

MENDIVE

REVISTA DE EDUCACIÓN

Translated from the original in Spanish

Contribution to community environmental education from a master's degree in Environmental Management

Contribución a la educación ambiental comunitaria desde una maestría en Gestión Ambiental

Contribuição para a educação ambiental comunitária a partir de um mestrado em gestão ambiental

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Received: December 15th, 2020.

Approved: April 27th, 2021.

ABSTRACT

Academic and scientific training from the postgraduate level allows the implementation of environmental education alternatives aimed at different sectors of the population. The objective of the study was to socialize the contributions to community environmental education, based on the results of the research carried out in the 3rd edition of the master's degree in Environmental Management, with an output in Community Environmental Education, which was coordinated by the Center for Environmental Studies and Natural Resources of the University of Pinar del Río, Cuba, in the period 2012-2017. The structural systemic method and measurement were used. The instruments used, the environmental problems identified, as well as the main positive impacts on the environment were identified and quantified in percentages. The environmental education program was the most widely used instrument (62.5 % of theses). 171 environmental problems were identified, with the highest infrastructure incidence being those related to technical, environmental deterioration and insufficient environmental education. Participatory action research and workshops represented the most widely applied method and form, respectively. 103 positive environmental impacts were achieved; among them, the most significant: environmental sanitation, actions for the conservation of biodiversity and the creation of educational spaces. It was concluded that the research activity of the master's degree contributed positively to the solution of environmental problems in different communities; however, it is necessary to increase environmental recovery actions.

Keywords: community; community environmental education; academic postgraduate.

RESUMEN

La formación académica y científica desde el postgrado permite implementar alternativas de educación ambiental dirigidas a diferentes sectores de la población. El estudio tuvo como objetivo socializar las contribuciones a la educación ambiental comunitaria, a partir de los resultados de las investigaciones realizadas en la 3ra edición de la maestría en Gestión Ambiental, con salida en Educación Ambiental Comunitaria, que coordinó el Centro de Estudios de Medio Ambiente y Recursos Naturales de la Universidad de Pinar del Río "Hermanos Saíz Montes de Oca", Cuba, en el período 2012-2017. Se utilizó el método sistémico-estructural y la medición. Se identificaron y cuantificaron en porcentajes los instrumentos empleados, los problemas ambientales identificados, así como los principales impactos positivos al Medio Ambiente. El programa de educación ambiental fue el instrumento más utilizado (62,5 % de las tesis). Se identificaron 171 problemas ambientales, siendo los de mayor incidencia los relacionados con la infraestructura técnica, el deterioro ambiental y la insuficiente educación ambiental. La investigación acción participativa y los talleres representaron el método y la forma de mayor aplicación, respectivamente. Se lograron 103 impactos ambientales positivos; dentro de ellos, los más significativos: el saneamiento ambiental, acciones para la conservación de la biodiversidad y la creación de espacios educativos. Se concluyó que la actividad investigativa de la maestría contribuyó positivamente a la solución de problemas ambientales en diferentes comunidades; no obstante, se requiere incrementar las acciones de recuperación ambiental.

Palabras claves: comunidad; educación ambiental comunitaria; postgrado académico.

RESUMO

A formação acadêmica e científica a partir do nível de pós-graduação permite a implementação de alternativas de educação ambiental dirigidas a diferentes setores da população. O estudo teve como objetivo socializar as contribuições à educação ambiental comunitária, a partir dos resultados de pesquisas realizadas na 3ª edição do mestrado em Gestão Ambiental, com resultados em Educação Ambiental Comunitária, que coordenou o Centro de Estudos de Meio Ambiente e Recursos Naturais da Universidade de Pinar del Rio, Cuba, no período de 2012-2017. O método estrutural sistêmico e a medição foram utilizados. Os instrumentos utilizados, os problemas ambientais identificados, assim como os principais impactos positivos sobre o meio ambiente foram identificados e quantificados em porcentagens. O programa de educação ambiental foi o instrumento mais utilizado (62,5% das teses). Foi identificado um total de 171 problemas ambientais, sendo os mais comuns os relacionados à infraestrutura técnica, deterioração ambiental e educação ambiental insuficiente. A pesquisa e as jornadas de ação participativa representaram o método e a forma de maior aplicação, respectivamente. Um total de 103 impactos ambientais positivos foram alcançados; entre eles, os mais significativos foram: saneamento ambiental, ações para a conservação da biodiversidade e a criação de espaços educacionais. Concluiu-se que a atividade de pesquisa do mestrado contribuiu positivamente para a solução de problemas ambientais em diferentes comunidades; contudo, é necessário aumentar as ações de recuperação ambiental.

