of conserving the cuabal.

Correct answers	Acceptable Answers
Enrich the oxygen of the Environment.	Is in danger of disappearing.
They absorb carbon dioxide.	To help reforestation.
It is a rare plant / they are endemic.	
To conserve the existing plant species in the area.	
We must take care of our flora.	
To contribute to caring for the environment.	

The general results provided demonstrate the certainty of the criteria of various authors [1, 3, 13, 16, 17, 72, 77, 81] on the need to increase EA in society and spaces for debate on local realities, for the development of social articulation mechanisms that strengthen sustainable community practices and guarantee participation of the population in the decision-making processes on the management of natural resources, as it is conceived in the National Program of Environmental Education for Sustainable Development of 2016-2020.

By way of generality, the results of the diagnosis of the current state of EAC of the inhabitants of the Callejón de Los Patos for the conservation of cuabal [26] validated the criteria of [73] that affirms the little participation of the community in decisions about environmental problems that affect their environment, which, in turn, is related to what was affirmed by [73, 75] regarding the negative consequences of ignorance of the population on the economic and cultural value of Cuban biodiversity, and with the criteria of [80, 82], in relation to the importance of knowledge about flora and vegetation for the management and conservation of biodiversity. These elements highlight the need for an EAC that enhances the protagonism of the subjects from the knowledge learned in the intervention process de [3].

As a conclusion of the diagnosis, the Operational Plan or Matrix of the current state of the EAC of the inhabitants of Callejón Los Patos was formed, to develop conservation actions for the cuabal. It endorsed the leading role of the subjects, from the use of the MAC for the intervention process, defended by [70]. Since the Matrix is formed by the group of participants (the students of fourth and fifth grade), in the group work sessions. Its value is supported by the recognition, by the subjects, of the environmental problems present in their PC and the possible solutions they propose. For the preparation of the matrix, the conception of EAC that supports the investigation was taken into account.

Issues:

Cognitive dimension: insufficient knowledge, in the population, associated with the conservation of biodiversity, with emphasis on the cuabal, its species and importance. Limitations are found to recognize the environmental problems (related to biodiversity) present in the PC and the causes that originate them, as well as the totalizing approach of the MA, which hinders the integrating vision of its components.

Procedural dimension: it is appreciated, in the inhabitants, little development of skills to identify the cuabal and its species; Environmental problems that affect the PC are identified, but their causes are not always explained. It is also difficult to locate information related to the conservation of biodiversity, cuabal and the projection of actions, as well as critical assessments in this regard.

Attitudinal dimension: behaviors and values that are typified by apathy, lack of motivation to participate in projects aimed at the conservation of cuabal are manifested in the inhabitants. They show a lack of responsibility towards environmental conservation; which is reflected in the presence of micro-dumps and other environmental problems present in the PC.

Priorities: Training for the subjects involved and preparation of actions for the conservation of the cuabal in the Callejón de Los Patos.

Factors that condition the problems: Insufficient actions that contribute to projects that promote knowledge, skills, and values aimed at the knowledge and conservation of the cuabal and its species.

Possible actions: Training for facilitators, preparation of brochures and brochures, excursions to the place where the cuabal relics are for environmental interpretation. Develop group processes to build, participatory, an EAC project aimed at the conservation of the cuabal.

Resources: pencils, sheets of paper, cameras, printers, computer.

Contributions from the Popular Council: venues for the workshops, documents, information from leaders who can contribute to the exchange process.

Participants: subjects who are willing to participate in the process: 12 teachers, and 28 students.

Responsible: the professional who accompanies the intervention process.

The main result achieved in the research was the development process of the EAC, achieved through the work sessions [32], organized in the third stage of the MAC. A summary of them is presented below (Table 3) to provide the reader with the logical order that contributed to the proposal of actions:

Table 3. Work sessions for the development process of Community Environmental Education

Session	Participants	Goals	Content	Technique
1	ENR professors	Identify the environmental problems of the Callejón de los Patos. Explain causes and consequences for the population.	Environmental problems of the Callejón de los Patos. EA and EAC, cuabal, characteristics, importance, actions for its conservation.	Workshop
2	ENR professors	Explain the conception of EAC for the conservation of the cuabal that is assumed for the process.	treatment of the environmental issue that they do in their classes and incorporation of the biodiversity of the area (example: the cuabal)	Group interview
3	ENR 4th and 5th grade schoolchildren	Introduce the researcher. Create the Circle of Interest, highlighting the elements of the EAC process that will be developed. Motivate schoolchildren for the knowledge of environmental problems in the Callejón de Los Patos.	The environmental problems in the Callejón de Los Patos, conformation of the Circle of interest.	Structured interview about MA Drawing directed "The Environment in my community"
4	ENR 4th and 5th grade schoolchildren	Motivate schoolchildren to carry out sustainability actions in the MA.	The MA and its sustainability.	Competitive game of questions and answers.
5	ENR 4th and 5th grade schoolchildren	Identify knowledge about cuabal in schoolchildren.	The cuabal of the Callejón de Los Patos.	Structured interview about cuabal
6	ENR 4th and 5th grade schoolchildren	Identify environmental problems of the Callejón de Los Patos and their possible	The MA in the Callejón de Los Patos.	Tour of the Callejón de Los Patos. Reflective group

		solutions through a tour of the place.		
7	ENR 4th and 5th grade schoolchildren	Identify the cuabal plants of the Callejón de Los Patos, the damage that affects it and its possible mitigation.	The cuabal, its particularities in the Callejón de Los Patos, importance, damages that affect it and conservation	Group interview about cuabal
8	ENR 4th and 5th grade schoolchildren	Learn about the richness and biodiversity of the Botanical Garden of the UCLV and its artificial cuabal.	The richness and biodiversity of the JB of the UCLV and its artificial cuabal.	Visit to the UCLV Botanical Garden
9	ENR 4th and 5th grade schoolchildren	Motivate students by knowing dates related to the MA.	MA Day and collective creation of promotional posters for environmental conservation.	Collective creation of promotional posters.
10	ENR 4th and 5th grade schoolchildren	Specify the EAC action plan for the conservation of the cuabal.	Conformación del plan de acciones de EAC para la conservación del cuabal.	Reflection and collective creation.

