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STRENGTHS AND OPPORTUNITIES OF THE THIRD SECTOR IN ENVIRONMENTAL EDUCATION IN VULNERABILITY AREAS OF THE BAIXADA FLUMINENSE (RJ)

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Abstract: Environmental Education (EA) is of relevant importance in research, in citizen actions and in theoretical productions to support socio-environmental public management. The main objective of this study is to present a critical analysis of the strengths, opportunities and challenges of the EDUC Project of the NGO Guardiões do Mar, active in Baixada Fluminense, with regard to environmental education initiatives associated with the theme of access to drinking water and to sanitation. The EDUC Project carried out environmental education work in five communities around the industrial complex of the Duque de Caxias Refinery (REDUC/RJ), in locations where the accelerated urbanization process took place without infrastructure, contributing to the contamination of water bodies. The application of a semi-structured questionnaire was used to determine the data referring to the communities and the surveys served as the basis for the evaluation system of SAPEA-Water environmental education programs and projects, which validated the importance of the EDUC Project, serving as a benchmark for the good practices of sustainability, protection of life and the environment, as proposed in the 2030 Agenda.
Keywords: Environmental Education, Sustainability, SAPEA-Water.

INTRODUCTION

For Freitas (2011), the way in which each society organizes itself is decisive in the intensity of the impacts caused to the environment and is a contributor to socio-environmental inequality. In view of this, in locations close to REDUC[1] we are faced with a societal model that lacks critical environmental education strategies capable of promoting a transformation of the local situation of environmental degradation, and of the human conditions that generate and reproduce social inequalities and socio-environmental conflicts, in particular in relation to access to water drinkable.

The Association of Protectors of the Sea (APMAR) or ONG[2] Guardians of the Sea (fancy name), through the EDUC Project, operates in five of these communities around REDUC, chosen due to the complex context in which they live. And the objective of the study, which gave rise to this article, was to carry out an evaluation of the results obtained by the EDUC Project in these communities. For this purpose, secondary data were used, such as Project performance reports, publications on the official website and virtual environmental education materials posted in the media, as well as primary data obtained from interviews with members of the EDUC Project team.

Although many Environmental Education programs/projects adopt reductionist and behavioralist educational practices, an evaluation system based on the critical-emancipatory methodological theory was developed, the Evaluation System of Environmental Education Programs and Projects for Water Resources Management (SAPEA-Water) and, through its INDICATORS and respective VERIFICATION MEANS, discusses, in this article, the strengths, opportunities and challenges of the EDUC Project, with a view to contributing to the performance of other NGOs with similar proposals and to the improvement of this evaluation system programs and projects.

The EDUC Project sought to operate in communities in the Campos Elíseos District, in the municipality of Duque de Caxias, providing these residents with the insertion in a process of self-recognition, participatory and focused on the exercise of citizenship.

This municipality grew disorderly. According to the Central Register of

1 Refinery of Duque de Caxias.

2 Non-governmental organization.

Companies (IBGE, 2018)[3], in the municipality of Duque de Caxias there are 13,129 local units and 12,442 companies and other active organizations. They are jointly responsible for environmental degradation. There is an urgent need to disseminate assertive socio-environmental practices, which promote changes that prioritize the proper disposal of solid waste, river protection, access to and care for water used for family consumption, to encourage diligence with health, environmental conservation and aesthetic improvement.

In the municipality of Duque de Caxias (RJ) irregular growth has led to the degradation of life support systems and the population has less access to ecosystem services. In most cases, residents live in degraded environments and suffer from the consequences and challenges imposed by this condition. At the same time, in these places there is "less access to health, education, housing, sanitation, healthy food, work and income" (FREITAS, 2011, p. 42), which characterizes the state of poverty of the population.

In Brazil, negative impacts of the acceleration of population growth can be seen in the landscape of the outskirts of large urban centers, such as Baixada Fluminense in the Metropolitan Region of Rio de Janeiro. The region, historically characterized by the presence of mangroves, suffered from anthropic actions in favor of the exploitation of the natural elements, until the accelerated and disorderly occupation, without adequate infrastructure, including the supply of drinking water and environmental sanitation (BRITTO et al., 2018).

According to the Brazilian Institute of Geography and Statistics - IBGE and the criteria adopted by the World Bank to establish and identify the condition of extreme poverty, in 2018, this situation configured for 13.5 million Brazilians. With a per capita monthly income of less than R$145.00 (one hundred and forty-five reais) or U$S 0.90 (ninety cents of a dollar) per day, a large part of the population fit these criteria[4].

In relation to the municipality of Duque de Caxias, there is an economic discrepancy evidenced by Camaz (2015), as it occupied the 6th position among the municipalities that represented 25% of the national Gross Domestic Product, in 2002, having in front the municipalities of Belo Horizonte, Brasilia, Rio de Janeiro and Manaus. In 2004, it ranked 7th in the Southeast region. However, the HDI of Duque de Caxias calculated in 2010, the year of the last complete IBGE census, reveals an HDI equal to 0.711, ranking 49th in the State of Rio de Janeiro and 1574th in Brazil. Regarding the map of poverty and inequality, it corresponds to the percentage of 53.53%, that is, the 9th in the state of RJ and the 1408th in the ranking of Brazil[5].

According to the Transparency Portal[6], the municipality of Duque de Caxias - RJ had the amount of R$ 895,902,600.00 (eight hundred and ninety-five million, nine hundred and two thousand, six hundred reais) made available as Emergency Aid and R$ 108,503,268.00 (one hundred and eight million, five hundred and three thousand, two hundred and sixty-eight reais) as Bolsa Família, during the year 2020. It can be seen, with the amount of aid received, that citizens in a state of

3 Available on the website: <IBGE | Cidades@ | Rio de Janeiro | Duque de Caxias | Pesquisa | Cadastro Central de Empresas | Unidades locais>.Accessed on: March 30, 2021.

4 Available on the website:<https://agenciadenoticias.ibge.gov.br/agencia-noticias/2012-agencia-de-noticias/noticias/25882-extrema-pobreza-atinge-13-5-milhoes-de-pessoas-e-chega-ao-maior-nivel-em-7-anos>. Accessed on: October 10, 2020.

