

“Lenghten Life” Operation: Environmental Education, Citizenship and Preservation of Rio Preto

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Abstract

This work is the result of a project named “Lenghten Life”, developed since 2010 in São Benedito do Rio Preto, Maranhão, Brazil, involving the Association of Children and Friends of São Benedito and the Association of Young People of Alto Rio Preto. It is a socio-environmental action which promotes the preservation and revitalization of Rio Preto and its main tributary, Rio Mocambo, important sources of water for the population. The operation occurs in three stages: 1) 7 groups of youths performed the river cleaning, quantifying collected garbage, the situation of the streams (tributaries) and environmental crimes. 2) teams sensitized river dwellers on the importance of preservation, pollution dangers and deforestation of the banks, and cataloged extinct species. 3) Plantation and cultivation of native species. The participants volunteered, the action was financed by residents’ donation. In the first year, 132 volunteers participated, collecting 16,442 kilos of garbage and identifying 42 streams (21 “dead”, 09 precarious and 12 good). In 2016, there were 131 participants, the removed garbage reduced to 5,400 kilos, 4 dead streams were revitalized, 5 improved and the others continued with good fluency. Deforestation and predatory fishing decreased. The Project showed efficiency in preserving Rio Preto through environmental education.

Keywords: Lenghten Life, environmental education, preservation and revitalization of rivers, São Benedito do Rio Preto – MA (Brazil)

1. Introduction

The municipality of São Benedito do Rio Preto is located in the eastern Maranhão, Brazil (03°20’02”S and 43°31’40”W), and presents a total area of 931,592 km², population of 17,799 inhabitants and human development index (HDI) of 0.541 (Teles, 2007; IBGE, 2010 and PNUD, 2012).

The municipality is bathed by the Rio Preto, one of the main tributaries of the Munim River Basin. The river rises south of the municipality of Buriti, Maranhão, Brazil (03°56’42” S e 43°02’31” W) and runs about 230 km, bathing the municipalities of Buriti, Brejo, Milagres do Maranhão, Anapurus, Mata Roma, Urbano Santos, Chapadinha, São Benedito do Rio Preto and Nina Rodrigues. (Pressoti, 2008)

In São Benedito do Rio Preto, one develops, since 2007, the Project “Avante Camaradas” (Forward Camarades), a social educational program aimed to the young community, with the purpose of assisting the young people on the moral, social, spiritual and civic formation of good citizens, conditioning them to an adequate level of preparation in order to better how to face the difficulties (Rocha, 2007).

The Project Avante Camaradas is sponsored by non-profit public entities: Association of Children and Friends of São Benedito do Rio Preto (AFASB) and the Association of Young People of Alto Rio Preto (JUAP). It is developed by volunteer instructors

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(teachers) and all the resources undertaken come from spontaneous donations from people in the community.

The project is a basic course on citizenship and humanization, where the young people are taught on some basic Sociology, Anthropology, Health, Morals, Human Relations, Human Values, Citizenship/Politics, Environmental Education, Civic Duty, Philosophy and Arts (Music, Drama, Dance and Plastic), One verifies that after the end of the course, the young people are better prepared to live in society, feeling valued and valuing others, as a good citizen, knowing their rights and duties.

The degradation of the reserves of fresh water has been verified in many regions in the planet, as the Report on Human Development, elaborated by the Program of United Nations for Development – PNUD (2006), have already pointed out. Some of the reasons for this degradation are deforestation, the removal of riparian woods, the practicing of irrigated agriculture with the use of agrochemicals and the livestock without technical support, along with the expansion of the urban zone, domestic and industrial waste that are disposed in the environment in an inadequate way. (Bomfim et al., 2015)

The process of degradation of the springs of rivers and streams have been strengthened by factors as the suppression of vegetation, livestock activities, the use inadequate of the soil (compaction, and inadequate preparation), monoculture, inadequate irrigation and the overgrazing. This also interferes in the quality and quantity of water in a river basin (Kobiyama et al., 2008).