Palavras chave: comunidade; educação ambiental comunitária; pós-graduação acadêmica.

INTRODUCTION

Faced with the growing deterioration of environmental conditions on the planet, the key role of environmental education processes is accentuated, which adequately addressed in all contexts and levels of society facilitate the appropriation of knowledge, skills, values and different attitudes, to those who have conditioned the sharpening of the contradictions between society and nature.

About environmental education are recognized varied and different definitions in the specialized literature, in relation to the concept of Environment that is assumed, constituting environmental problems, its study object, which, from a broad perspective and integrative of the Environment do not limit to issues of the natural environment, but also social and the one built, in which the responsibility of all social sectors is evident, are recognized.

A respect, Ariza, Wheel & Sardoth (2017) conceives environmental education "... not with a purely naturalistic character, but of social significance, as an effective tool to transform reality" (p.17). In this sense, they argue the role of environmental education as a global strategy for sustainability, by promoting the formation of individuals and social groups with knowledge, skills, values and attitudes oriented to the construction of a new social paradigm, which leads to a social, economic, political and, above all, ecological improvement, recognizing among its characteristics being participatory and inclusive.

When addressing sustainability as a development paradigm, Cage, Márquez, Ferragut & Casas (2018) argues that "... it is possible to reach and to maintain a dynamic - evolutionary equilibrium and

harmonious among the factors that make up the components of the new paradigm: nature, society and the economy" (p. 728); with which, environmental education acquires a new conceptual and methodological dimension aimed at improving the relationships of human beings with each other, and of them with the natural environment, based on principles of equity, social justice and solidarity. It is, therefore, an essential instrument to promote environmental change based on social transformation.

In correspondence with this conception, Gutiérrez (2018) recognizes the importance of environmental education as education for action, through which individuals are helped to understand the causes of environmental problems and contribute to the search and implementation of solutions that lead to environmental, social, cultural and economic change, by promoting the appropriation of knowledge, skills, values and attitudes different from those that make up the current social rationality. Deepening the criteria of Gutiérrez (2018), the essence of environmental education should be aimed at "promoting understanding of the causes of environmental problems, reflecting, working with a critical spirit, (...) Training for action..." (P. 91).

For such purposes the potential of environmental education community, specific type that is inserted into the non - formal environmental education, which entails, as reported by Goyo (2017), "A massive implementation of environmental education in all processes training are pointed out. In this way, the proposed solutions are based on comprehensive strategies where the different sectors of society play an important role in solving problems" (p.67).

Regarding a definition of community, Zúñiga (2020), in the article entitled "The community of the XXI

century. An interpretative framework from the perspective of Social Work", proposes, from the analysis of elements on which there is greater consensus in texts published throughout the second half of the 20th century and the beginning of the 21st, that the community consists of " A process (or several) of participation that takes place in a specific physical space in which the people and groups that interact in it develop a psychological component or of belonging/reciprocity" (p. 203).

From this relation it is considered as a community, both human settlement, as a company, institution or social entity, as its common interests, motivations, socio-cultural traits are identified, leading to hold even, that "within the neighborhood can be one or more communities" (Zuniga, 2020, p. 200). On the other hand, the key role of participation in the community context is also signified, an issue that revalues the role of environmental education as an essential means capable of promoting participation, in favor of achieving a higher level of commitment and responsibility of the different social sectors in solving the environmental problems that affect them.

With intent to advance these goals, and in the Cuban context, through postgraduate training strengthens the acquisition and generalization of scientific results that contribute to the theory and practice of environmental education in communities, helping to reverse the starting situation, by favoring the increase of beneficial environmental impacts to the environment.