In Session 1, it was found that teachers have the knowledge and skills to identify environmental problems present in the PC that are not only limited to those of negative incidences in their lives.

In their arguments, it can be seen that they recognize other difficulties that affect the MA and biodiversity, mainly related to soils and trees that affect the MA and biodiversity, mainly related to soils and trees. They also recognize that these environmental affectations are caused by the neighbors themselves, and consequently, their environmental awareness must be influenced to reduce inappropriate behaviors towards the MA.

However, in relation to the cuabal, it is manifested, in the teachers, insufficient knowledge and skills to identify the cuabal and its plant species. Regardless of this, teachers recognize its importance for biodiversity. In addition, they assume that the main damages that impact it are related to anthropic activity. Therefore, they highlight the need to inform and educate the community in this regard.

In Session 2, the teachers mentioned that the treatment of MA in the classes includes: the elements of nature, its care and the measures to achieve it; living and non-living beings, their integration; the environmental components, and the incidence of man in the MA. However, teachers consider that other ways and actions could be developed to promote EA in schoolchildren, such as drawings, contests, excursions; activities in which they participate and motivate them.

In relation to this, they contributed ideas to motivate the students during the intervention, such as: animated environmental videos, where negative behaviors towards the MA are shown so that the students identify them and propose positive ways of acting. Teachers report that these exhibitions can lead students to make critical assessments, reach conclusions and perhaps, at home, discuss with their parents what they have seen and learned; thus, achieving incidence on other residents of the PC.

The willingness of the teachers to contribute to minimizing the environmental problems of the PC and to look for ways to influence the development of environmental awareness in its inhabitants was appreciated. The instrument also reaffirmed the ignorance of teachers in relation to cuabal; which has led to its not being included in the classes

In Session 3, the schoolchildren showed the following results:

Figure 5 shows the favorable criteria of schoolchildren regarding the conservation of MA. In this regard, they allege its importance due to its usefulness to man; thus, reaffirming the effectiveness of the programs of the subjects received by them at school.

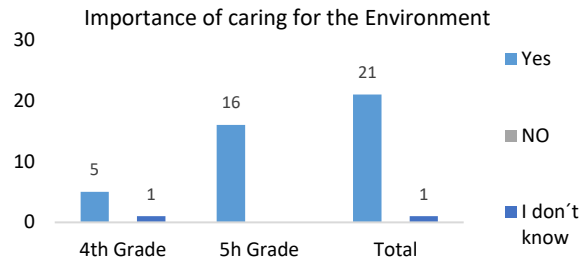

Figure 5. Do you consider important to take care of the environment?

However, Figure 6 shows that schoolchildren do not recognize the inappropriate behaviors that are evident in their PC towards the MA. The few schoolchildren who denounce them refer to the fact that the residents throw garbage in the streets, the rivers and cut down the trees.

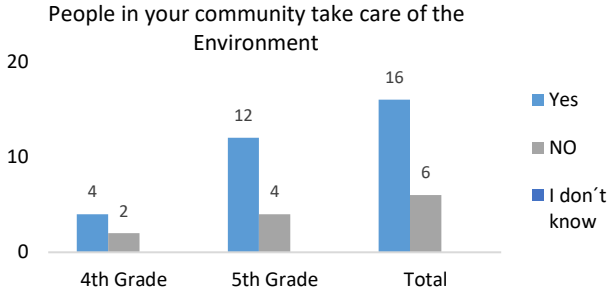

Figure 6. Do people in your community take care of the environment?

From the elaborated answers of the 5th grade students, to the structured interview, it can be inferred that they perceive the MA as the set of biotic and abiotic components, including man or the place where they live; others understand it as everything that surrounds us, the whole world, or nature. Regarding what they have learned about MA, the students highlighted the importance of caring for it for human survival, protecting flora and fauna for their beauty and usefulness, and avoiding contamination. From these statements, it is concluded that they recognize the importance of biodiversity and its conservation and include the incidence of man for said conservation.

For their part, most of the 4th grade students show a more limited understanding of MA, taking into account only the biotic elements, including man as one of the components. Consequently, these schoolchildren highlight, among their knowledge of the subject, the need to take care of the MA, nature, flora, and fauna and not contaminate them through solid waste due to their usefulness for man.

In the guided drawing (Appendix G), the fourth and fifth grade students reflected as elements of the MA: clouds, sun, the sky, a sunrise, a sunset, mountains, birds, butterfly, waterfalls and rivers, fish and tortoise, a crocodile, river snail, aquatic plants, trees, palm, fruit trees, a woodpecker in a tree, grass, a horse, flowers, butterflies, herbs, bushes and plant formations, houses (a bathroom outside of the house or relief room), a shed, a pot with a flower, a well, a pond, people and children planting plants and the earth.