Like many other Brazilian rivers, the Rio Preto has also suffered greatly from the degradation promoted by man, in search of a development without any control.

In expeditions carried out by the authors, one notices several kinds of attacks resulting from the anthropocentric action to the river. In many of its springs, forests and riparian forests are almost non-existing, as they have been destroyed for the maintenance of agribusiness, as monoculture of soybeans and eucalyptus. There are also large dams, for fish farming, built in the place that have already been riverbed. One can also perceive the action of small producers, such as family farmers, “caieiras” (charcoal production) and rudimentary football fields built on the river bedside that agonizes in the face of this reality.

According to Braga and Rebouças (2017), the main environmental impacts regarding Brazilian rivers, as a consequence of unsustainable activities, are: elimination of the buffer zone between terrestrial and aquatic ecosystems, increase of particular material suspended in the water, disappearance of riparian or neighboring forests and habitats for aquatic fauna, significant changes in the composition of sediment of aquatic ecosystems.

In this participative management of water resources, the community needs to act in a conscious way in taking decisions, being then important the knowledge, the change of attitude and the environmental conscience. In this sense, environmental education acts as a field of pedagogical action for the training an awareness of people in the intervention and transformation of local reality through community participation (Oliveira, 2008).

In this sense, strategies should be based on the recovery and preservation of water bodies, especially of the sources, and the community can contribute in the protection and environmental preservation with the elaboration of self-sustaining development depending both on the attainment of scientific knowledge and on its publishing to the general public (Rogério, 2017), as human actions that interfere in natural cycles and in

the availability of good quality water have compromised the sustainability of water resources (Tundisi, 2003).

Sources have been the aim of many studies in Brazil (Ferreira et al., 2009; Soares et al., 2010; Koperski et al., 2011, Fry et al., 2012; Mora et al., 2013; and Bomfim et al., 2015), but they are rare when one deals with rivers in the State of Maranhão and studies about the Rio Preto basin have not been found.

In face of this reality, there is the need of plans for the revitalization of the Rio Preto, as well as its main tributary, the Rio Mocambo. One understands that this mobilization should come from the community itself, once in Brazil the National Policies of Water Resources (Brasil, 1997) is based on the grounds that water is a public domain good and its management should be decentralized and count on the participation of the Public Power, users and communities,

Concerned about pollution and depredation of the Rio Preto and its largest tributary, the Rio Mocambo, since 2010, JUAP, in a partnership with the “Avante Camaradas” Project and the AFASB, promote the Social Action “Lenghten Life”, a socio-environmental project that aims the revitalization of the lower section of the Rio Mocambo and the middle section of Rio Preto.

This project aims to promote a joint social action among the residents of the municipality involving the maintenance, preservation and revitalization of the bed, the banks, the riparian forests (ebb) of the rivers Preto and Mocambo, from the city of Urbano Santos until São Benedito do Rio Preto and bring information to the riverside population about the importance of this preservation of river banks and their streams.

2. Methodology

2.1 Planning and Preparation

The project was developed in two parts: the planning or preparation, and execution or action itself. The first part, the preparation of the action, was carried out in three stages.

In the first stage, a precursor team made the preliminary recognition of the itinerary in the beds and banks of the river to be preserved, in order to map the route and make a constant report of a movement map of the action, which detailed the expenses with the operation, the possible risks that the teams could run and the objectives to be achieved.

In the second one, with the first stage report, the action itself was elaborated and partnership were sought with people and institutions in order to allow its execution. In the third and last stage, an expedition was created, properly activated and prepared to execute the Action in three phases, according to methodology and structure planned.

All the groups are directly subordinated to “Lenghten Life” Action Comission formed by member of AFASB, JUAP and the Central Center of “Avante Camaradas” Project, using as “headquarter” the headquarter of the Public Employees Union of São Benedito do Rio Preto (SINFESP).

