

ENVIRONMENTAL EDUCATION AS A STRATEGY FOR REDUCTION OF SOCIO-ENVIRONMENTAL RISKS¹

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Introduction

In recent decades, socio-environmental disasters have occurred with increasing frequency, attracting considerable media attention in Brazil. By way of example, the 2011 incident in Rio de Janeiro State's Mountainous Region, considered a mega-disaster (COELHO-NETTO, 2013), may be cited. The Brazilian coastline is significantly influenced by rainfall systems from the Atlantic Ocean and Atlantic Convergence Zone. In recent years, such rainfall along the country's coastline has increased in volume, causing both floods and landslides. Geomorphological and geological characteristics, along with disorganised land occupation (MENDONÇA & GUERRA, 1997) contribute to a land area's degree of susceptibility to such incidents. To this end, taking into consideration persistent pressure for improper land use, occurring as it does in a disorganised manner with no State intervention, actions to mobilise the vulnerable population to participate in risk mitigation have become essential.

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In view of its capacity to contribute to change in its own environment, education in current times is seen as having an increasingly important role to play. Environmental education is seen as a strategy of reflection for society or a group, through which values are re-established and new identities created for individuals. Considering that they may only be educated to demonstrate environmental awareness based on a project of society which includes individuals as opinion formers, and not just followers of orders or rules, but which, above all, allows them to be seen as part of the problem, thereby enabling them to see themselves as key to the solution.

To this end, the paper analyses two environmental education projects implemented in landslide-risk areas housing populations in situations of historically established socio-environmental vulnerability. They are: the Community of Maceió in Niterói, a municipality in the Rio de Janeiro (RJ) Metropolitan Region, and the Zumbi do Pacheco Community, situated in Jaboatão dos Guararapes, a city in the Recife Metropolitan Region (RMR/PE). Such projects invested in educational actions to provide dialogue between the different actors involved in the theme of landslide disasters, reduce social distance between them and bring about transformational action among all in order to effectively reduce them. The desired content, method and specific objectives of such educational actions are rightly questioned, and experiments such as the two projects examined in this paper are therefore necessary.

This study is justified by the inefficiency of structural actions (engineering works) for disaster risk reduction (DRR), given that disasters associated to landslides and floods continue to increase in magnitude and frequency, afflicting new land areas. It is therefore our wish that this study promote thought on the urgency of actions geared towards populations in socio-environmental risk situations, with capability for being vectors of transformation to DRR in the light of extreme-weather events.

This text is divided into three parts. The first is aimed at discussing socio-environmental vulnerability as a historically established construction process, making for a situation of environmental injustice in the urban areas of large Brazilian cities. The idea of environmental education becoming a fundamental strategy for DRR is then discussed. Such an education strategy becomes fundamental primarily in a context of raising awareness of socio-environmental risk conditions in which vulnerable populations live, and institutionalisation of the sustainability of development. Finally, the two case studies are presented: in the Community of Maceió (Niterói, RJ); and the Zumbi do Pacheco Community (Jaboatão dos Guararapes, PE).

Vulnerability and environmental (in)justice in urban areas

Vulnerability and urban peripheralisation

During the 20th century, Brazilian cities became the centre stages for significant economic, social and spatial transformations due to the rapid processes of industrialisation and urban development in the country. Particularly in larger cities, many capital investment activities and work activities were concentrated which, associated to modernisation

of agriculture, led to a considerable rural exodus (SANTOS 2006). In a late-developing capitalist society such as Brazil, the urban environment acquires peculiar features as a result of unequal appropriation of land through capital investment activities. Consequently, spatial configuration reflects the unequal process of wealth accumulation and privileges granted by the public authority to hegemonic agents (ALMEIDA, 2003).