It is highlighted that the fourth and fifth grade students included anthropic elements in their representation of the MA; one student even reflected its conservation by planting flora species. The drawings highlight the rural landscapes, where mountains, trees, animals, birds and rivers predominate; elements that relate to your CP.

In Session 4, through participant observation, it was noticed that, in their competitive answers about the MA, the schoolchildren expressed criteria that corroborated the results obtained through the structured interviews carried out in the previous session. In addition, they showed discrete progress that indicates a development of knowledge, skills, and values consistent with the EAC process.

The main results of Session 5 were:

Figure 7 shows, as a trend, the knowledge about cuabal, among schoolchildren, although they do not know it by that name. They identify it as *a thorny plant with flowers, similar to aroma, that stores water during drought, a plant that has many thorns, is very beautiful, and also has flowers*.

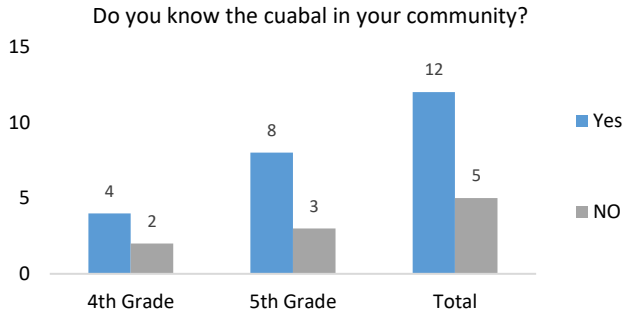

Figure 7. Knowledge of schoolchildren about cuabal

It can be seen in Figure 8 as a positive result, that most of the schoolchildren report that they would like to keep the cuabal.

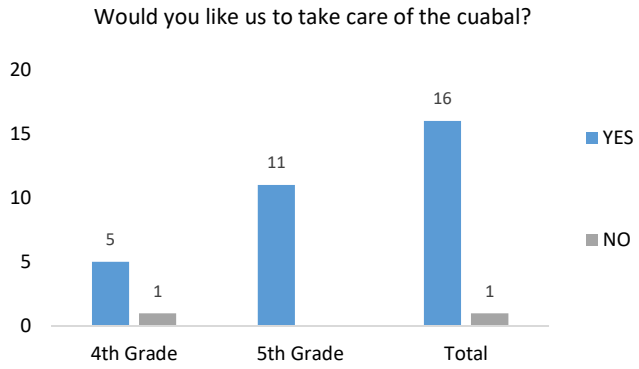

Figure 8. Students' considerations about the cuabal and its conservation

Their arguments provided to keep it are:

- *Although it is thorny, it is in the environment and has beautiful flowers*
- *It is a plant of the Environment, and it is a living being*
- *It is important for nature*
- *It is very pretty and of different colors*
- *They are bushes that flourish, and adorn the community*
- *It is a very nice place*
- *They are very precious to me, and it should be to other people*
- *Provides us shade.*

The schoolchildren consider that we can take care of the cuabal (Table 4):

Table 4. Considerations of the students to conserve the cuabal.

Correct answers	Acceptable Answers	Wrong answers
Avoiding fires.	Not taking away the flowers that make it more beautiful.	Watering it every day.
Not mistreating him, taking care of him, protecting him.		Pouring it with monthly water; Pouring water.
Do not hit it, nor cut it.		
Not cutting down the places where he lives.		
Leave the cuabal alone.		

In Session 6, the tour of the settlement, facilitated the practical experience of the schoolchildren, since they appreciated the environmental problems in situ and recognized that in their PC there is a lot of solid waste scattered. In addition, they perceived various wild birds in captivity and argued that several children in the settlement hunted and kept them in captivity. Which is manifested as a behavior that typifies the leisure activities of various residents and children in the PC. This experience validates the statement of [84] about the effectiveness of the approach to the physical world, since this type of activity allows students to become more aware of the responsibility linked to the conservation of the environmental heritage of a region.

The debate carried out on the results of the tour, which was carried out by the reflective group, contributed to the fact that: the schoolchildren showed rejection behaviors towards the negative environmental practices that are evident in their PC and showed interest in seeking solutions to those situations. In addition, they proposed not to imitate these negative behaviors towards the MA.

In Session 7, through participant observation, it was observed in the schoolchildren, an evolution in knowledge related to the importance of conserving trees and animals; they used previously learned arguments and expressed critical judgments regarding the felling of trees and the importance of planting them, as well as making their use sustainable. Therefore, the didactic procedures that develop the Primary Model are promoted in these actions.

The schoolchildren, who participated in the group interview, provided data that reveals knowledge, skills, and values contained in the purpose of EAC that pursues the research; since they show abilities coherent with this conception, such as: they identify that "the cuabal is close to the *Pollera* and that there is also one in the *Güiros*," they recognize "its importance for biodiversity because that in the area of that plant formation there is the presence of *zunzunes, cartacubas, tomeguines del pinar, gorriones* and *arrieros*". They also consider that cuabal is important because: "it purifies the air and the birds make nests in it; a student added that the cuabal is the same as the *tocororo* (the native Cuban national bird); it is endemic."

They make critical judgments about the behavior of the people in the settlement with respect to the cuabal, because they throw garbage in it. Consequently, the schoolchildren proposed initiatives to avoid these negative behaviors, through posters and notices.

The presentation of images on the cuabal motivated the schoolchildren and developed their observation regarding the characteristics and species of this plant formation, since they claimed to know them after observing the images, but they do not know their names. The session contributed to the participants determining the essentials, describing what was observed, and identifying species. They also expressed the practical utility that these plants provide, according to the empirical knowledge that their families reproduce.