2.2 Execution or Action itself

After the preparation part, the second part of the action was performed, which was developed in three phases, as described below:

2.2.1 Maintenance

In this phase, the collection of the garbage in the bed and the banks of the river was carried out. The garbage was collected, packed (in nylon bags of 60cm x 90cm) and transported. The expedition was divided into 7 groups, being 1 support group and 6 working groups (WG), distributed along the route in strategic points. Each WG, formed by at least 15 people, was divided into 4 subgroups (WS). The WS – 01, formed by 6 people, was responsible for collecting the garbage found on the river bed and divided into two teams (one on each side of the river), with 3 people each – 2 collecting garbage and the other carrying it.

Subgroups 2 and 3 were responsible for collecting garbage from the river banks (one on the right bank and one on the left) and consisted of three people each, two collecting and the other carrying the garbage. The subgroup 4, composed of 5 people, was in charge of transporting the bags full of garbage collected by the other three subgroups.

The organization of each WG can be verified in table 1.

Table 1. Organization and distribution of volunteers in the working groups and subgroups

WG (17 people)	WS-01 (6 people) Cleaning the riverbed	(3 people) Right side	2 people Garbage collector
			1 person Carry garbage
		(3 people) Left side	2 people Garbage collector
			1 person Carry garbage
	WS-02	(3 people) Right bank of the river	2 people Garbage collector
			1 person Carry garbage
	WS-03	(3 people) Left bank of the river	2 people Garbage collector
			1 person Carry garbage
WS-04	5 people Trash from ws-1, 2 and 3		

Each working group, as well as each subgroup, received a specific name, in allusion to something related to the river reality, place or nature, as shown on table 02.

Table 2. Notations, names and routes of the working groups and subgroups

Working Group	Route	Departure	Arrival	Working Subgroups
WG-1 (Mocambo)	5 km	Urbano Santos	Bandeira	WS-1 (Jacaré) WS-2 (Paca) WS-3 (Lontra) WS-4 (Piaba)
WG-2 (Bandeira)	15 km	Bandeira	Baixa Grande	WS-1 (Corubeira) WS-2 (Grão de Galo) WS-3 (Paciência) WS-4 (Mofumbo)

WG-3 (Baixa Grande)	14 km	Baixa Grande	São José	WS-1 (Água) WS-2 (Terra) WS-3 (Lama) WS-4 (Lodo)
WG-4 (São José)	13 km	São José	Marçal	WS-1 (Árvore) WS-2 (Folha) WS-3 (Tronco) WS-4 (Raiz)
WG-5 (Marçal)	7 km	Marçal	Pau Quebrado	WS-1 (Limão) WS-2 (Laranja) WS-3 (Lima) WS-4 (Tangerina)
WG-6 (Pau Quebrado)	4 km	Pau Quebrado	Sinfesp	WS-1 (Socó) WS-2 (Garça) WS-3 (Pavão) WS-4 (Jaçanã)

All the six working groups began their activities at 07:00 am and finished between 11:00 am and 12:00, at the time that the transportation team picked up people and collected the garbage at a specific point for each group. People were taken to SINFESP headquarters, where they all had lunch and rest, and where the garbage was stored in a reserved place.

The seventh working group (WS-7), **Support Group**, worked to assist all the participants in the project, divided into specific teams: 1st **FOOD**: composed of 12 people, provided food to the expedition operators, snack in the morning, lunch and snack in the afternoon; 2nd **HEALTH**: formed by 6 people, one in each WG, is responsible for providing first aid; 3rd **TRANSPORTATION**: formed by 12 people, being three drivers with vehicles and nine auxiliaries to make the transportation of the people and the garbage; and 4th **PRESS**: formed by 7 people who made the communication between the groups and the command of the Action, as well as the registration of the Operation, in videos, images and testimonies. After lunch and rest, at 2:50 pm, all the components from all WG followed the final route of the river, between SINFESP's headquarters and the main bridge in the city, a distance of approximately 3.5 km, following a new restructuring in which four great teams are formed, as detailed below.

The first team, made up of all components of the riverbed teams, divided into two groups, Delta Group and Eco Group, with 18 components each, which were divided into trios, two for the collection and one for the transportation of collected garbage. The first group cleaned the left side and the second the right side of the river.