As a result of unequal urban land appropriation in late-developing areas, less favoured social groups end up occupying spaces of little or no market value, leading to the socio-economic inequality seen today, and express themselves through those spaces (MATTOS and DA-SILVA-ROSA, 2011) as will be explained later in this paper. Groups of higher social vulnerability are thereby forced to occupy preservation areas which, in many instances, are or become environmental risk areas (*id.*). According to such logic, capital investment activities create and construct a situation of both social and environmental injustice. Distribution of social groups to natural assets and environmental risk situations is defined by Layargues (2009) as environmental inequality, causing disproportionate access to material resources, influenced by socio-economic inequality. As such, significant social inequality typical of developing countries is linked to environmental inequality in which Alves (2007) points out that there is an overlap of such inequalities.

When they expel poorer communities to areas of little market value in the urban environment, the economic elites contribute, according to Freire (2007), to a spatial fragmentation process based on social fragmentation due to income inequality. In other words, spatial fragmentation reflects social inequality historically produced through the push for access to land in cities. Such social groups are, then, obligated to settle in geologically dangerous areas, most of the time inappropriate for the construction of housing (DAVIS, 2004 *apud* FREIRE, 2007, p.16-17). As a result of the considerable competition brought about by land occupation and use in urban centres (JACOBI, 2006), those groups of lower socio-economic value migrate primarily to peripheral areas of the city, reflecting "a clear trend of increased occupation processes through irregular activities such as trespass, favelas and black-market plot allocation" (*Id.*, p.120).

Consequently, an informal city grows up linking illegal land occupation, brought about by urban expansion, to social exclusion, and is visible in groups of illegal settlements characterised by the lack of public investment and by social exclusion (*Id.*, p.126). The result of such disorganised occupation processes are communities compromised by precarious infrastructure and by the risk to which they are exposed, given that appropriation of risk areas in cities is linked to considerable environmental degradation. Furthermore, deprivation among such populations and the worsening of their vulnerabilities occurs in a scenario of non-existent public policies and/or inefficiency in their implementation by the State.

Despite distinguishing poverty from social vulnerability, Katzman *et al.* (1999) say that the latter is linked to the likelihood of an individual or group suffering in the future as a result of certain weaknesses demonstrated in the present. Being the poorest – those most needy in material and symbolic terms, it is they, therefore, that are the most vulnerable. According to Dasgupta *et al.* (2003), it is precarious living conditions, the low level of schooling and access to information and occupation of marginal areas which render the poorest sections of the population the most environmentally vulnerable.

Excluded communities in urban centres, therefore, are characterised by social vulnerability coupled with subjection to risk, defined by Veyret (2007, p. 30) as “[...] representation of a hazard or danger affecting the targets and constituting indicators of vulnerability”. Such risks are defined, in this present case, as floods and landslides, common problems in Brazilian urban areas mainly when the urbanization process does not consider local biogeophysics aspects.

Environmental exclusion and injustice

Based on the above, construction of highly socio-economically vulnerable communities can no longer be identified simply as a form of social injustice, but also one of environmental injustice. The concept of environmental injustice came into being in the USA in the 1970s - designating, more specifically, a situation of environmental racism due to the concentration - not at all random - of toxic waste and discharge from polluting companies in minority neighbourhoods, particularly those of black ethnic groups. In Brazil, however, environmental inequality goes beyond the limits of pollutant build-up in determined social groups, in addition to the fact that the poorest Brazilian population is, in the majority, of black ethnicity, rendering any talk of environmental racism somewhat irrelevant. Environmental injustice is, according to the definition given by Acselrad (2005), the unequal distribution of negative environmental impacts in the most socially vulnerable populations. On the other hand, environmental justice portrays the mitigation of such environmental inequality. In the words of Herculano (2002), environmental justice means

[...] the set of principles which ensure that no group of people, whether ethnic, racial or class, bears a disproportionate share of the negative environmental consequences of economic transactions, federal, state and local policies or programmes or those resulting from lack or omission of such policies. (p. 2)

While environmental justice is about tackling unequal distribution of environmental problems among social groups, above all between social classes in Brazil, environmental injustice represents such a scenario of dispute between favoured and unfavoured social actors. Social exclusion and spatial segregation therefore give rise to environmental clashes in risk areas and those with more urban infrastructure.