It can be seen that the EAC process, developed in the group sessions, takes place in a spiral, as conceived in the IAPT [3]; since the participants proposed actions, such as: holding a contest on the cuabal, through an exhibition of the leaves of their plants or photos of them.

Through participant observation, it was verified that the session provided evidence of the progress of the community conception proposed by [3, 70], which supports the research; since the progress of the group in terms of their participation, cooperation and critical awareness is appreciated; that is evidenced in the knowledge, skills, values, and behaviors developed during the work sessions.

In Session 8, through participant observation, it was confirmed that the visit to the UCLV Botanical Garden was useful for the development, in schoolchildren, of aspects related to the knowledge of cuabal and its conservation. After their observation in the Botanical Garden, the schoolchildren identified its characteristics, previously learned in the Circle of Interest (CI), such as: "it has small leaves, thorns, small fruits, stoney soil, less water reaches them, roots too deep to drink water. In addition, respectful behaviors were observed for the Botanical Garden specialist with whom they exchanged knowledge about this plant formation, learned in the CI. These positive results support the statement of [85], by highlighting that didactic activities related to the natural environment are understood as a good resource to motivate students and complement the programs of the different subjects; and, at the same time, they are capable of laying the foundations for behavior that protects nature.

In Session 9, a structured interview was used to evaluate the results of the CI, developed in the intervention process. The trends of responses was positive towards CI. In their opinions, they mentioned that they liked: “everything we have done; trees and plants; learning about the cuabal, animals, and plants; taking care of the MA and the animals; what the teachers and the trips taught us; the visit to the Botanical Garden; we enjoy games”.

It was valuable to observe the critical judgments of the schoolchildren in relation to what they did not like; they made reference to: “when the teacher showed us trees with garbage; that on the tour we saw caged animals; that there is garbage everywhere”.

The schoolchildren also issued opinions that highlight the transformations that occurred in them during the EAC process for the conservation of the cuabal, since they affirmed that in the CI they learned about: “the cuabal, where there is a great variety of plants and birds, which do need much water, have small leaves and many thorns, and grow on stones; to take care of the cuabal and the MA; many incredible things about nature and its wonders; do not throw garbage in rivers or streets; some things that we need for our lives”.

As valuable elements, it was highlighted that the work sessions carried out were very useful for their learning about cuabal, since it allowed them to know that: “it has thorns, hard and small leaves, little birds live in it; many birds make nests in it; that they live where there are rocks and where there is cuabal there is a lot of heat; they are in a rocky and dry terrain; that it should be taken care of and not throw garbage in it; that it is a “unique piece” of this place, and it exists in places without water”.

As a result of the collective work, in the last session, the EAC Action Plan was obtained to contribute to the conservation of the cuabal, in the population of Callejón de Los Patos (Table 5).

Table 5. Community Environmental Education actions to contribute to the conservation of cuabal in the population of Callejón de Los Patos

Specific objectives	Actions	Addressed to	Responsible	EAC
Promote the importance of cuabal	Creation of a Circle of interest on the conservation of cuabal	ENR schoolchildren	ENR professors, Students and sociocultural managers	Skills Values
	Participatory contests on cuabal	ENR schoolchildren	ENR professors, Students and sociocultural managers	Knowledge Attitudes
	Presentation and discussion of videos on the importance of biodiversity	ENR schoolchildren	ENR professors, Students and sociocultural managers	Knowledge
Encourage a sense of belonging to the cuabal	Excursions to the cuabal of the CP and the Botanical Garden (BG) of the UCLV	ENR schoolchildren	UCLV BG specialists, ENR professors, Students and sociocultural managers	Knowledge Attitudes
	Observation and discussion of the floristic values of cuabal	ENR schoolchildren	UCLV BG specialists, ENR professors, Students and sociocultural managers	Knowledge Behaviors
	Inclusion of floristic species of cuabal in the garden of the school and houses	Residents of Callejón de Los Patos	Students and sociocultural managers	Habits Behaviors
Raise awareness about the importance of the conservation of cuabal	Execution of conversations with specialists about cuabal and its importance	Residents of Callejón de Los Patos	UCLV BG specialists, Students and sociocultural managers	Knowledge Skills
	Preparation of a mural on the conservation of cuabal for the Circle of interest	ENR schoolchildren	Students and sociocultural managers	Skills Attitudes
Train teachers on EA aimed at the conservation of cuabal	Organization of meetings, workshops and conferences on EA	ENR professors	UCLV EA Specialists, Students and sociocultural managers	Knowledge Skills
	Development of talks with specialists on the values of the cuabal and the importance of its conservation	ENR professors	UCLV BG specialists, Students and sociocultural managers	Knowledge Values
Promote conservation tasks of cuabal	Collection of solid waste discarded in the cuabal	ENR schoolchildren	Students and sociocultural managers, ENR professors	Habits Behaviors
	Preparation of brochures, posters and promotional signs for the conservation of cuabal	Residents of Callejón de Los Patos	Students and sociocultural managers	Values Attitudes
Promote a responsible attitude towards MA in Callejón de Los Patos	Carrying out promotional campaigns to raise awareness of MA and cuabal	Residents of Callejón de Los Patos	Students and sociocultural managers	Knowledge Values
	Development of ecological campaigns for cleaning the green areas of the PC	Residents of Callejón de Los Patos	Students and sociocultural managers	Habits Behaviors
	Creation of a student group for environmental conservation in the PC	ENR schoolchildren	Students and sociocultural managers, ENR professors	Values Attitudes
	Execution of community projects on the conservation of cuabal	Residents of Callejón de Los Patos	Students and sociocultural managers	Values Attitudes