5 Source: IBGE, Demographic Census 2000. Household Budget Survey –POF. Available on the website: < IBGE | Cidades@ | Rio de Janeiro | Duque de Caxias | Pesquisa | Mapa de pobreza e desigualdade | Incidência da pobreza>. Accessed on: March 30, 2021

6 Available on the website: <http://www.portaltransparencia.gov.br/beneficios>.Accessed on: January 25, 2021.

vulnerability represent a significant portion of the population of Caxias do Sul who do not is able to buy drinking water for consumption.

It is important to point out that environmental education actions and investments in urban infrastructure with the universalization of environmental sanitation can contribute to reversing the scenario of poverty and misery faced by Brazilians in a situation of socio-environmental vulnerability.

The Campos Elíseos Water Treatment Station, in Duque de Caxias, was recently inaugurated, on April 5, 2021. Until that date, there is a pressing concern with access to treated water. It was found that access to drinking water continues to be a major challenge for the communities of residents of Campos Elíseos who, due to lack of access to water, are excluded from the proposed practices of adherence to the Sustainable Development Goal (SDG) 6 - Clean water and sanitation.

According to Carvalho (2008, p. 126), critical EE includes changing behaviors by transforming the social relationships that "we constitute and by which we are constituted", in order to change attitudes towards the collective, in the political, social and economic dynamics. ecological, with a view to intervening in the public sphere.

Critical EE is essential so that a naive view of the social role where the naturalness of sociocultural exclusion prevails does not feed. It is imperative that there are curricular practices and educational moments of analysis, reflection and protagonism, which ensure a "conscious and active PARTICIPATION of the concrete subjects involved", in order to transgress the automation of "conceptions and actions conveyed as socially adequate, adapting the subjects and relentless sociocultural and economic contexts" (LOUREIRO & TORRES, 2014, p. 125).

Non-Governmental Organizations play an indispensable role in informal critical environmental education, as emancipatory rationality does not only occur in the school environment. For Giroux and McLaren (1995, p. 151), a critical pedagogy must base the relationship between individuals through "practices that promote concern and solidarity, instead of oppression and human suffering", in order to generate new conceptions that serve as basis for possible and desirable changes.

After decades of waiting, the communities of Campos Elíseos will adapt to the new reality with gradual access to drinking water, starting in 2021. However, in the context of the critical-emancipatory EE present in the work of the NGO Guardiões do Mar, a complex vision of the environment that will contribute to the new reality that unfolds, this moment being "understood as a relational space in which man is an agent that belongs to the web of social, natural and cultural relations", presuming interaction. (FERRARO JUNIOR, 2007, p. 230).

Thus, in order to fulfill the objective, we present the EDUC Project of the NGO Guardiões do Mar and the characterization of the communities of Campos Elíseos, in Duque de Caxias and their precariousness in relation to environmental sanitation and the importance of critical EE. Next, we show SAPEA-Water and the analysis and evaluation of the EDUC Project, in all categories of analysis, INDICATORS and VERIFICATION MEANS. Finally, we disclose the evaluation results and indicate the strengths, opportunities and biggest challenges of an Environmental Education project, which seeks to disseminate a reflection of itself and of collective action in the environment, without ignoring its citizenship, with rights and duties.

EDUC PROJECT

Location of communities targeted by EDUC actions

The EDUC Project operates in Campos Elíseos, second district of the municipality of Duque de Caxias in the Baixada Fluminense, Metropolitan Region of Rio de Janeiro, latitude 22.7158 S and longitude 43.2618 W, and occupies an area of 98 km2 in the central region. west of the county. The neighborhoods highlighted in the analysis emerged during the construction of REDUC. People from other states were attracted by the job opportunity and settled around the refinery (Figure 1).

Five communities around the REDUC were selected for action (Figure 2), three of which are located next to the REDUC (Vila Serafim, Campos Elíseos and Saraiva) and two border the REDUC storage tanks (Parque Marilândia and Parque Bom Retiro).

DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERIZATION OF THE MUNICIPALITY OF DUQUE DE CAXIAS

The municipality of Duque de Caxias occupies an area of 467.32 km2, its population was 855,048 inhabitants in 2010 (IBGE, 2010), with a demographic density of 1,828, 51 inhabitants per km2, while that of the State Capital was 5,265, 82. The 2nd. Campos Elíseos District is home to 30% of the total population of the municipality, and the greater part 40% is located in the 1st Central District (PMSDC[7], 2017, p. 31).

The peripheral areas of large urban centers in Brazil generally concentrate poverty and in Duque de Caxias it is no different. In the municipality, 111,039 families were registered in the single register in October 2020, with 59,060 families having a per capita income of up to BRL 89.00 (equivalent to USD 16.48). And 56,992 were enrolled in the Bolsa Família benefit[8]. The Gross Domestic Product (GDP) per capita in 2018 was BRL 45,490.61, with the city of Rio de Janeiro equal to BRL 54,426.08, and the municipality of Palmas in the State of Tocantins, one of the lowest in Brazil, equal to 32,293.89 BRL. The municipal Human Development Index (HDI) was equal to 0.711, while that of Rio de Janeiro was 0.799 and that of Palmas equal to 0.788 in 2010 (IBGE, 2010).

ENVIRONMENT AND ENVIRONMENTAL SANITATION IN DUQUE DE CAXIAS

The precariousness of access to sanitary sewage is one of the biggest environmental problems in the Metropolitan Region of Rio de Janeiro, which includes the Baixada Fluminense and, more specifically, the municipality of Duque de Caxias. This negatively affects the rivers in the region, and consequently imposes negative impacts on the population. The costs for reversing pollution problems are high and complex, involving long-term efforts (BRITTO and QUINTSLR, 2020).

The problem of environmental degradation is compounded by the natural susceptibility to flooding in lowland regions:

> Baixada Fluminense suffers from frequent flooding in urban areas. These floods result from the form of land occupation and use, inappropriate to the particular conditions of the region, which has extensive areas with very low elevations, and from the accelerated process of soil sealing due to the disorderly expansion of the urban fabric. (LERNER, 2016, p.215)

According to Kronemberger (2013), the region of Duque de Caxias stands out with high percentages of morbidity from diarrhea, in the universe of the 100 most populous municipalities in 2011, affecting children under 5 years of age.

The Municipal Sanitation Plan of Duque de Caxias (PMSDC, 2017, p.116), also highlights

7 Municipal Basic Sanitation Plan of the Municipality of Duque de Caxias - PMSDC

8 Available on the website: <http://aplicacoes.mds.gov.br/sagi-paineis/analise_dados_abertos/>. Accessed January 25, 2021.