Following the same configuration, the second team was responsible for collecting the garbage on the banks of the river, the Banana Group on the right bank and the Bigode Group on the left bank.

The third team, made up by the 30 components that were responsible for the transportation of the collected garbage since the beginning of the Operation, kept up with this task at in the final stage of the process.

The transportation team continually picks up the trash to the cars and transports it to the storage location. All the collected garbage is transported to the same place and delivered

to the local Power, and then to the final destination, which is responsibility of this power.

This project has already been carried out in six annual editions, from 2010 to 2016. In this article, we will cover the results of the 2010, 2011, 2015 and 2016 editions.

3. Findings and Discussion

In the first phase of the first edition of the project “Lengthen Life” Operation, in 2010, it was collected 16,442 kilograms of garbage from the bed and river banks of the river, being plastic bags the predominant type of waste, followed by PET bottles, clothing, shoes (trainers, shoes and sandals), as well as other types of garbage, such as: PVC chairs, disposable diapers, motorcycle and bicycle tires, Styrofoam, metal containers (sprays, sardine cans and other kinds of food), iron, aluminum and steel frames.

The greatest obstacle found by the volunteers was the difficulty in transporting the garbage collected because the river level was low.

One identified, along about 61 km of river, 42 streams that feed the rivers, of which only 9 were in normal water volume, 9 were in precarious situation and the other 21 were dead, that is, without water.

The teams also detected many environmental crimes, as “caieiras” charcoal production made on the banks of the river, using the wood from the riparian forests as raw material. Fields of stump (small family farms) were also found on the banks of the rivers, which probably contribute to the extinction of some springs, since this type of crops deforests and burns the vegetation in the preparation of the soil for planting.

One founded yet many dredges for removing sand and stones from the riverbed, which causes deforestation, erosion, fuel leaks to the river, as well as the roads that were built on the banks of the river so that the removal of these sand and stones could be possible. Another environmental crime detected was a considerable number of “coivaras”, name given to a kind of fishing done by cutting trees along the river banks, so that the branches and leaves of the plant are attractive for fish, which, after some time, are captured by using nylon nets.

At the end of this first phase of the edition of the “Lengthen Life” Operation, many volunteers expressed their concern about the risk of contamination of the waters of these rivers, as well as the reduction water volume or even their extinction.

In the second phase of the first edition of the “Lengthen Life” Operation, a team of 26 volunteers visited basic education schools to bring information about the results of the Operation and Environmental Education, highlighting the importance of preserving the Preto and Mocambo Rivers for the current and future generations of the community of which they are part.

Days later, 32 agents visited the local FM radio and 817 homes in the vicinity of the Preto and Mocambo Rivers, bringing this information to the residents. One estimates that the action has reached about fifteen thousand people in this edition.

These teams also surveyed species that became scarce or disappeared from the region. According to residents’ testimony, no alligator can be seen in the region of Rio Petro, which may justify the proliferation of piranha carnivorous fish. The birds “jaçanã”, “socó-boi”, heron, spring and true “sabiá” are rarely seen today, but have been very

frequent in the region.

In 2011, the first phase of the second edition of the “Lengthen Life” Operation was executed when one noticed a considerable decrease in the amount of garbage removed from the riverbed and river banks, 4,774 kilograms. From this total, more than 40% were taken from an urban stretch, with about 400 meters, within the municipality of São Benedito do Rio Preto.

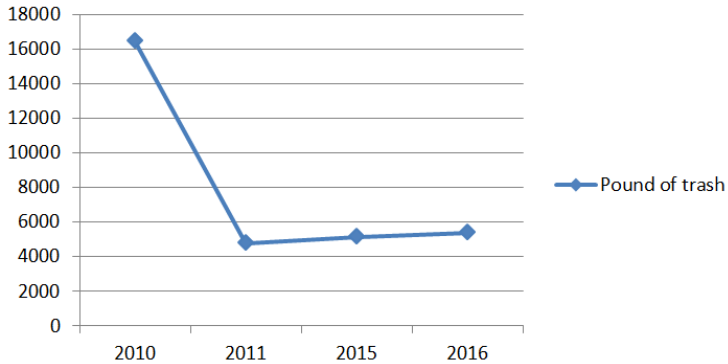


Figure 1. Mass of litter collected from riverbeds and river banks, in kilos

Regarding the streams, from the 9 that were found in a precarious situation, 3 returned to flow normally; from the 21 that were dead, 9 began pouring water timidly at a certain time of the year. Thus, out of 42 streams, 12 were dead, 15 in a precarious situation and 15 were flowing well.