The participatory preparation of the Action Plan, according to the principles of the MAC, is consistent with the criteria of [76], who affirm that:

The actions outlined to promote community social projection require the analysis of experiential aspects in relation to the system of beliefs, attitudes, values, conceptions, norms, and opinions that the educational community has built about the environment, strengthening collective capacities for community leadership and organization to promote sustainability. This leads to the design of training strategies and an action plan to propose solutions to socio-environmental problems and respond to a new environmental rationality, where community members assume individual and collective responsibility. (p 286)

On the other hand, through participant observation, developed in the group sessions, it was confirmed that the schoolchildren showed knowledge, skills, and values consistent with the conception of EAC assumed in the research [25] and the developing didactic procedures included in the governing documents of those degrees (Programs, Methodological Orientations of: The World in which We Live and Natural Sciences).

The environmental training process showed the value of community environmental education, whose distinctive element is its developer character, which will guarantee, in the subject, the active and creative appropriation of culture from their own experience. At the same time, it will promote the constant self-improvement of the subject, their autonomy, and self-determination in close connection with the socialization processes [27, 28]. Its development function is also materialized in the construction of the action proposal, facilitating compliance with the intention and purpose of the process; it transcends traditional proposals to emerge as a transmission of culture, as a transformation of itself, and as a transformation of reality adjusted to the context [28].

These elements achieved, typifying EAC, respond to the development of environmental culture in schoolchildren, which, according to [86-88] is in correspondence with the inclusive and participatory purpose of the Cuban social project: to move from the object approach to the subject one, from assistance to protagonism, as an expression of the self-transforming action of the subjects.

The practical activity of man gives culture a core character that occurs in its social relations. [87] highlights that this premise is essential for the process of environmental education and training; it has a socializing, developing, and emancipatory character that occurs in the different socializing agents. The authors specify that, as a cultural process under construction, it generates changes in behavior based on the knowledge, skills, and values acquired in it, which are expressed in the development of the environmental culture of society.

The observed elements strengthen the aspirations of the Study Plan and the Primary Model for the Improvement of the National Education System; since a development of: observation, investigation, determination of the essentials, debate, explanation of cause-and-effect was verified, critical judgments were issued, proposals were suggested for the solution of environmental problems, and sides were taken regarding judgments.

The development and results of the work sessions with the schoolchildren validate the affirmation of authors [1, 88-90] who defend environmental education as a fundamental tool for overcoming the biodiversity crisis. The use of group techniques and games in the sessions is based on the criteria of [34, 90] on the dynamization and better incorporation of concepts, by children, in these themes.

The community intervention process and its results highlight the effectiveness of EAC, as defended by several authors [2-30, 83].

4. Conclusions

The proposal for the conservation of the cuabal from the Community Environmental Education, in the Callejón de Los Patos, originated from the group of participants in the intervention process, developed through the Community Self-Development Methodology,

an element that we want to highlight as a novelty of the study and the main result of the path taken in the research.

From the analysis of the research records, it was evident that the group sessions contributed to the Community Environmental Education of the schoolchildren who participated in the process. In the cognitive dimension, they acquired knowledge associated with the environment, conservation of biodiversity, and cuabal (characteristics of the space where it develops, species, its importance, and conservation). In the procedural dimension, they formed skills to identify, explain, and argue aspects related to the cuabal (characteristics, importance, damages that affect them, and conservation) to select information, expose it, and self-evaluate the results through participatory contests. In the attitudinal dimension, behaviors, values, and attitudes that facilitated the participation of the subject, critical awareness, and the projection of actions aimed at the conservation of cuabal were stimulated.

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5. Appendix

5.1. Appendix A

Guide for an in-depth interview with the delegate of the PC Universidad, the director and a teacher of the ENR Carlos Manuel de Céspedes.

Objective: Approach of the professional to the context where the intervention will be carried out to confirm the request made.

Greetings. We are carrying out research on the conservation of the cuabal in the Callejón de los Patos. To do this, we ask for your help through your answers in this interview. They will be of great importance for the result of the investigation.

Interview topic: _____

Interview date: _____

Full name of the person interviewed: _____

Age: _____

Degree of instruction: _____

Specialty: _____

Occupation: _____

1. What environmental problems exist in your Popular Council? How does the behavior of its residents towards the Environment?

2. Do you consider it necessary to carry out research and projects to contribute to the environmental awareness of the people in your Popular Council?

3. Do you know the cuabal that exists in the Popular Council?

If the answer is NO, its characteristics and location are explained.

5. What perception do the residents of the cuabal have, what is their action towards it?

6. What damage is evident in this plant formation?

7. Do you think the cuabal is important, what should be preserved?

8. Do the people of the Popular Council contribute to its conservation?

9. Do you think it is necessary to carry out research and projects to help residents conserve the cuabal?

10. Do you think that the school can influence the conservation of the cuabal by the residents?Thank you very much for your answers.

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo.

5.1.1. Appendix A1

Guide for an in-depth interview with the delegate of the University Popular Council

Objective: To know the characteristics of the University Popular Council.

Greetings. Based on the research we are carrying out, we need to know some characteristics and data about the Popular Council. For this we ask for your help through your answers in this interview. They will be of great importance for the outcome of the investigation.