According to Gutiérrez (2019), research in the field of environmental education is considered a key element for its development, although it recognizes that what has been done is still insufficient, as this process is manifested in an asystemic way, as "... it is usual to stay in the diagnosis,

without implementing lines of action that cause an increase in the field of knowledge and practices of people, society, and institutions" (p. 7).

Hence, community environmental education is not conceived as a process and lacks of an adequate pedagogical and didactic foundation. In this sense, the reality is specified in the design and execution of environmental actions in the communities in an isolated, decontextualized, spontaneous and ineffective way, in order to promote awareness and training of the population. All of which affects the insufficient environmental education, not achieving the environmental change that is required.

In response to the limitations presented in relation to environmental community education and its positive impacts, the present study was carried out, with the objective of socializing the contributions to the practice of environmental community education, based on the analysis of the results obtained in the research conducted within the framework of the 3rd^{ra} edition of the master's degree in environmental management from Environmental Education Community, which coordinated CEMARNA of the University of Pinar de Rio "Hermanos Saiz Montes de Oca" (UPR), Cuba, in the period 2012-2017, being the only issue with this output completed under the aforementioned program.

MATERIALS AND METHODS

In the present investigation, methods of the theoretical and empirical level were used, specifically the systemic - structural and measurement, respectively. The first all owed the structuring of the results of the study in three aspects: identification of

the environmental problems of the communities, the components of environmental education (instruments, methods and forms) and the positive environmental impacts achieved with the application of not formal Environmental Education. In addition, they established relationships and the dynamics between these three aspects and between environmental education components.

The measurement was implemented from the documentary analysis technique, with the review of the 24 written reports of the III Edition of the master's degree in Environmental Management, with output in Management of Community Environmental Education. Numerical values were attributed to the qualitative information obtained, for their subsequent evaluation and representation.

In both methods, the theoretical analysis and synthesis procedures were used, which allowed decomposing the Environmental Education process as a whole, into its components, with the relationships they establish among themselves, to later unite them in the achievement of positive environmental impacts, from the application of Environmental Education as a whole.

The following polychromous nominal qualitative variables were collected:

- a. Type of community studied
- b. Main environmental problems identified in the communities
- c. Environmental education instruments used in the theses
- d. Methods of Environmental Education used
- e. Forms of Environmental Education used in the theses

f. Positive impacts on the environment, obtained from community actions developed by teachers

Statistical processing

The different categories found for each of the variables in the 24 theses, stored in a spreadsheet Excel 2016 and proceeded to the descriptive analysis of data, based s in obtaining percentages as measures of aggregation.

RESULTS

Students of the third edition of the master Environmental Management conducted their research into six different types of communities: rural (9); urban (8); university (4); coastal (1); school (1) and workers (1). The fact that the university communities, coastal, school and workers were shortly represented in research conducted by students highlighted third edition of the master in Environmental Management; only 16.6 % of the teachers carried out their study in university communities, while 4.2% in the rest of the underrepresented communities.

The environmental problems identified in the studied communities are indicated in Table 1, 171 environmental problems were determined; 100 % of which were caused, either directly or indirectly, by entropic activity.

Table 1- Main environmental problems identified in the studied communities

Environmental problems	Absolute frequency	%
Problems in technical infrastructure	27	15.9
Deterioration of sanitation	27	15.9
Insufficient environmental education in the population	27	15.9

Loss of biodiversity	25	14.6
Environmental pollution	2.3	13.4
Social problems	14	8.2
Poor drinking water supply network	9	5.2
Soil degradation	7	4.1
Deforestation	5	2.8
Deterioration of water resources	3	1.7
Bad condition of the built fund	3	1.7
Deficit of public spaces	1	0.6
Total	171	100

As for the most significant environmental problems manifested in the communities studied, excel, first, the apparent lack of environmental education in the population; the substantial disappearance of the country's indigenous biodiversity; the extreme enthrone of the territory; environmental pollution, both due to the quantitative and qualitative loss of the water resource, as well as due to the abatement of aquifers and also due to liquid waste and solid waste indiscriminately discharged into the environment. In conjunction with the deterioration of the physical space of the territory, there is its negative influence on living conditions, lack of sanitary and environmental hygiene, as well as problems associated with technical infrastructure.