In light of such unequal distribution of environmental risks (landslide, flooding, pollution and contamination, etc.) and socio-environmental vulnerability, there is a requirement for implementation of socio-educational measures that prioritise critical participation in order to facilitate awareness-raising among vulnerable populations on the subject of citizenship.

Environmental education and disaster risk reduction

In the light of disasters occurring in Brazil in recent years, despite increased and continuous investment in structural interventions, much discussion is taking place in

respect of the urgent requirement for dialogue between the scientific community and society which, with its significant knowledge, cannot be marginalized. Such change envisions proactivity in vulnerable populations. In this context, Environmental Education (EE) may be harnessed as a contribution aimed at encouraging participation of such populations in decision-making processes geared toward DRR. In other words, EE has much to contribute in this area, with the objective of

[...]assisting us in gaining an understanding of the environment as a set of social practices permeated by contradictions, problems and conflicts which weave an intricate network of relationships between human life habits and their peculiar forms of interaction with the physical-natural elements around them, of giving them significance and managing them. (CARVALHO, 2008, p. 163)

Within the DRR scope, it is crucial to seek an understanding of the manner in which society interacts with nature, because established interactions are essential for the survival of human beings. Based on this perspective, it is believed that communities will be capable of getting involved in participative processes and, thereby, contribute to DRR.

The advent of EE in the international scenario is related to the crisis brought about by expansion of the capitalist industrial development model, in evidence since the 1950s and 60s. Its proposal was born of the Stockholm Conference, but it was only during the Tbilisi Conference (UNESCO and UNEP, 1997) that it was couched in a textual body in which its principles and directives were systematised. The innovation provided by the advent of EE is grounded on its quest to lend greater criticality and knowledge to human interaction with the environment, in addition to raising awareness among members of society of their rights and responsibilities. EE has, therefore, contributed to understanding the situation at a more complex level through the involvement of different scientific fields, uniting humankind with that from which modern science had separated it: nature. It is in this way that human activities and, consequently, economic activities are conceived within the natural system.

Despite the passing of laws in Brazil which, to some extent, have sought collaboration toward strengthening EE since the 1980s, it was only the end of the twentieth century that saw institution of the National Environmental Education Policy – Brazilian Federal Law 9.795 of April 27, 1999. A product of the 1988 Federative Constitution of Brazil, this policy confers responsibility on the public authority to promote EE and raise awareness in respect of conservation and preservation. In general terms, environmental standards are formulated with perception of the requirement for collective participation in defence and improvement of environmental quality - involvement considered fundamental since the final declaration of Tbilisi (*Id.*). Articles 1 and 16 of the regulation provide respectively on what Environmental Education is and on public authority responsibility.

In line with Brazilian legislation, it is the municipality that carries responsibility to promptly assist a population afflicted by disasters, and it is therefore worthy of note that, according to the National Environmental Education Policy, municipalities are res-

possible for promotion and dissemination of information on environmental issues. This can be seen in Article 13 of Law 9.795/99, which charges municipalities with the duty of encouraging “dissemination, by means of mass communication methods, in significant vehicles, of educational programs and campaigns, and of information on themes related to the environment” (BRASIL, 1999).

It is clear that the municipal public authority, as a component of the system, has significant responsibility on the environmental issue. In respect of EE at municipal level, mere access by citizens to such environmental information or knowledge is not sufficient. According to Loureiro (2004, p.81), “Transformational Environmental Education emphasises education as a permanent, daily and collective process by which we act and think, transforming the real-life situation”. Going beyond provision of content to the citizen, the necessity for critical, transformational thought on the manner in which the human being establishes a relationship with his/her habitat is clearly evident, more specifically in relation to risk areas, and whose aim, in this case, is to contribute to DRR.