Interview topic: _____

Interview date: _____

Full name of the person interviewed: _____

Age: _____

Degree of instruction: _____

Specialty: _____

Occupation: _____

- Socio-economic and cultural characteristics of the Popular Council.
- Gender relations in the Popular Council (history and evolution).
- Relations of the Popular Council with projects, (characteristics).

The following are some subtopics that can be included:

- Total population of the Popular Council disaggregated by sex.
- Basic services and personnel working in them (health, education, etc.).
- Natural characteristics of the area.
- Main elements of Biodiversity in the area.
- Management of natural resources.
- Main environmental and biodiversity conservation problems.
- Representative ecosystems. Representative species of flora and vegetation and fauna.
- Ways of using resources to ensure their survival.
- Main advantages and threats to biodiversity in the Popular Council.
- Plant species present in the cuabal of the Popular Council.
- Uses that the population makes of these species.
- Damages that affect the cuabal.
- Potential of the Popular Council for its conservation.

Taken from Tréllez (s.f) Guide manual for communities. Environmental education and biodiversity conservation in community development.

Reworked by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo.

5.1.2. Appendix A2

Guide for in-depth interviews with elderly people, natives of the settlement, a forestry worker and a peasant who lives next to the cuabal.

Objective: Capture information from popular knowledge to shape and enrich the characterization of the cuabal.

Greetings. We are conducting a research about the conservation of the cuabal in the Callejón de los Patos. For this, we ask for your help through your answers in this interview. They will be of great importance for the outcome of the investigation.

Interview topic: _____

Interview Date: _____

Full name of the person interviewed: _____

Age: _____

Years living in the settlement: _____

Degree of instruction: _____

Specialty: _____

Occupation: _____

If Retired, what occupation did you have before you retired: _____

1. Do you know the cuabal in the Callejón de los Patos?

If you answer No

1.1 By what name do you know the plant formation found after the Poultry Farm, in areas of the Forestry Company?

2. How is that plant formation?

3. What plants do you know are in it?

4. Do you know if before there were some plant species that have disappeared from that area?

If yes, which ones?

5. Of the plants that are in that plant formation, do you know the usefulness or use of any of them?

6. What birds or animals abound in the area of that plant formation?

7. Do you think that plant formation is important?

7.1 Why?

Thank you very much for your answers.

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo.

5.1.3. Appendix A3

Guide for in-depth interviews with vegetation specialists on streamers from the UCLV Botanical Garden.

Objective: Capture specialized information to confront the formulated demand, the empirical data captured and the starting theoretical references.

Greetings. We are conducting research on the conservation of the cuabal in the Callejón de Los Patos. For this we ask for your help through your answers in this interview. They will be of great importance for the outcome of the investigation. In addition, we ask for your permission to record your responses.

Interview topic: _____

Interview date: _____

Full name of the person interviewed: _____

Age: _____

Specialty: _____

Occupation: _____

Workplace: _____

Years of work experience: _____

1. What are the characteristics of cuabales?

2. What is its importance for the conservation of biodiversity?

3. What are the main threats that affect them?

4. In addition to their biological importance, are they beneficial for the people who live near them?

5. Generally, how do people perceive cuabales?

6. Do you consider it necessary to educate the communities for the conservation of the cuabales?

7. What actions are carried out for its conservation?

8. What other actions do you think could be carried out?

9. Do you know the cuabal in the Callejón de los Patos?

10. What are its characteristics?

11. What state of conservation does it present?

12. What are the main threats that affect it?

13. Do you consider necessary to carry out actions for its conservation?

14. What potential do you think the Callejón de los Patos has for the conservation of its cuabal?

15. What actions do you think could be carried out in this regard?

Thank you for your answers.

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo.

5.1.4. Appendix A4

Guide for an in-depth interview with an Environmental Education specialist from the UCLV Botanical Garden.

Objective: To know about the cuabal conservation projects that have been carried out, their results and limitations.

Greetings. We are conducting research on the conservation of the cuabal in the Callejón de los Patos. For this we ask for your help through your answers in this interview. They will be of great importance for the outcome of the investigation. In addition, we ask for your permission to record your responses.

Interview topic: _____

Interview date: _____

Full name of the person interviewed: _____

Age: _____

Specialty: _____

Occupation: _____

Workplace: _____

Years of work experience: _____

1. What actions have you carried out, from Environmental Education, for the conservation of the cuabales?

2. What have been the main results and limitations?

3. What are the main motivational elements for children regarding the conservation of cuabales?

4. How can you get childrem lern about this thorny plant formation?

5. What elements of the cuabal do they promote in children?

6. What actions could be carried out to preserve the cuabal, with the childrem performance ?

7. What actions could be carried out to contribute to the conservation of the cuabal of the Callejón de los Patos?

Thank you for your answers.

Pepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo.

5.2. Appendix B

Observation Guide for the Callejón de Los Patos.

Objective: Capture empirical data to compare it with the demand formulated and the documents analyzed.

- Place where the research is carried out: _____
- Socio-economic and cultural characteristics of the communities.
- Urban characteristics (housing conditions).
- Basic services and personnel who work in them (health, education, etc.).
- Natural characteristics of the areas.
- Main elements of the biodiversity of the area.
- Representative ecosystems.
- Representative species of flora, vegetation and fauna.
- Environmental and biodiversity conservation problems that are evident.
- Main advantages and threats to biodiversity in the study area.
- Potentials that are evident for the conservation of the cuabal.

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo .

5.2.1. Appendix B1

Observation Guide for the relict of cuabal of the Callejón de Los Patos.

Objective: Capture empirical data to confront them with the formulated demand.