Among the technical infrastructure problems recognized, poor public lighting, lack of sewage, lack of recreational areas, the poor state of the roads, and the deterioration of the housing stock and the existence of water leaks stand out.

Regarding the deterioration of sanitation, the following were identified: the inadequate final disposal of solid and liquid waste, the proliferation of diseases, and the lack of a garbage collection cycle, insufficient sanitation, the existence of micro dumps and the incineration of waste.

Associated with the loss of biodiversity, the high presence of alien species and

invasive plants, scarce native vegetation and deterioration of the landscape stand out. In relation to environmental pollution re identified: management inadequacy of solid and liquid waste, contamination of land and marine waters, noise and air pollution, waste incineration, use of chemical fertilizers and pesticides are identified.

Among the problems with the highest incidence in rural and coastal communities, they determine the loss of biodiversity, soil deterioration, deforestation and environmental pollution. In urban areas, technical infrastructure problems, the deterioration of sanitation, environmental contamination, poor condition of the construction fund, deficit of public spaces and those associated with social issues stand out. These last two are also identified in coastal communities.

In school, worker and university communities there are problems associated with the inadequate handling of solid and liquid waste, technical infrastructure, environmental pollution, insufficient educational spaces, as well as the lack of vegetation.

In order to contribute to the understanding, mitigation and / or solution of the environmental problems mentioned, the teachers applied different instruments of environmental education, so that in the 24 theses reviewed, the use of 15 programs (62.5 % of the theses), eight strategies (33.3 % of the theses) and an action plan (4.2 % of the theses) of environmental education.

In general, the program prevailed as a contribution to solving problems in rural communities and the strategy in urban communities. In the school and university communities, both the program and the strategy were used interchangeably; in the workers' office,

the program was used and in the coastal community, the action plan.

For the effectiveness of the instruments of environmental education, Grandee applied the methods that are recorded in the table 2.

Table 2- Methods of EA used in the Thesis of third edition of the master in Environmental Management. CEMARNA. UPR. Cuba

Environmental Education Methods	Absolute frequency n = 24	%
Participatory action research	23	95.8
Operational action project	22	91.7
Group discussion	21	87.5
Brainstorming	15	62.5
Field study	9	37.5
Clarification of values	6	25.0
Experimental demonstration workshop	4	16.7
Games and simulations	3	12.5
Community sociocultural work	two	8.3

Participatory action research, the operative action project, and group discussion were the most widely applied methods in the teachers' research; these were used in 95.8%; 91.7% and 87.5% of these respectively. It is noteworthy that in all cases more than one environmental education method was used.

Closely related to the methods are the forms used to develop environmental education activities. In the total of revised thesis, they identified ten different ways, of which the workshop was the most applicable, as shown in the table 3. As with the

methods, the teachers used more than one way to develop environmental education in the communities under investigation.

Table 3 - Environmental Education forms used in the thesis of the third edition of the master in Environmental Management. CEMARNA. UPR. Cuba

Forms of Environmental Education	Absolute frequencies n = 24	%
Workshops	17	70.8
Sanitation campaigns	6	25.0
Excursion	3	12.5
Exposition	3	12.5
Dramatizations	2	8.3
Outreach campaign	1	4.2
Sensibilization campaigns	1	4.2
Interest club	1	4.2
Children's contest	1	4.2
Environmental mural	1	4.2

Using the methods and forms previously expressed favored 103 achieving positive environmental impacts, which are recorded in the figure 1.