Except for the route between the Marçal and Pau districts, one verified deforestation in all the other stretches of the river, but dredges were not noticed in this edition of the project, although there were still signs of destruction caused by them. There are still lots of “caieiras”, but in a lower number comparing to the previous edition of the project. One cannot notice either any predatory fishing by using “coivaras”.

One estimates that the second phase of this edition of the Operation, from 2011, should have reached about 6 thousand people.

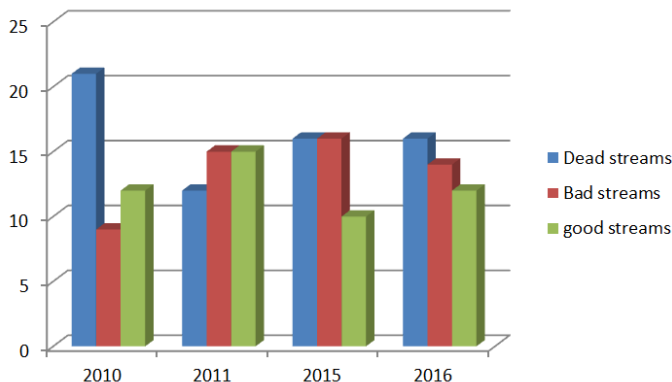


Figure 2. Situation of the tributaries of the Preto and Mocambo rivers

The sixth edition of Operation “Lenghten Life”, from 2015, obeyed the same standards of the previous ones. This time, the total amount of garbage collected from the riverbed and riverbanks was 5,160 kilograms, the qualities of which are the same as in previous editions. At the time of the action, from the 42 streams, 10 flowed well, 14 in a precarious situation and 16 were without water. Environmental crimes were also perceived to a lesser extent, and the deforested area was only observed in the vicinity of very populated areas, as the center of the city. “Caieiras” on the banks of the rivers, practically were not detected, and the fishing by using “coivaras” still exists, however in a very small proportion.

The seventh edition of “Lenghten Life” Operation occurred in 2016, where 5,400 kilos of garbage from the river bed and banks were removed with the same features of the garbage removed in previous years. No dredges on the route, but the presence of “coivaras” and “caieiras” are still verified, in a few amount, though. Deforestation still exists but in a lower scale and especially in the vicinity of the urban areas.

As it can be seen from the data presented and on Figure 1, there was a significant decrease in the amount of garbage collected from river beds and banks, which highlights the importance of the “Lenghten Life” Action project, which through environmental education seeks to raise awareness and inform the population. Actions like this need to be valued as, certainly, these results contribute to the gradual depollution of rivers, environmental awareness and improvement of the health and quality of life of the residents (Silva and Nogueira, 2014).

The results shown on figure 2 show that the situation of the streams that feed the rivers also improved significantly during the period of the action, due to the information and awareness given to the population by the volunteers of the project. As shown by Trovão, Presznhuk and Brandani (2014), the sharing of information experienced by society show the socio-environmental problems, and people tend to exercise, in an effective way, the social control, working and searching for partnership with public and private institutions for better quality of life.

4. Final Considerations

Over the times, it has been observed that the situation of the waters of the Rio Preto, main source of water for the population of the municipality of São Benedito do Rio Preto, Maranhão, Brazil, has become worse, both in terms of quantity and quality. The low levels of these waters reached increasingly worrying values in the dry season and the rates of degradation and pollution of the river is also a reality.