With the general directives of the regulation (Law 9.795/99 – National Environmental Education Policy) having been set out, it is necessary to recognise that the parameters for dissemination of EE through cooperation between all involved (Federal, State and Municipal levels) were proposed as a means to minimise environmental problems for future generations and enable them to enjoy better quality of life. In such a dynamic, as a way of easing tensions generated by inequalities, education, in the vision of Pelicioni (2004, p. 459) should provide “access to different data, enabling their collection, selection, organisation, management and use, in addition to keeping knowledge up to date”. It can therefore be said that, based on the assumption of education as a strategy to bring about change, a new mindset on society emerges – a new lifestyle for the collective, geared to DRR. To achieve this, however, attention must be paid to two “wisdoms” among the seven that Morin (2001) set out as being necessary to education: the importance of access to knowledge to understand global issues and the multidimensional essence of the human condition, as follows:

To teach the principles of pertinent knowledge, i.e. promote knowledge capable of seizing global, fundamental problems to tackle them with local knowledge in its complexity, as a collective without fragmentation. To teach methods which enable the fostering of mutual relationships and reciprocal influences between the parties and the whole;

To teach the human condition, considering that human nature is at the same time physical, biological, psychic, cultural, social and historic. It is impossible, then, to achieve this by means of separate disciplines (page35-47).

The socio-environmental risk situation to which populations are exposed when excluded by the late development model - as in the Brazilian case -is an environmental problem being tackled in a disjointed manner across the country as a whole, both by the municipal authority and by society in general. Based on the National Prevention and Civil

Defence Policy (Law 12.608, of April 10, 2012, BRASIL, 2012), the situation tends to improve thanks to the requirements of such legislation, essentially in respect of including prevention as a paradigm, conferring the idea of resilience on DRR actionsⁱ (OTONI DE ARAUJO et al, 2013; ARAÚJO & DA-SILVA-ROSA, 2014). In other words, such a paradigm integrates into DRR the thought process on actions before occurrence of an event in the sense of making communities more resilient in accordance with the risk management perspective, as defined in the Hyogo Framework for Action (UNISDR, 2005).

Inclusion of prevention in Brazilian national policy (and, consequently, policies in the state and municipal spheres) was a result, therefore, of the Hyogo Framework (OTONI DE ARAUJO et al, 2013; ARAÚJO E DA-SILVA-ROSA, 2014). Noteworthy among the five priority points presented by the milestone is the importance of knowing and being aware of the risks in order to be ready to react appropriately. Only in that way will communities be capable of contributing to risk reduction and be prepared to face adverse events.

Despite the uncertainty of a disaster, it is recommended that mitigation actions harness the sustainability of development as proposed in international debates on DRR. In this sense, one observes the possibility of coordinating purposes among debates on climate change, sustainability and DRR post-Hyogo, adding complexity to the future DRR scenario as other social actors come to participate in it. Involvement of such actors and of the population in risk situations becomes essential for risk management. Such perspective positions environmental education as a fundamental strategy for raising awareness in society of its relationship with the environment, encouraging critical reflection on human activities and their socio-environmental consequences. It also questions the dominant rationality that, through its interventions in nature, enabled the emergence of environmental crises and socio-environmental vulnerabilities.

It is particularly this complex aspect which supports the notion of environmental citizenship that Waldman (2003) highlights, because

contemporaneous reality presupposes [...] redoubled attention to understanding the environmental issue in all its complexity. In light of the magnitude of ecological problems, renewed detailed discussion of the paradigms that have guided humanity in recent centuries is an undeniable requirement. It is based on such conjuncture that we can better understand an idea such as that of environmental citizenship. (p.543)

This maxim suggests that the notion of citizenship is, in general, evaluated through the eyes of the citizen in respect of possibilities and potentialities that he or she can or could enjoy in his/her relationship with the State and with society in its widest sense. Citizenship should be associated with a way of life developed in the community, evident in the etymology of the word itself, deriving as it does from the Latin *civitas*, i.e. city.

Seen in this way, it is based on such understanding that the importance of developing environmental citizenship is disseminated. Environmental awareness-raising should be the result of an educational process which seeks to understand the interdependence

between development, nature and vulnerabilities, with the human individual as an element of the risk management process.