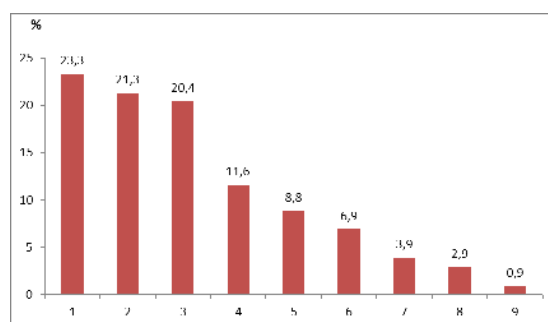


Fig. 1 - Positive impacts to the environment obtained from the Community action developed by the Grandee of third edition of the master in Environmental Management. CEMARNA. UPR. Cuba
 Legend:

1. Community sanitation
2. Actions for the conservation of biodiversity
3. Creation of educational spaces in the

community4. Training of environmental promoters5.
Development of educational materials6.
Implementation of sustainable practices in
agriculture7. Clean technology implementation8.
Actions to mitigate air pollution9. Restoration of
technical infrastructure

Environmental sanitation, actions for biodiversity conservation and the creation of educational facilities in the community accounted for the main positive impacts achieved from the actions of environmental education developed by the Grandee of Third Edition of the master in Environmental Management of CEMARNA. On the other hand, it was not possible to achieve the restoration of the technical infrastructure as a positive impact in most of the teachers' investigations.

DISCUSSION

The need to promote educational processes that go beyond the school framework and are projected to the general population, with the intention of promoting changes in lifestyles, behaviors and dominant values that contribute to the exacerbation of environmental problems, was the basis of the research development of the third edition of the Masters in environmental Management coordinated by the CEMARNA. These investigations contributed with their results to project institutional "Management of environmental education community in selected communities in the province of Pinar of the Río" and "environmental Rehabilitation and landscape of the campus of the University of Pinar of the Río Cuba".

The results of this study show that the university community was not the most representative in the investigations carried out by the teachers; However, in the works of Benayas, Marcén, Alba & Gutiérrez (2017); Corbetta, (2019), it recognizes its importance in order to

promote environmental education from the substantive processes that characterize this institution, of teaching, research and extension, as the main agent of change that "... can provide answers to the problems of society, to experiment scientifically and technologically the solutions to these problems and train the human capital that must undertake the change" (Benayas del Álamo *et al.*, 2017, p. 21).

In the case of environmental education in school communities, they were also weakly treated, despite the school being recognized as one of the ideal spaces to address environmental problems, by offering "... the possibility of applying a wide diversity of strategies and varied educational resources" (Castro & Rivera, 2020, p. 36). However, Castro & Rivera (2020) coincide that studies about school interventions on environmental education, specifically implemented for the primary level, are still scarce; although they recognize that in the last two decades they have increased.

Through the research carried out by the teachers in school contexts, actions were projected from the extracurricular point of view, in favor of the environmental improvement of the schools, at the same time that the role of the educational institution as a transforming agent of the community in which it is inserted.

In the case of worker communities, their contributions, coinciding with the study carried out by Reyes (2018), were directed to the development of environmental education actions in the company, as well as towards the community in which it is inserted, meaning thereby that "... business-community link should promote the integration of educational purposes of each one towards adaptation and adjustment of environmental issues at the time that it also promotes the

potential to change and transform the environment creatively" (p .3).

Regarding the environmental problems identified by the teachers in the studied communities, it is found that they manifest themselves in the natural, social and built environment, being the result of insufficient environmental education that prevents reverting this situation. The lack of environmental education is recognized as a problem, but at the same time, it is an essential cause of existing environmental problems. This criterion corresponds with those obtained by Perez Linares, Márquez, Vento & Pérez (2018) in the paper entitled " Evaluation of sustainability indicators in the community 'Los Jazmines', Viñales, Pinar de Rio, Cuba", who recommend "environmental education as a management tool with the objective of mitigating environmental problems, conserving natural resources and achieving transformations directed towards the sustainable development of the community" (p.750).

The educational instruments used in the investigations of the students of the master's degree were aimed at raising awareness of responsibility in the face of different problems, training and developing environmental recovery actions, from promoting the participation and action of the social actor of the communities from the stage of diagnosis, the search for alternatives and implementation of solutions to the evaluation of the applied measures. However, the actions of environmental recovery proposals were inadequate and actions aimed at managers, communicators, teachers, officials of government, an issue that is prioritized in the investigations of the Grandee of fifth edition of this Master's program that is currently running. Thus, for example, a teacher of this edition in the article entitled "Impact of Environmental Education actions in the "Semilla" community, with the

support of the Green Map Methodology", refers among the positive impacts, from the implementation of the plan of environmental education actions, which "It was possible to insert the decision-makers of the Popular Council, as well as other mass organizations" (Leo, Alonso & Alonso, 2019, p.7).