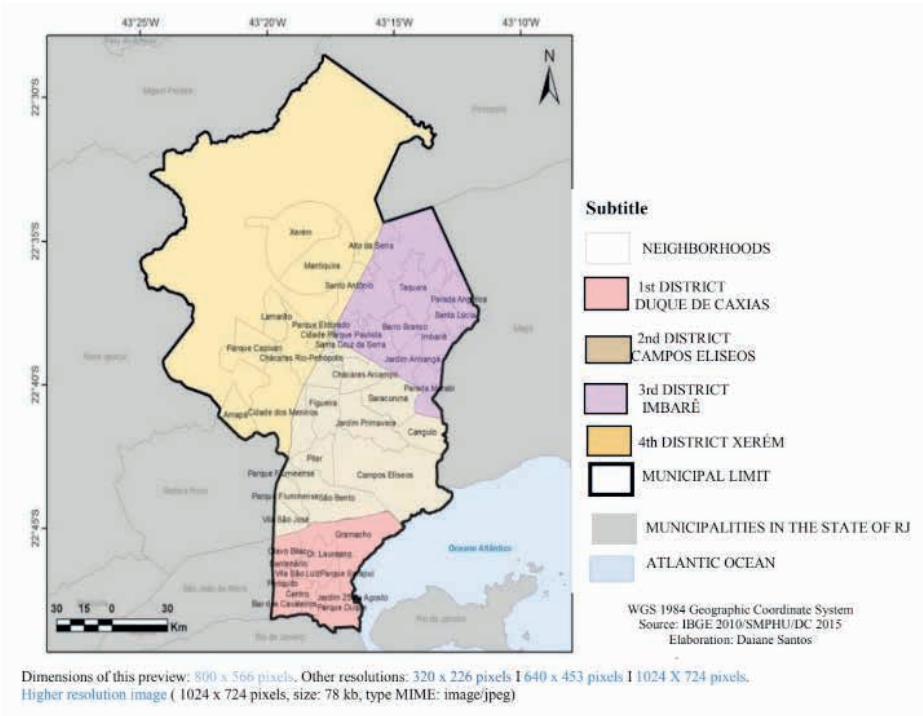

Figure 1. Location of Campos Elíseos, Duque de Caxias.

Source: https://pt.wikipedia.org/wiki/Ficheiro:Mapa_IBGE.jpg

Figure 2. Location of the area covered by the EDUC Project

Source: DSCE, 2018, p. 16.

the insufficiency of the sewage collection network, and that it is significant in most of the territory the discharge of the same in the stormwater gallery. This situation can even get worse when these same areas start to be flooded due to the precarious existence or even the non-existence of local rainwater drainage infrastructure.

Much of the Baixada Fluminense faces water supply problems and in Campos Elíseos the same occurs (Lemes, 2007). The public water supply system in Campos Elíseos served 18,558 inhabitants in 2000, increasing to 26,539 inhabitants in 2020, with a total population contingent of 756,738 inhabitants in 2000 and 924,624 inhabitants in 2020. According to Lemes (2007) it has already been indicated as terrible. It's an old and known problem. The PMSDC (2017) in its structural actions foresees the need for supply, for the growing population of residents, when it highlights "water supply services that guarantee the supply and meet the entire demand and satisfy the ideal quantity and quality standards" (p. 130). Bear in mind that a large portion of the population makes use of alternative water supply and sanitation strategies, unrelated to standard public and collective systems.

After 17 years of works to mitigate the insufficient water supply infrastructure in Campos Elíseos, the Campos Elíseos Water Treatment Station, in Duque de Caxias, which was inaugurated in the first half of this year, until the submission of this article, has still not achieved the initialization of the system operation, so that the water reaches the taps of all residents of the neighborhood. Still without an alternative, many residents of the communities surrounding the refinery continue to violate the REDUC water mains, for their own supply.

From the perspective of charging for sanitation services, the problem of the populations that inhabit these degraded areas on the outskirts of large urban centers in Brazil, such as Duque de Caxias, needs to be considered, at the expense of increasing social injustice. It is precisely populations with limited family income that find it difficult to opt for individual solutions, such as: paying for water supply by water tanker; contract the drilling and construction of artesian wells or finance the construction of septic tanks.

REDUC

Petrobras' Duque de Caxias Refinery (REDUC) has an extensive pipeline terminal, in the Campos Elíseos District, whose function is based on receiving and storing oil originating from Angra dos Reis, Macaé and Ilha D'Água, in addition to supplying petroleum and diesel oil from the Gabriel Passos Refinery (Regap). There, operations of the São Paulo-Rio de Janeiro Oil Pipeline (Osrio) are also monitored, which receives gasoline, diesel and alcohol at the Volta Redonda terminal for the Distribution Base of Volta Redonda[9].

The water that supplies REDUC comes from the Saracuruna dam, built in the 1960s, with the aim of providing raw water to REDUC, being the only user of the water from this dam. As a result of the expansion of its facilities, Petrobras began to capture water from the Guandu River as well. In these systems, the adduction takes place directly in small dams and the treatment consists of a simple chlorine disinfection (LEMES, 2007).

The effluents are previously treated, before disposal, in order to comply with the quality standards established in the environmental legislation. These actions also involve reuse, which ends up providing significant annual savings of approximately R$35.8 million in the investment in water collection and effluent disposal. In 2019, the total reuse volume was

9 Available on the website: < https://petrobras.com.br/pt/nossas-atividades/principais-operacoes/terminais-e-oleodutos/terminal-campos-eliseos.htm >. Accessed on: January 25, 2021.

82.2 million m3, which corresponds to 34.4% of the total freshwater demand[10].

In Lemes (2007) it is also highlighted that although it is a state assignment and the refinery has no legal responsibility to supply drinking water to the community neighboring the refinery, there was a forecast for the installation of a water treatment plant, from a second Guandu pipeline, to be built by the Water and Sewage Company of the State of Rio de Janeiro - CEDAE, and which would use part of the water captured by REDUC.

According to the Petrobras Sustainability Report[11], the company's strategy consists of a permanent commitment to respect human rights, "in accordance with the principles of the United Nations Global Compact and inspired by the Sustainable Development Goals". However, the installation and growth of the communities around it got out of their control.