Analysis of educational practises in risk areas

The two educational practices were developed in two risk areas in Brazil, namely: The Community of Maceió, city of Niterói, Rio de Janeiro Metropolitan Region; and the Zumbi do Pacheco Community in the city of Jaboatão dos Guararapes, Recife Metropolitan Region (PE) - Figure 1. Interventions took place in these two communities: in the Rio de Janeiro case, after disasters in 2010 and 2011 and, in Pernambuco on an ongoing basis over the last eight years. Communities were mobilised by institutions already operating in the area, favouring teamwork and facilitating mobilisation of the inhabitants, particularly young people. In the case of Niterói, the role of NGO *Oficina do Parque* (Park Workshop) was important in respect of activities it had previously run in the area and, in the case of Pernambuco, the local municipal school facilitated activities with the involvement of its teachers. Practical, educational activities were run in the two communities, such as workshops, poster making by the younger people, mock-ups, photographs, theatre and videos, as described below.



Figure 1 – Location in Brazil of areas where the educational activities analysed in this paper took place.

Community of Maceió (RJ, Brazil)

Located in the central area of Niterói city, and contained within the Coastal Massifs geomorphological context, the community is spread over an area of some 700,000 m², with valley relief, steeper south-facing hillsides and rocky peaks, with topographical amplitudes in excess of 300 m predominant and large declivities with colluvium and talus deposits. Occupation, primarily in the hillside areas, has been somewhat disorganised, with clearing and grubbing common, along with cuts and fills for installation of housing and streets; sewers, waste and rubble dumped directly onto the land, and deficient water-main connections. With approximately 4,500 inhabitants (in 2010), basic infrastructure in the

community is precarious, with 71% of households supplied with well or spring water, 53% having a septic tankⁱⁱ. As a consequence of the natural characteristics and human actions which adversely affect the stability of slopes, serious landslide events with considerable effect on the local population have been recorded, such as those in 2010. In April of that year, after a period of intensive rainfall, a significantly large number of mass movements caused deaths, material losses and social harm in the communityⁱⁱⁱ.

During the project, workshops were run involving theatre, art, photography and mock-up construction for community residents who felt naturally attracted to such events, primarily young people between 10 and 14 years of age, in groups of 6 - 11 students (MENDONÇA, 2013). These events were held at the headquarters of NGO *Oficina do Parque*, already active in artistic education and vocational training. The workshops were given by instructors from the NGO, and a professor of Geotechnical Engineering at Rio de Janeiro Federal University delivered advance lectures on disasters involving landslides in order to provide a basic knowledge on the subject. The lectures were aimed at contextualising the problem by addressing landslides and their imminent signs, anthropic actions in respect of disorganised occupation and mitigation measures. Following these lectures, plans were made for the workshop content based on discussion between the respective instructors and geotechnicians. In the different workshops, in addition to the aim of teaching the respective activity (theatre, drawing, photography and mock-up), efforts were made to have students look at their daily lives with a sharper critical sense.

For the theatre workshop, a text was prepared with reference to the discussions and situations experienced by the participants, thereby providing the outlook of residents on disasters, where government neglect was perfectly clear. In the photography workshop, field activities took place in the community itself, with geotechnicians pointing out landslide scars to students, their consequences, the different human actions which worsen slope instability and signs of imminent land rupture. Based on this activity, the students were asked to photograph the areas of greater interest. One part of the text introducing the display of photography taken by the instructor read:

[...] The aim of taking these photos was to evaluate and work on the way we see the place where we live, and how we live. The challenge for students to apply a critical and photographic eye to a place they pass through every day was a big one. However, they understood that through photos they could create a method of learning photography and, at the same time, learn and understand the different types of land occupation. (MENDONÇA, 2013)

The choice of building a mock-up was based on the experience of Valencio *et al.* (2009) who considered it a very illustrative teaching resource on the theme of disasters, where use of geographical aspects of the community and the outcomes of land occupation confer a recreational and reflexive dynamic on the group. To this end, a mock-up of an area in the community was made after successful identification of geotechnical and anthropic conditions unfavourable to the stability of slopes (Figure 2). Students attend-

ing the workshop represented the earth's surface, geographical elements observed in the community itself and landslide and boulder-fall phenomena.