Regarding the methods used in educational proposals, the most used was Participatory Action Research, which was considered a priority to promote community participation in the construction and implementation of solutions to problems.

Other methods, such as field study, the experimental demonstration workshop, the games and simulations, as well as the use of art were insufficient. Specifically, the potentialities of various artistic manifestations, including dramas and plays, are considered by Lawson, Gordon, Mensah & Atipoe (2015) in the work entitled *Developing Tools for Community-Based Environmental Education for Migrant Children and Youth in Ghana*, as an effective tool in favor of educating children and young people in appropriate environmental behaviors.

However, it is value that the methods used were essential for the development of environmental education from researching the main problems and finding and implementing alternatives for improvement and / or solution with the participation of communities. All this favored to be consolidated skills for group work and strengthen values of responsibility, respect and cooperation.

In correspondence with the methods used , the workshop prevailed as the most widely used educational form in the analysis of problems, the identification of alternative solutions, the presentation of experiences, the evaluation of the applied measures,

training and the promotion of the participation of the social actors of the studied communities. Through the workshops, the experiences and potential of the participants in favor of environmental

change were recognized, by favoring dialogue, collective reflection, creativity, and the exercise of criteria, cooperation and the appropriation of knowledge. In this way, "... knowledge is built from reasoning, critical spirit and experience in a process in which learners must discover for themselves the elements of said knowledge ..." (González & Aramburo, 2017, p.18).

Despite the importance of the workshop, it is noted that, taking into account the problems identified and the need to contribute to their solution in a creative way, the forms used were insufficient, including the various manifestations of art, which can provide greater wealth, vitality and sensitivity to the actions that are carried out, at the same time that they can encourage participation.

Regarding the beneficial impacts on the environment, the most significant corresponded to the main problems related to the deterioration of sanitation, the loss of biodiversity and insufficient environmental education.

However, the actions aimed at mitigating the problems associated with environmental pollution and technical infrastructure were scarce; the latter represented in the study the main environmental problem identified by the teachers in the different communities. In these two aspects, it is required greater support from managers, and relevant government agencies, which raises the priority to continue promoting awareness and the training in this sector.

The creation of educational spaces in the community, the training of environmental promoters and the elaboration of educational materials are

impacts that tend to mitigate the insufficient environmental education of the inhabitants, one of the main problems identified by the students of the master's degree in their research.

On the other hand, although the study considered the implementation of clean technologies and actions to mitigate air pollution as independent environmental impacts, the first responds to the decrease in air pollution, a problem identified in most of the cities, communities studied and that not only represents a local or territorial environmental problem, but an environmental problem with a global scope.

The study showed the major contributions made under the program Master of Environmental Management coordinated by the CEMARNA, in the area of Community Environmental Education, basing various theoretical and methodological conceptions for development, which become references for further investigation.

It is recommended to prioritize community environmental education actions aimed at environmental recovery, based on achieving awareness and training of social actors in the communities, in which the key role of managers, communicators, teachers, government officials, is recognized so that increasingly coherent proposals are articulated that lead to the necessary environmental change.

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Conflict of interest:

Authors declare not to have any conflicts of interest.

Authors' Contributions:

Dora Lilia Márquez Delgado: Conception of the idea, general advice on the topic addressed, authorship coordinator, literature search and review, translation of terms or information obtained, preparation of instruments, compilation of information resulting from the instruments applied, drafting of the original (first version), revision and final version of the article, correction of the article, revision of the applied bibliographic norm.

Elisa Maritza Linares Guerra: Creparation of instruments, application of instruments, and compilation of information resulting from the instruments applied, statistical analysis, preparation of the tables, graphics and images, preparation of the database, revision and final version of the article, revision of the applied bibliographic norm.

José Alberto Jaula Botet: General advice on the topic addressed, literature search and review, preparation of instruments, revision and final version of the article, correction of the article, revision of the applied bibliographic norm.



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