The Campos Elíseos District is also home to a number of small, medium and large companies and the region concentrates two large clusters that make an important contribution to the GDP of the municipality and the State: the Gas-Chemical Pole and the Petrochemical Pole of Centro, as well as a number of logistics and transport companies (DSCE, 2018, p. 11).

According to Lemes (2007), REDUC discards its effluents into the Iguaçu River, as it borders the entire southern area of the refinery, despite the increasing saturation of this resource, as it is a highly polluted river, with a large presence of organic matter in periods of rains "[...] the influence of the tide, considerably raising the salinity of the water in the stretch close to the REDUC, increases the difficulty of its use as a source of water supply" (COLLARES, 2004).

EDUC ACTIONS AND PERFORMANCE

The EDUC Project started its activities in December/2017, and is the result of a partnership with Petrobras, through the Petrobras Socioenvironmental Program. The actions aim to promote reflections on the importance of living in a sustainable environment, for themselves and for future generations. It works to change the perspective of residents who live close to REDUC, to value the community where they live, fostering community leadership through integrated actions to raise awareness and train young people and leaders. It aims to disseminate positive socio-environmental concepts and practices in the five communities of Campos Elíseos, mentioned above, considering the environmental risks to which residents of these locations are exposed, such as the dangers arising from behavior, in relation to the disposal of solid waste and the consumption of reuse water.

The EDUC Project carried out a survey in locations close to REDUC, in the 1st. quarter of 2018, to identify local socio-environmental problems and thus foster community leadership, valuing the community they inhabit "through integrated actions to mobilize/raise awareness and train young people and leaders to disseminate positive socio-environmental concepts and practices", through the change of vision of this target audience (COSTA et all., 2018, p. 05). The problems pointed out to the detriment of environmental degradation were many: accumulation of garbage, bad smell, infestation of harmful animals, floods, diseases, inadequate disposal of solid waste, burning of garbage, river pollution, misuse of the storage tanks area[12] (fuel) and reserve

10 Available on the website: <https://sustentabilidade.petrobras.com.br/#balanco-hidrico-e-gestao-de-materiais-e-residuos>. Accessed January 25, 2021.

11 Available on the website: <https://sustentabilidade.petrobras.com.br/src/assets/pdf/Relatorio-Sustentabilidade.pdf >. Accessed on: October 15, 2020.

12 Storage tanks - The Petrobras Campos Elíseos Terminal has among its main activities the storage of oil originating in Angra

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(water) at the Duque de Caxias Refinery - REDUC. This survey carried out with 1,261 people is included in the DSCE (2018). After applying the questionnaires, the results were compiled and critically analyzed by EDUC. Table 1 presents the general characterization of the interviewed population.

ANNEX presents an extract from the questionnaire containing the questions whose answers were used in the SAPEA-Water evaluation process.

It is noteworthy that in 2018 and 2019, the EDUC Project carried out leadership training for the five communities involved in the Project's pressing action, with a view to promoting community leadership, through integrated actions with qualification/ training of young people and leaders to the dissemination of socio-environmental concepts and practices in communities close to REDUC. Promoting the protagonism of local leaders is among the main objectives of EDUC.

The leadership training course had the following specific objectives: i) Carry out the qualification of community managers; ii) Promote actions for the management of solid waste and institution of the group of community environmental agents; iii) Carry out a participatory diagnosis. Among the actions, solid waste (SR) was a topic among leaders, young people and participating adults. Also, with specific language, themes in Environmental Education and Inclusive Environmental Education were addressed. In addition, young people with a grant were selected to act as environmental agents, promoting information on the correct disposal of SW and selective collection of recyclables, which were passed on to local collectors. Result: all the objectives of the Leadership Training Course were achieved.

The leadership course was held in 24 meetings, between July/2018 and July/2019, which totaled 48 hours. It addressed various topics related to sustainability. Highlighting Module 6 - Relationship with social actors and sustainability and the theme of the 7th. Meeting - The importance of leadership for community development.

During the workshop process, a booklet was created, in a shared way, with the purpose of being made available as a support tool, for the multiplication of this set of workshops, in other locations. In addition to highlighting that "we intend to demonstrate that the strengthening of community leaders is the main path for local development and achievement of results based on the UN SDGs". (Support Booklet for Community Leaders - CALC - the experience of the EDUC Project, 2019, p. 7).

The place where most of the meetings were held was Colégio Seice, a private institution, in the Marilândia neighborhood. And there were also meetings at the Conectora de Oportunidades warehouse, in the Campos Elíseos neighborhood.

In all, there were 23 participants, with 10 of those enrolled and 04 others who enrolled during the course. Leaders from the following communities participated: Campos Elíseos, Marilândia, Saraiva. Unfortunately, there were no subscribers from Bom Retiro and Vila Serafim. Among the people who, in fact, started the training, only 1 gave up, due to the change of address.

The duration was 12 months of workshops, with themes such as: Identification of Problems and Local Solutions; Personal marketing; Verbal Communication; Leadership Characteristics; The History of the Municipality; Healthy Cities; Health and

dos Reis, Macaé and Ilha D'Água. It is also responsible for supplying the Gabriel Passos Refinery (REGAP). The São Paulo-Rio de Janeiro oil pipeline is also monitored there, which receives gasoline, diesel and alcohol in Volta Redonda for distribution in Volta Redonda. Storage tanks. Available on the website: < https://petrobras.com.br/pt/nossas-atividades/principais-operacoes/terminais-e-oleodutos/terminal-campos-eliseos.htm > Accessed on: January 22, 2021.

Total number of respondents	**1.261**
Male respondents	574
Female respondents	687
People interviewed from Parque Bom Retiro	230
People interviewed from Parque Marilândia	143
People interviewed from bairro Saraiva	132
People interviewed from Vila Serafim	79
People interviewed from Campos Elíseos	677
Age range 18 to 24 years	172
Age group 25 to 39 years	356
Age range 40 to 59 years	489
Age group 60 years and older	223
Age not informed	21
Occupation: no occupation	580
Occupation: freelance	247
Occupation: retired	163
Occupation: employee	129
Occupation: employer	49
Occupation: public servant	20
Occupation: others / the person does not know	73
People from the same household who work: one	568
People from the same household who work: none	391
People from the same household who work: between two and three	272
People from the same household who work: four or more	19
People from the same household who work: the person can not say	11

Table 1: Characterization of the Campos Elíseos community

Source: DSCE, 2018.

Environment; Conscious Consumption; Promotion of the Sustainable Integrated Local Development Forum and 09 specific modules, with Project Elaboration workshops.