Another educational resource used in risk communication between public agents and the community is the leaflet on landslides which, in the majority of cases, is the only vehicle employed. In the main, these leaflets are prepared from a merely technical point of view. In this case, the interest of the public, already socially distant from public administrators, is greatly reduced.

As an alternative to the more traditional leaflet, students attending the workshop in the community of Maceió were encouraged to create a comic-book story addressing the theme of landslides, based on a script prepared by the technical team using simplified language (Figure 3).



Figure 2 – Activity: construction of interactive mock-up

The workshops lasted between 2 and 4 months. After the workshops were completed, the project was brought to a close with an event held in the community to

demonstrate the results of all activities and raise awareness of the theme among the local population and invited public administrators. During the event, photographs were exhibited, the interactive mock-up was presented and there was a stage play, booklets with a comic-book story and a video was shown about activities with testimonies from residents, technicians, a social assistant and educators.



(a)



(b)

Figure 3 – art workshop activity:
(a) cover of comic-book story; (b) one of its inside pages.

Zumbi do Pacheco Community (PE, Brazil)

The community of Zumbi do Pacheco is situated in the municipality of Jaboatão dos Guararapes, Recife Metropolitan Region (PE). The district has a population of approximately 28,000 (2010) and is located in a hilly area, characterised by precarious settlements with high population density and disorganised occupation. Most houses have no network for disposal of sewage, which is discharged into septic tanks constructed informally by the residents. Waste and rubble are either deposited illegally in hidden areas, or serve as

landfill to establish horizontal platforms on hillsides. The neighbourhood is affected by the consequences of rainfall, primarily causing landslides and floods.

The project was implemented in the community's Antônio Vieira de Melo Municipal School. During the mobilisation and awareness-raising period, dialogue mechanisms were put in place to enable contact by the municipality's Civil Defence Service with educators and forty school pupils between 10 and 15 years of age. In this phase, the theme was discussed with the Civil Defence Service, addressing its working philosophy and purpose. This was also an opportune moment to make participants aware of the contribution that the school can make in implementing actions which favour the community in development of their socio-environmental defence resources.

The young students and teachers took part in thematic workshops addressing matters such as risk perception; first aid; participation and active citizenship; the rights of children and adolescents in risk and disaster situations; human rights, socio-environmental risk prevention and risk mapping. Workshops included lectures, theatre and construction of a mock-up to represent a neighbourhood from a disaster prevention standpoint, all with a view to integration and encouraging participation of the young people in preventive actions. In respect of the teachers, efforts were made to integrate values and establish understanding to be drawn upon in day-to-day school life and not as a one-off, decontextualized in the local scenario.

The young students learned how to carry out community planning in favour of self-management of the disaster issue, seeking to develop the principle of empowerment, i.e. enhancement of individuals as social actors. In a legitimate and lasting way, this is aimed at their increased participation in the process of changing their social and political environment in the drive toward improved quality of life and equity, essential elements for DRR (WALLERSTEIN, 2006, p. 17).

The project has now been running for seven years and its workshops are updated drawing on previous experiences, keeping the young people active in their prevention activities, constituting the Youth Community Civil Defence Center (*Nudec Jovem*). In 2010, *Nudec Jovem* organised, in collaboration with the Municipal Civil Defence Service, the 1st Free Municipal Youth Civil Defence Conference, in which several institutions were involved and, working as part of an inter-sector enterprise, combined their efforts in search of conceiving ideas from the viewpoint of young people in the community and educators committed to formulation of social policies focused on socio-environmental risk prevention and citizen education.

Discussion of educational practices

It has been noted that workshops with activities such as theatre, mock-ups, art (comic-book story) and photography are possible to run and very enriching for the community, with disasters associated to landslides as the cross-cutting theme. Such activities favour direct action by young people in an enterprise related to their daily lives and land area, and although proposed and guided by technicians, the final products were achieved interactively by the participants themselves – the local residents. Such

activities consequently reveal the individual and collective experience of the community, enabling understanding of their problems and those of the land area they live in, leading to reflection about their own situations (UNESCO and UNEP, 1977).