- Place where the investigation is carried out: _____
- Location of the cuabal.
- Name by which the population knows it.
- Effects that are evident.
- Species originating from the cuabal vegetation present in it.
- Predominant plant species.
- Other plant species present.
- Utility or use that the population makes of the species present in the cuabal.
- Common names with which the population knows the species present in the cuabal.
- Potential for its conservation.

Prepared by MsC. Yaima Mederos Jiménez, Dra. C. Georgina Castro Acevedo.

5.2.2.Appendix B2

Participant Observation Guide to the workshops developed in the Circle of Interest:

Objective: Assess progress that the subjects develop during the sessions and gaps that prevail during the Community Environmental Education process.

Items to be assessed: knowledge, skills and values that contribute to the EAC.

Dimensions:

- Cognitive: knowledge associated with the Environment, conservation of biodiversity, the cuabal, (characteristics of the space where it develops, species, its importance, value, conservation).
- Procedural: ability to identify, explain, argue aspects related to the cuabal, to select information, present results, self-evaluate the results.
- Attitudinal: behaviors, values, attitudes that facilitate the subject's participation, critical awareness and the projection of actions aimed at the conservation of the cuabal.

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo .

5.3. Appendix C

Guide for document analysis: Characterization and Diagnosis of the Popular University Council.

Objective: Compare the empirical data collected from the start.

- Socio-economic and cultural characteristics of the communities.
- Migration and miscegenation process.
- Gender relations in communities (history and evolution).
- Relationships between communities and projects (characteristics).

The following are some subtopics that may be included:

- Total population of each community disaggregated by sex.
- Gender hierarchies in the rural world.
- Main legends and myths in the selected communities.
- Basic services and personnel who work in them (health, education, etc.).
- Natural characteristics of the areas where the communities live.
- Maps of the study areas.
- Main elements of the Biodiversity of the areas.
- Management of natural resources.
- Main environmental and biodiversity conservation problems.

The following are some subtopics that can be included:

- Altitude of the community (masl)
- Surface area of each of them.
- Climatic characteristics.
- Types of soil and their use.
- Hydrographic basin to which each community belongs.
- Representative ecosystems
- Representative species of flora and vegetation, of fauna.
- How residents manage the resources and environment where they live (methods, techniques, infrastructure, etc.).
- Ways of using resources to ensure their survival.
- Main advantages and threats to biodiversity in the study areas.

Taken from Tréllez (2014) Guide manual for communities. Environmental education and biodiversity conservation in community development.

5.3.1. Appendix C1

Guide for document analysis: Programs and Methodological Guidelines for the subjects: The world we live in and Natural Sciences.

Objetivo: Valorar cómo los programas y orientaciones metodológicas de las asignaturas tributan a la Educación Ambiental Comunitaria.

Ítems a valorar: conocimientos, habilidades y valores que tributen a la EAC.

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo.

5.4. Appendix D

Analysis of documents, Programs and Methodological Guidelines of the subjects: The world we live in and Natural Sciences.

Objective: To know the orientation for the formation of knowledge about the Environment in primary schoolchildren.

Grade	Subject	Knowledge to acquire	Skills	Values
4th grade	The world in which we live	Concept of nature, its components, diversity, movement, relationships, transformations and changes. Various components of nature and social life. Different ways in which Planet Earth can be represented. Relationships of living beings in nature, in particular, of man. Fundamental elements of Cuba. Social and biological aspects of sexuality. Beauties of nature, creative work and struggles for freedom.	Analysis, reasoning and communication. Analysis of simple problems of natural and social life. Analysis, assessment and recognition of correct behaviors. Processes of reflection and regulation of behavior.	Norms of social coexistence. Love and respect for everything that surrounds the child. Moral education. Love, admiration and respect for the heroes of the Homeland. Aesthetic development. Positive interests towards school, study and work.
5th grade	Natural Sciences	The Solar System, the stars that make it up. Structure of the Earth and spheres that compose it, phenomena that occur in their causal relationships (geographical, astronomical, physical, chemical or biological). Effects of man's action on the Environment. Atheistic scientific conception of the world.	Satisfactorily explain, according to their level, the main processes and phenomena of nature with a materialist scientific approach. Cognitive independence.	Consistent attitude towards the world. Moral convictions, norms and habits of conduct. Feeling of love for nature and the need to provide protection. Love of work, respect for workers. Hygienic standards and habits, individual and collective. Correct behavior in relationships with social life. Enviromental culture

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo.

5.5. Appendix E

Structured interviews with: farmers, housewives and older adults from Callejón de los Patos, teachers from the ENR Carlos Manuel de Céspedes.

Objectives: Identify the environmental problems recognized by the residents of Callejón de los Patos in the Popular Council.

Diagnose the current state of Environmental Education of the residents of Callejón de los Patos for the conservation of the cuabal.

Dear respondent.

Professors and students from the University's Department of Sociocultural Studies are conducting research on the conservation of biodiversity in the Callejón de los Patos. To do this, we ask for your help with the answers to the following questions. Your answers will be completely anonymous and of great importance for the outcome of the research. Therefore, we ask that you be most sincere in your responses and that all questions be answered. Thank you very much for your help.