The proposal aimed to equip the participants so that they would be able to compete in the selection promoted by EDUC, to receive a contribution of R$ 45,000.00 to carry out a community project. The selection culminated with the winning project #tamojunto, prepared by the Association of Residents of Campos Elíseos. The chosen project used the practice of sport allied to environmental education strategies.

As for the objective related to solid waste, 05 bicycles were adapted for the collection of recyclable materials, in 150 registered households and 10 commercial locations, in the 05 areas where the project operates. 6,175.92 kg of recyclable materials were collected in the community selective collection, from July/2019 to January/2020.

There were also 06 editions of the activity entitled "Informing to Prevent", that is, activities that took place in the squares of the localities, contemplating the Green Bazaar, which consisted of exchanging recycled materials for clothes, shoes and toys, in addition to the opportunity to inform about the risks of entering storage tank areas, burning garbage, the risks of releasing balloons, especially in those locations, due to the terminals, with the presence of tanks and pipelines.

MATERIALS AND METHODS

Considering the importance of water for human life, as well as the distribution and democratic access to this natural asset, the Evaluation System of Environmental Education Programs and Projects for Water Resources Management - SAPEA-Water (CHACON-PEREIRA., acting with a view to "contributing to the theoretical deepening and to the praxis of programs/projects that integrate environmental education and integrated management of water resources, favoring critical and sustainable educational processes" (CHACON-PEREIRA et al., 2020, p.29).

SAPEA-Water is a system for evaluating Environmental Education Projects and Programs, based on the following national and international documents: i) Belgrade Charter (1975), ii) Tbilisi Declaration (1977), iii) Environmental Education Treaty for Sustainable Societies and Global Responsibility (1992), iv) National Environmental Education Policy – PNEA (1999), v) Resolution of the National Water Resources Council - CNRH n.o 98 (2009).

Its structure is composed of six categories of analysis: Contextualization, Interdisciplinarity, PARTICIPATION, Sustainability of the Program/Project, Communication and Self-Assessment, established from classic international and national documents that guide the principles of critical Environmental Education (CHACON-PEREIRA et al., 2020, p.221). Each Analysis Category is composed of INDICATORS and their respective VERIFICATION MEANS, totaling 15 INDICATORS and 43 VERIFICATION MEANS.

According to Chacon-Pereira et al. (2020, p. 87), the INDICATORS used as a measurement device consist of:

> establishment of parameters and evaluation, the INDICATORS are also management instruments, as they allow the administrator to act in key areas of systems and processes, monitor situations that must be changed, encouraged or strengthened from the beginning of an intervention and analyze the scope what was intended and anticipated as a result.

However, to evaluate the actions of the EDUC Project, these Categories were used as evaluation instruments, which made

it possible to measure the progress of the project from the perspective of one or more INDICATORS and VERIFICATION MEANS of the pre-established dimensions, in SAPEA-Water.

Next, we will outline the aspects evaluated by SAPEA-Water, where Chacon-Pereira et al. (2020, p. 99) address the importance of using INDICATORS for environmental education. The use of INDICATORS is ratified by the document for Environmental Education (2005), which contributes to carrying out an evaluation with relevant criteria:

> In the context of critical environmental education, it is worth discussing the pertinence of using sustainable development INDICATORS to evaluate environmental education programs/projects, since sustainable development INDICATORS signal development in several facets, such as economic growth, well-being, human being, environmental quality and institutional structure. Thus, when we speak of INDICATORS of sustainable development or sustainability, we return to the term adopted by Unesco in the decade of education (2005-2014), (Manifesto pela Educação Ambiental, 2005).

For Lopes & Teixeira (2013) In Educação Ambiental em Ação (N.43, Year XI), the adoption of analyzes using INDICATORS provides diagnosis and monitoring of actions, based on objective practices that seek to evaluate results, with technical support, by the researcher, as they consider it necessary and urgent "[...] the creation of reliable INDICATORS, to enhance the possibilities of success in the process of formulation and implementation of environmental education projects".

Below, Table 2, which presents the organization of SAPEA-Water.

Briefly, Table 3 explains what we could say about what each analysis category looks for:

Source: Chacon-Pereira *et al*. (2020, p. 52 - 86).

According to Chacon-Pereira et al. (2020, p. 41), regarding the grades applied in the evaluation of the program/project, there are specifications:

> [...] it is suggested that the SAPEA-Water score be standardized for all programs/projects and that each means of verification be assigned the value +1 when present and the value 0 in case of absence. It is also suggested that the analysis category Participation has a weight of 2, since critical environmental education is mainly based on the process of participation of social actors in a situation of socio-environmental vulnerability. Thus, it is proposed to assign the value +2 when present and the value 0 when absent to the means of verification of the Participation analysis category.

Table 4 summarizes SAPEA-Water in numbers, that is, the number of analysis categories used, as well as the indicators and their means of verification. And Table 5 demonstrates the classification applied by SAPEA-Water.

According to Chacon-Pereira et al. (2020, p.40), in addition to the functionality of evaluating programs/projects for environmental education in the integrated management of water resources, SAPEA-Water "can serve as a model for the terms of reference in public calls, or serve as a reference for elaboration of new proposals".

Another relevant point is the possibility of leaving open the attribution of weight to the categories of analysis, aiming at a better adaptation of SAPEA-Water to the priority purpose of the program/project to be analyzed, in general, by the financing institution or by the responsible supervisory body (CHACON-PEREIRA et al., 2020, p. 42).