Two points are worthy of reiteration. Firstly, it is the opportunity for community participation in proposed activities that can contribute to its empowerment. In respect of the project in Jabotão dos Guararapes, Farias (2012) reports that 95% of the young people involved stated that the actions of Youth Community Civil Defence Center (Nudec Jovem) contribute to the effective participation of local youngsters and help the community to live with risk and understand what to do in an emergency situation.

The second point is regarding the role of the Nudec Jovem in the community. According to LUCENA (2008), *Nudec Jovem*, exemplified by the project studied, provides a different outlook since it is an in-school enterprise, cross-fertilising the learning environment and providing an interface with the community experience acquired by children, adolescents and young people in their daily lives. Continuity of the Jabotão dos Guararapes project over seven years is an indication of the greater independence gained through effective community participation.

It is considered that “proximity management”, addressed by Lucena (2005), is significant at the moment in which democratic action is applied, where all participants see themselves as agents of transformation and change, and jointly responsible for risk and disaster prevention in their home communities. It is understood that interaction of those involved in citizen construction (technicians, Civil Defence and residents) gives rise to a process of maturation through which all involved come to make joint decisions on their priorities.

In this context, Freire & Shor (1986) state that “individuals take charge of their own lives through interaction with other individuals, generating critical thinking in relation to their situation, favouring construction of personal and social capacity and enabling transformation of social power relationships”.

The actions carried out in the two land areas favour both the interaction stressed by the authors and reflection by residents on their day-to-day lives, an essential stage in transformation of the individual and his/her relationship with the local environment. It is believed that the individual (in the two cases studied, young people) can come to understand his/her role as a resident of a land area - important for a DRR action. In other words, he/she acquires the necessary skills to act in a more conscious manner in his/her own surroundings. Lucena (2006) adds weight to this concept, stating that

[...] it is in the appropriation of citizen conscience and the capacity for transformation that a community has, based on the process of information and knowledge construction, that formulation of instruments of participation with an end to a new social scenario, enabling legitimisation of power as a mechanism capable of bringing about transformations in the local environment. (p.50)

Understanding that this is achieved through a process of construction, in which formal and informal education are essential, citizen conscience means assuming that

community members see themselves as actors in a transformation, understanding that they pertain to their situation, and being able to invest in legitimisation of processes which significantly lead to change. In its project, RRD integrates transformation of situations, historically constructed, of socio-environmental vulnerability through ecologically unsustainable and socially unequal development.

Final Considerations

The expressive socio-economic inequality in Brazil, so characteristic of an economic model based on over-exploitation labour and natural resources, has been shown to be linked to unfair distribution of natural amenities and to environmental risks. The high level of social vulnerability among certain groups has impeded their settlement in areas with better access to sewage systems, water treatment, the telephone network, etc. This, coupled with a lack of State support, has to a certain degree obligated populations in Brazilian urban areas to migrate to areas of little or no value, such as riverbanks and hillsides.

On appropriating areas which, owing to natural factors, degradation and lack of infrastructure, become risk areas, such groups tend not to understand the situation in which they find themselves. It is therefore of paramount importance that educational interventions take place, particularly those of an environmental nature, so as to provide knowledge of the risks and equip people to deal with such risks.

It is observed that Brazilian environmental education has been constructed throughout history by political and legislative engagement aimed at contributing to creation of a fairer, more sustainable and participative society. As such, weight is lent to the idea that “day-to-day social and pedagogical practices need to be seen as possible spaces for future projects, of redefinition of the political dimension of our existence” (REIGOTA, 2008).

Socio-educational activities carried out in the communities of Maceió (Niterói, RJ) and Zumbi do Pacheco (Jaboatão dos Guararapes, PE) enabled setting up of a communication channel on risks associated to landslides involving a number of actors interested in the theme: residents, technicians and Civil Defence agents. Their final products are the result of such integration. One feature of these actions is that they were carried out in collaboration with residents, and not imposed by outside agents (public administrators), thereby practising proximity management, where all see themselves as agents of transformation of the environment in which they live with an end to reducing disasters.