GENDER: ___ Female ___ Male ___ other
AGE: _____
OCCUPATION: _____
1. What importance do you attribute to caring for the Environment?
___ very important ___ important

___unimportant ___not important

2. What do you think are the main environmental problems in your community?_____
_____

3. What do you think could be done to solve the environmental problems in your community?

_____
_____

4. Do you know the cuabal that exists in your community?

____ yes ____ no

5. What is the community like in your community?
_____
_____

6. Do you know the plants that are in your community's cuabal?

____ yes ____ no

6.1 Which ones? _____

7. Do you know if there were plants in your community's cuabal that have already disappeared?

__ yes __ no

7.1 Which ones? _____

8. What importance do you attribute to the cuabal?

___ very important ___ important

___unimportant ___not important

9. What do you consider to be the state of conservation of the cuabal?

___ very good ____ good

___ fair ___ bad ____ very bad

10. What do you think are the main damages that affect the cuabal?

_____
_____

11. Do you think it is important to conserve the cuabal that exists in your community?

_____ yes ___ no

11.1 Why? _____ _____
_____

12. What do you think could be done to take care of the health of your community?

_____
_____

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo .

5.5.1. Appendix E1

Structured interviews on the Environment for fourth and fifth grade students from the ENR Carlos Manuel de Céspedes.

Objective: To specify the knowledge of schoolchildren about the environmental problems in the Callejón de Los Patos.

Hello. The teachers and students of the University want to participate with you in a Circle of Interest on the Environment. Therefore, we need your help answering these questions. We look forward to your sincere answers and company in the Circle of Interest. Thanks for your answers

GENDER: ___ Female ___ Male

AGE: _____ GRADE: _____

1. What is the environment?

_____

2. In what subjects have you learned about the Environment?

_____

3. What other ways do you learn about the Environment?

_____

4. What have you learned about the Environment?

_____

_____

5. Do you think it is important to take care of the Environment?

___ yes ___no ____ I don´t know

Why? _____

_____

6. Do people in your community take care of the Environment?

___ yes ___no ___ I don´t know

Why?_____

_____

7. What do you do to take care of the Environment?

_____

_____

8. How do you think the Environment should be cared for in your community?

_____

_____

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo

5.5.2. Appendix E2

Structured interviews about cuabal for fourth and fifth grade students from the ENR Carlos Manuel de Céspedes.

Objective: Argue the elements necessary for the conservation of the cuabal.

Hello. The teachers and students of the University want to participate with you in a Circle of Interest on the Environment. Therefore, we need your help answering these questions. We look forward to your sincere answers and company in the Circle of Interest.

Thanks for your answers

GENDER: ___ Female ___ Male

AGE: _____ GRADE: _____

1. Do you know the cuabal that is in your community?

__ yes ___no

2. What do you know about cuabal?

_____

3. Do you like the cuabal that is in your community?

___ yes ___no

Why? _____

_____

4. What is the cuabal like in your community?

_____

5. Would you like us to take care of the cuabal that is in your community?

___ yes ___no

Why? _____

_____

5. How do you think we can take care of it?

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo .

5.6. Appendix F

Guide for Group Interview with ENR Carlos Manuel de Céspedes teachers.

Objectives: Identify the environmental problems recognized by the Popular Council.

Diagnose the current state of Environmental Education, of the teachers for the conservation of the Callejón de los Patos cuabal.

Good afternoon, teachers. We are carrying out research on the conservation of biodiversity in the Callejón de los Patos. To do this, we ask for your help through your answers in this group interview. They will be of great importance for the outcome of the investigation, so we ask for the greatest sincerity in your answers. Additionally, we ask for your permission to record this group session.

Interview topic: _____ Interview date: _____

Number of people interviewed: _____

F _____ M _____

1. About the Environment, say: components and importance of its sustainability.
2. What are the main environmental problems that affect your Popular Council (PC)?
3. Do you consider that the people in your PC conserve the Environment (MA)?

3.1 How have they done it?

4. Do you think it is necessary to take actions so that the people in your PC keep the MA?

4.1 What actions do you think could be carried out?

5. What ways do you use to promote Environmental Education (EA) in your students?

5.1 How do they do it?

5.2 What is the role of the family in this sense?

5.3 Do you consider it necessary to continue working on EA with the students at your school?

5.4 What gaps do you observe in your students' EA?

5.5 What actions do you suggest in that direction?

5.6 What other people from the PC could we get involved?

6. Of the cuabal say. Why do you consider its conservation important?

6.1 What knowledge do the residents of Callejón de los Patos have to preserve it?

6.2 Do you consider it necessary to take actions to guide the population in this regard?

6.3 What actions do you think could be carried out?

6.4 To what extent is cuabal conservation important for birds and other species?

7. What role do you think the school plays or can play to contribute to EA in PC?

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo

5.6.1. Appendix F1

Guide for Group Interview with fourth and fifth grade students from the ENR Carlos Manuel de Céspedes.

Objective: To corroborate the knowledge that schoolchildren have about the cuabal of Callejón de Los Patos.

Interview topic: _____ Interview date: _____

Number of people interviewed: _____

F _____ M _____

1. Raise your hand if you know the cuabal

1.1 What is it like?

2. Who has seen it?
2.1 Where is it?
3. Do you like cuabal?
3.1 What do you like about it?
4. What plants are in the cuabal?
4.1 What are they like?
4.2 What use are these plants?
5. What little birds have you seen in the cuabal
6. Do you think the cuabal is important?
6.1 Why?
7. Do you think we should take care of the cuabal?
7.1 Why?
7.2 How could we take care of it?
7.3 Would you like us to take care of it?

Prepared by MsC. Yaima Mederos Jiménez, Dra. C Georgina Castro Acevedo .

5.6.2. Appendix F2

Drawings directed towards the environmental theme of the fourth and fifth grade students of the ENR Carlos Manuel de Céspedes

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