Category I – CONTEXTUALIZATION	
INDICATORS	**VERIFICATION MEANS**
A - Identification of multiple uses of water and, in particular, of traditional knowledge linked to water resources.	1 -It presents an environmental and socioeconomic diagnosis of water resources and multiple uses of water.
	2 – It reports the environmental history of water resources in the area covered by the program/project, specifying traditional knowledge in productive practices related to water.
B - Identification of local socio-environmental problems related to water resources.	3 – It presents a map of social actors and conflicts involving the multiple uses of water.
	4 - It reports the history of conflicts involving the multiple uses of water, mediations, negotiations, alliances and political rupture.
	5 – It reports the socio-environmental problems signaled by local social actors and by the river basin committee or water resources management body.
C - Program/project actions contribute to tackling local socio-environmental problems related to water resources.	6 - At least 90% of the established goals are related to tackling local socio-environmental problems of water resources.
Category II – INTERDISCIPLINARITY	
INDICATORS	**VERIFICATION MEANS**
D - Formation of an interdisciplinary team (articulation of the technical dimension with the social dimension)	7 -According to the local problem, there is a balance in the number of professionals designated by area of knowledge (Exact and Earth Sciences, Biological, Health, Agrarian, Applied Social, Humanities, Engineering, Linguistics, Literature and Arts) that make up the program/project team.
	8 - It includes adequate number and profile of local social actors in the team.
	9 - It enables the team to understand the program/project in the context of critical environmental education and to dialogue with popular knowledge.
E - Adoption of educational practices that integrate scientific knowledge with popular knowledge to understand the economic, social, political and environmental factors that involve the multiple uses of water.	10 Educational activities discuss production and consumption practices related to water resources, integrating and strengthening the different areas of knowledge and traditional knowledge linked to them.
	11 - It presents the number, description, period of realization, attendance list, profile and contact of the participants, as well as a photographic record of the interdisciplinary educational activities.
	12 – It presents materials produced in interdisciplinary educational activities.
	13 - The number and profile of participants in interdisciplinary educational activities are significant and are in line with the planned goals.
Category III - PARTICIPATION	
INDICATORS	**VERIFICATION MEANS**
F - Proposals for educational actions of the program/ project with the participation of local social actors in vulnerable situations	14 - It reports the demands identified and negotiated with local social actors in vulnerable situations in relation to water conservation and management.
	15 - It presents the number, description, attendance list, profile and contact of the participants, as well as a photographic record of the meetings for the proposal of the educational actions of the program/project.

G - Training and instrumentalization of local social actors in a situation of vulnerability to participate in decision-making processes and in the social control of the application of financial resources collected with the charge for the use of water resources and public financing in the hydrographic basin.	16 - It presents the number, description, period of realization, attendance list, profile and contact of the participants, as well as a photographic record of the training activities and instrumentalization of local social actors for qualified intervention in decision-making processes and social control related to water resources.
	17 – It presents materials produced in training, instrumentalization and social control activities.
	18 - The number and profile of participants in training, instrumentalization and social control activities are significant and are in line with the planned goals.
Category IV – COMMUNICATION	
INDICATORS	**VERIFICATION MEANS**
H - Dissemination of information on program/project actions and on the conservation and management of local water resources through various means of communication, with the aim of increasing the participation of the local population in decision-making processes and social control of local water resources.	19 – It describes the communication actions, indicating the title, the means of communication, as well as their disclosure periods, purpose and profile of the target audience.
	20 - It presents textual, digital and photographic materials produced in the communication actions.
	21 - The number and profile of the public reached by the communication actions are significant and are in line with the planned goals.
I - Educommunication actions aimed at increasing the participation of the local population in decision-making processes and social control of local water resources.	22 - It presents the number, description, period of realization, profile and contact of the participants, as well as a photographic record of the educommunication actions in the context of local water resources management.
	23 – It presents textual and digital materials produced in educommunication actions.
	24 - The number and profile of the public reached by educommunication actions are significant and are in line with the planned goals The number and profile of the public reached by educommunication actions are significant and are in line with the planned goals.
J - Formation of social networks linked to the Environmental Education program/project (real or virtual).	25 - It presents the number, description, period of realization, profile and contact of the participants, as well as a photographic record of the social networks that interconnect institutions and social practices around water resources.
	26 - It presents materials produced by social networks and homepage of virtual social networks.
	27 - The number and profile of the public reached through social networks are significant and are in line with the planned goals.
Category V - PROGRAM/PROJECT SUSTAINABILITY	
INDICATORS	**VERIFICATION MEANS**
K - Initial and procedural training of multipliers.	28 - It presents the number, description, period of realization, profile and contact of the participants, as well as a photographic record of the training activities for multipliers in order to continue the program/project after its completion.
	29 – It presents materials produced in training activities for multipliers.
	30 - The number and profile of participants in training activities for multipliers are significant and are in line with the planned goals.

L - Formation of partnerships and raising of financial resources, mainly with Hydrographic Basin Committees, public institutions and organizations linked to social movements involving local water resources.	31 It presents the number, description, period of realization, profile and contact of the participants, as well as a photographic record of the activities with River Basin Committees, community leaders, non-governmental organizations, the private sector and/or public bodies involved in the management of water resources, taking into account with a view to establishing partnerships for the continuity of the educational process, after the end of the program/project.
	32 – It presents the partnership agreements signed by the parties involved.
	33 - The number and profile of partner institutions are significant and are in line with the planned goals.
M - Integration with public policies.	34 -It presents the number, description, period of realization, profile and contact of the participants, as well as a photographic record of the educational activities that articulate civil society, the private sector, the public sector and governmental organizations involved in the water theme for the formulation of documents and collective commitments in favor of sustainability of water resources.
	35 – It presents the documents and collective commitments signed by the parties involved.
	36 - The number and scope of documents and collective commitments are significant and are in line with the planned goals.
Category VI - SELF-EVALUATION	
INDICATORS	**VERIFICATION MEANS**
N - Procedural Evaluation	37 - At least 80% of the action plan is respected.
O - Results assessment	38 - It presents physical, chemical and biological indicators that prove the improvement of water resources as a way of evaluating and monitoring the results achieved (e.g. improvement in water quality, increase in green areas, replanted seedlings, recovered land, creation of conservation areas, increase in water availability/water security, increase in the population of living beings, ecosystem services maintained or restored, etc.).
	39 - It presents related socioeconomic indicators that prove the improvement of water resources as a way of evaluating and monitoring the results achieved (e.g. generation of work and income, dignified quality of life for the local population, increase in the resilience of the populations and of the watershed, preparation to face the risks of climate change, adequate basic sanitation system, reduction of waterborne diseases in the local population, etc.).
	40 - At least 80% of established targets were achieved.
	41 - It presents the demands pointed out by the social actors in relation to the conservation and management of the waters served by the program/project and justification for those not met.
	42 – It shows the beneficiary's degree of satisfaction with the program/project (attach survey and number by social group or institution of respondents).
	43 – It presents criticism of the program/project and suggestions for improvement and continuity of the same.