Experiences with theatre, mock-ups, art, photography and lectures enabled formation of a communication channel which works as a further cohesive element in the areas studied. Noteworthy among activities in the Niterói community was the interactive mock-up, which enabled the grouping of different aspects into a single instrument, such as natural conditions, anthropic actions and indications of landslide imminence, along with the effects in the event of their occurrence, attracting the attention of workshop participants during the final project event.

It is also worthy of mention that the actions of *Nudec Jovem* in Jaboatão dos Guararapes have gained momentum through their continuity (seven years) and through the investments of municipal administrators in recognising the importance of preventive

actions and ongoing dialogue with the community as a means of reducing the effect of human actions and adverse events.

In summary, drawing on the contribution of all actors involved in the educational process, whose engagement is indispensable, environmental education provides, through activities such as those discussed herein, a new approach to tackling disaster risks.

Notes

- i Available at: <http://www.defesacivil.es.gov.br/conteudo/legislacao/default.aspx> accessed on 15/11/2013.
- ii These data were obtained through personal communication by members of the NGO Oficina do Parque.
- iii These events and their consequences are based on a field survey carried out by one of the authors of this article in the Community of Maceió. No bibliographical sources were found. This also applies to the Zumbi do Pacheco community (in item 3.2).

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ENVIRONMENTAL EDUCATION AS A STRATEGY FOR REDUCTION OF SOCIO-ENVIRONMENTAL RISKS

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Resumo: No Brasil, estudos no campo socioambiental mostram que a Educação Ambiental pode contribuir na redução de riscos de desastres (RRD) por colaborar para a construção da cidadania a partir da compreensão da situação de risco em que vivem populações vulnerabilizadas historicamente pelo processo de desenvolvimento. A partir de dois projetos de educação ambiental em áreas de risco do país, esta comunicação discute a vulnerabilidade socioambiental como processo de construção historicamente estabelecido o qual contribui para a consolidação da injustiça ambiental em áreas urbanas de grandes metrópoles brasileiras. Situados em Niterói (RJ) e em Jaboatão dos Guararapes (PE), os projetos analisados envolveram jovens e buscou motivá-los a participarem de atividades no sentido de levá-los a compreender e instigá-los a transformar a situação de risco em que vivem.

Palavras-chave: Vulnerabilidade socioambiental; Risco de desastres; Justiça ambiental; Educação ambiental; Cidadania.

Abstract: In Brazil, the socioenvironmental disasters show that the environmental education can contribute to the disaster risk reduction (DRR) strategy as it collaborates to the construction of citizenship through an understanding of hazard situation in which vulnerable population is faced to. Based on two projects of environmental education in landslide risk areas in Brazil, this paper discusses the social and environmental vulnerability as historically established process which contributes to environmental injustice in urban areas of large Brazilian cities. The studied projects, located in Niterói (RJ) and Jaboatão dos Guararapes (PE) cities, involved young people and aimed motivate them to participate in activities in order to get them to understand and change the risk situation in which they live.

Keywords: Socioenvironmental vulnerability; Disaster risk; Environmental justice; Environmental education; Citizenship.

Resumen: En Brasil, los desastres socioambientales muestran que la educación ambiental puede contribuir a la reducción del riesgo de desastres (RRD) por colaborar para la construcción de la ciudadanía, a partir de la comprensión de la situación de riesgo en el cual vivem poblaciones vulnerabilizadas históricamente por el proceso de desarrollo. A partir de dos proyectos de educación ambiental en áreas de riesgos del país, ésta comunicación discute la vulnerabilidad socioambiental como proceso de construcción históricamente establecido, el cual contribuye para la instauración de la justicia ambiental en áreas urbanas de grandes metrópolis brasileñas. Situados en Niterói (RJ) y en Jabotão dos Guarapes (PE), los proyectos analizados involucraron jóvenes y buscaron motivarlos a que participen de actividades con el objetivo de que comprendan la situación de riesgo en la que viven.

Palabras clave: Vulnerabilidad socioambientale; Riesgos de desastres; Justicia ambiental; Educación ambiental; Ciudadanía.