Table 2: Consolidated version of SAPEA-Water

Source: Chacon-Pereira *et al.*, 2020, p. 34 - 39

Contextualization	To promote solutions to socio-environmental problems.
Interdisciplinarity	To present a set of conceptual frameworks, methods and procedures for understanding the phenomena.
Participation	Respect the democratic process that encourages community participation.
Communication	To reflect the process of information democratization.
Sustainability	To support the maintenance of program/project objectives and results.
Self-evaluation	To evaluate the program/project according to the ecological, political, social, aesthetic and educational factors proposed in the document.

Table 3: What each SAPEA-Water analysis category looks for

ANALYSIS CATEGORY	NUMBER OF INDICATORS	VERIFICATION MEDIUM NUMBER	WEIGHT	SUM
Contextualization	3	6	1	+6
Interdisciplinarity	2	7	1	+7
Participation	2	5	2	+5x (2) = +10
Communication	3	9	1	+9
Program/Project Sustainability	3	9	1	+9
Self-evaluation	2	7	1	+7
Total	15 INDICATORS	43 means of verification		+48

Table 4: Total number of analysis categories, indicators and means of verification, and their respective suggested values for the quantification of SAPEA-Water

Source: Chacon-Pereira *et al*., 2020, p. 42

SUM	CLASSIFICATION	COLOR
From 37 to 48 points	Great	
From 25 to 36 points	Good	
From 13 to 24 points	Regular	
From 0 to 12 points	Insufficient	

Table 5: Classification of Programs/Projects according to the sum achieved in SAPEA-Water

Source: Chacon-Pereira *et al*., 2020, p. 43

RESULTS ANALYSIS AND DISCUSSION

EVALUATION OF THE EDUC PROJECT THROUGH SAPEA-WATER

In the application of SAPEA-Water, each of the 6 categories of analysis is scored and the final sum allows classifying the program/project between Great (37 to 48 points), Good (25 to 36 points), Regular (13 to 24 points) or Insufficient (0 to 12 points).

The EDUC Project was evaluated according to SAPEA-Water, through secondary data (reports, planning, testimonials and publications posted on the project's official website) and primary data (interviews with members of the EDUC team), in order to understand whether the means of verifying the indicators of the 6 categories were present, performing the sum of such data. And the sum was used to determine the classification of the Project in quality bands, highlighted by colors, according to the score achieved.

CONTEXTUALIZATION

In Category I, it was possible to evaluate the three indicators. Regarding Indicator A, in Verification Means (MV) 1, the EDUC Project carried out a Socio-Environmental Diagnosis of the communities where it would operate. In MV 2, most residents identify and narrate the origin and use of the water they consume, as portrayed in the answers to questions 04 and 14 of ANNEX 1. Indicator B, MV 3, appears in the informal reports of the population that cooperated in the development of maps of socio-environmental problems and questions 04 and 14. In MV 4, the reports revealed the existence of several means of access to water in these communities, which were part of the survey carried out: water from the pipes that supply the REDUC that the population uses appropriate to supply their homes, water from an artesian well, purchase a gallon of water for drinking and cooking (residents who have financial resources). MV 5 in the answer to question10, where the EDUC Project heard the target public that would be sensitized, before its beginning, to guide the actions. For Indicator C, for MV 6, the EDUC Project carried out an evaluation survey for the water supply in the communities, having obtained as a result the majority response that it is "regular/poor/does not exist" and it is worth mentioning that the project is based on its activities on other fronts, such as solid waste and leadership training, to promote local sustainability.

INTERDISCIPLINARITY

In category II, for Indicator D, MV 7, 8 and 9, the team has a mixed background and strives to train community leaders. As for Indicator E, MV 10, 11, 12 and 13, EDUC project has records of the various activities it carries out with the civil community and municipal schools in the communities, aiming to reflect the conservation and protection of natural water resources: non-pollution, campaigns involving teenagers (Ecoclube), community leaders, young people (agents environmental issues) with the propagation of the adoption of selective collection in the neighborhoods and in raising awareness in the community about the deleterious effects of burning household waste, participation in environmental education lectures that inform about the dangers of invading reserve storage tanks to use as leisure (swimming pool) or for consumption, as the water is raw.

PARTICIPATION

Category III, is included in Indicator F and G, MV 14, 15, 16, 17 and 18 are found in the reports and materials available on the official website of the NGO Guardiões do Mar and can be viewed and checked on the official

pages/ websites[13]. The same occurs with the environmental education productions and the booklet of the community leadership project. The answers to questions 01, 05, 06, 10, 13 added to participation in EDUC actions aimed at environmental protection, fostering in communities the ability to restructure themselves in the face of adversity and the desire to engage in socio-environmental causes, contribute.

COMMUNICATION

As for Category IV, the EDUC Project corresponds to Indicators H, I and J, MV 19 to 27. The EDUC Project, through social networks and the virtual pages, disseminates material about the history of the NGO Guardians of the Sea and about the project, the actions carried out, the courses offered, content publications on the environmental theme, the booklet, as well as the campaigns, maintaining photographic and video records. It even carries out inclusion activities in schools and online, with several posts in LIBRAS of the materials used in Environmental Education, by the specialist in Inclusive Education, Aline Angel Varges, being a positive differential of the EDUC Project.

PROGRAM/PROJECT SUSTAINABILITY

Category V is contemplated in its K indicator, in MV 28. The well-prepared schedule of the leadership course in Campos Elíseos, exemplifies this category, as the training of multipliers is one of the pillars of sustainability of EDUC, that is, a strategy that guarantees the continuity of the project, even after the completion of its operation. The Leadership Course Booklet exemplifies the MV 29. The MV 30 is evidenced by adherence to training activities for multipliers. Although the NGO's headquarters are in São Gonçalo, the leadership course was offered at night, for greater adherence by residents. Perseverance until completion and the contemplation of supporting one of the projects developed during the course is the guarantee that they will influence others to participate. Indicator L is included in MV 31, 32 and 33. EDUC has a partnership with Petrobrás, which is the financier, and with SME Duque de Caxias, working in environmental education in schools in the municipal education network. The entire documental part of the EDUC aims to ensure clarity in the formation of partnerships. As for Indicator M, MV 34, 35 and 36, EDUC has proven experience in integrating with Public Policies such as the National Solid Waste Policy PNRS (Law number 12.305/10), the National Environmental Education Program PNEA 9795/99 and the Law 13,146, of July 6, 2015, which establishes the Brazilian Law for the Inclusion of People with Disabilities - Statute of the Person with Disabilities. There is also alignment with the Sustainable Development Goals.

SELF-EVALUATION

In Category VI, in Indicator N, to verify the MV 37, a brief consultation was carried out with the EDUC member, Helensandra Louredo da Costa (Coordinator of Environmental Education) who declared the percentage of 100% of the goals achieved. Several testimonials posted on the main page of the EDUC Project corroborate the finding of this MV. For Indicator O, MV 38, EDUC did not score because the survey of these physical, chemical and biological characteristics of water resources is not part of the project's goals. Regarding MV 39, the team, as well as the people involved, carry out the procedural evaluation, and it is customary to publish testimonials on EDUC's social networks. As

13 Available on the website: <https://www.facebook.com/projetoeducoficial/>.Accessed on: October 10, 20200.

for MV 40, the answer is similar to MV 37, it being noticeable that EDUC promotes the strengthening of communities, encouraging them to develop and be proactive, identifying and reflecting their main socio-environmental demands and preparing themselves to act in an increasing way, through local environmental improvements. MV 41 and 42 are related to the satisfaction survey and evaluation of those involved, recording many testimonials and participating together with community leaders and managers and teachers of schools contemplated with EDUC. Finally, in MV 43, throughout its execution, the EDUC was open to the observations of the people involved with the intention that "the various social actors that operate in the region will be able to identify their strengths, weaknesses, opportunities and threats; suggest proposals for action plans, whether short, medium or long term". (DSCE, 2018, p. 100).

RESULT OF THE EVALUATION OF THE EDUC PROJECT BY SAPEA-WATER

Although it was not possible to score the EDUC Project in all the MV, this analysis revealed the importance of the project in locations that are environmentally vulnerable, in terms of water management, having been evaluated as excellent and reaching the sum of 47/48, classified in green color, even though it is not a specific project for the management of water resources; which corroborates with its diversified and comprehensive approach in the socio-environmental area.

Despite the scope of the EDUC Project's action in the communities of Campos Elíseos, promoting reflection on anthropic actions, for a positive change in practices that harm the environment, the EDUC Project still reaches a small percentage of citizens of these listed communities. Such practices collide with the aggravation of the problems faced, with regard in particular to the disposal of solid waste, which contributes to the pollution of water bodies in the region.

Hostages of a policy of abandonment, these communities suffer from lack of access to drinking water, which causes disease. In this sense, projects like this need to have uninterrupted continuity and expansion of their actions, so that more people are added and can benefit from it.

THE MAIN FORCES IN THE EDUC PROJECT'S PERFORMANCE

Compliance with most means of verification attests to the strengths of the EDUC Project. Another important factor is the issue of inclusion, attended by few socio-environmental projects. There is a concern that the actions reach everyone, especially people with sensory and intellectual disabilities.

OPPORTUNITIES IN THE RENEWAL AND CONTINUITY OF THE EDUC PROJECT

The EDUC Project proved to be a relevant project, which acts positively in the communities of Campos Elíseos, close to REDUC. Its continuity represents an assertive investment, in the case of a comprehensive and innovative socio-environmental project. According to APMAR, the EDUC Project was renewed by Petrobrás, but due to the pandemic period due to the SARS-CoV-2 coronavirus, the current forecast is that activities will resume on the 2nd. Semester of 2021.

THE BIGGEST CHALLENGES OF THE EDUC PROJECT

As the headquarters of the EDUC Project is located in São Gonçalo, it is clear that a base in Campos Elíseos could contribute even more to the visibility of the project, on the part of the local communities.

CONCLUSIONS

Environmental education is one of the ways to free oneself from poverty and possible reversal of the situation of environmental degradation in areas occupied by vulnerable communities on the outskirts of urban centers, with a view to sustainable and socially fair development. NGOs play an important role in informal environmental education. However, the diversity of incentives and the multiplicity of organizations in operation make it difficult to critically reflect on the value added of these initiatives.

This article promoted the evaluation of the EDUC Project of the NGO Guardiões do Mar, which operates in the Baixada Fluminense in the State of Rio de Janeiro, Brazil, and is financed through the Petrobras Socioambiental Program. The Project met all analysis categories of the SAPEA-WATER system, applied in the evaluation, and obtained the optimal concept, associated with 47 points out of a total of 48. It was also observed that EDUC adopts inclusive and appropriate actions for people with special needs. Only one of the means of verification was not observed, which deals with monitoring water quality as one of the indicators of recovery of the degraded environment, and one of the ways of evaluating the effectiveness of educational actions and social innovation, which are objectives of several projects and environmental education programs such as EDUC. Additionally, there was an opportunity to expand the Project's articulation with other instances of the local government, as well as a greater involvement of these actors in the Project's actions and in participatory management processes and in the identification of innovative solutions for local problems.

The implementation and continuity of the project are relevant for the implementation of environmental sanitation, as well as providing contributions to public bodies, serving as the benchmarks for good sustainability practices, protection of life and the environment, as proposed in Agenda 2030 of the UN. It is also observed that the critical analysis promoted in EDUC and its results contribute to the continuous improvement of other activities in Environmental Education.

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ANNEX 1

Quiz Questions:

01 Do you participate in any social program? (p.25)
02 Housing conditions (rented/owned/given/own/don't know)? (p.37)
03 Type of housing. (p.38)
04 What is the main type of water supply in your home? (they could mark more than one resposta). (p.44)
05 What is the destination given to the sewage in your home? (p.45)
06 What is the destination given to your solid waste? (they could choose more than one answer) (p.46)
07 What is the frequency of garbage collection in your community? (p.47)
08 Does your community have selective garbage collection? (p.49)
09 What kind of recyclable materials have people in the community already collected to sell? (p.50)
10 What are the most common problems in your community? (p.55)
11 What kind of activity would you like to have in your community? (p.63)
12 What is the assessment for garbage collection in your community? (p.66)
13 What is the assessment for the sewage system in your community? (p.67)
14 What is the assessment for the water supply in your community? (p.68)
15 What is the assessment for street upgrading in your community? (p.70)
16 What is the assessment for sports and leisure areas in your community? (p.71)
17 What is the assessment for environmental areas in your community? (p.76)

18 Do you like the community where you live? (p.83)
19 Who would you turn to to improve the problems in your community? (p.85)
20 How do you rate the Residents' Association in your community?86
21 What is the evaluation for social projects in your community? (p.88)
22 How do you evaluate Reduc's performance in your community? (p.97)

Source: DSCE, 2018.