With the intention of reversing or decreasing the effects of this degradation, the civil non-profit organizations JUAP and AFASB, as well as the egresses from the “Avante Camaradas” Project, develop since 2010 the socio-environmental project “Lenghten Life” Operation, which has showed efficiency in the preservation and revitalization of this river and its main tributary, the Rio Mocambo.

During this period, it was possible to verify that the amount of garbage discarded on the riverbed and river banks, as well as the predatory fishing, deforestation and extraction in the rivers and neighborhood decreased in the stretches in which the action takes place. Lot of springs that had already dried up, returned to pour after the operation.

This shows that the awareness of the community by the voluntary operators of the Action has given results, showing that it is possible to change the reality, reverse predatory destructive actions and even raise awareness through the practice of environmental education.

However, one can also conclude that this is not a reason for full celebration, since, even though it is characterized as environmental crime, according to Brazilian legal norms, practices such as deforestation, non-biodegradable waste disposal, predatory fishing and extraction in these rivers have been a constant during that period, without the proper authorities taking measures to ensure the preservation of these rivers.

5. Future Perspectives

In face of the editions already made of “Lengthen Life” Operation, one understands that for the next editions it is interesting the following adaptations / innovations, seeking to optimize the expected results in maintenance and revitalization of the Rio Mocambo and the Rio Preto:

- Search for partnership with people and institutions of the neighboring municipalities in order to give more efficiency to the works already carried out in the Operation and to extend the extension of the rivers benefited by the project;
- Identify and separate the different types of solid waste collected from the riverbed and river banks in order to better use them in post-collection stages;
- Establish partnerships with institutions with expertise in the area of waste recycling, to collaborate with the project and, in return, to benefit the waste collected during the operation; and
- Establish partnerships and celebration of agreements with public and private institutions to seek financing for the project, as well as for the actions of permanent preservation of the rivers.

6. Acknowledgements

The authors of this work thank all the volunteers and coordinators of “Lengthen Life” Action, on behalf of JUAP and AFASB entities, for the opportunity and for sharing information. They also thank IFMA, The City Council of São Benedito do Rio Preto – MA and FAPEMA, for the institutional support.

References

- Bomfim, E. O. Gadelha, C. L. M. Figueira, H. J. A. Amorim, J. F. Amorim, D. da S. (2015) Sustentabilidade Hidroambiental de Nascentes na Bacia Hidrográfica do Rio Gramame no Estado da Paraíba, Brasil. *Sociedade & Natureza*, 27 (3), 453-468.
- Braga, B.; Rebouças, A.C. (2017). *Capital Ecológico. Uso e Conservação*. Retrieved from http://ambientes.ambientebrasil.com.br/agua/artigos_agua_doce/impactos_recuperacao_e_conservacao_de_ecossistemas_aquaticos.html.
- BRASIL (1997). *Lei n. 9.433*, de 8 de janeiro de 1997. Retrieved from http://www.planalto.gov.br/ccivil_03/leis/L9433.htm

- Ferreira, M. J. Pereira, I. M. Botelho, S. A. Mello, C. R. de. (2009). Avaliação da regeneração natural em nascentes perturbadas no município de Lavras, MG. *Ciência Florestal*, 19(2), 109-129.
- Fry, L. M. (2012). Climate change and development impacts on the sustainability of Headwater-fed water supply systems in the Alto Beni region of Bolivia. *Journal of Hydrology*. 468-469, 120-129.
- Instituto Brasileiro de Geografia e Estatística – IBGE. (2010). *Censo 2010*. Retrieved from <http://www.censo2010.ibge.gov.br/sinopse/index.php?uf=21&dados=1>
- Kobiyama M. Mota, A. A. Corseuil, C.W. (2008) *Recursos hídricos e saneamento*. Curitiba: Organic Trading.
- Koperski, P. Dumnicka, E. Galas, J. (2011). Abiotic parameters determining fauna composition in karstic Headwaters. *Polish Journal of Ecology*. 59(1), 153–163.
- Mora, M. A. Grant, W. E. Wilkins, L. Wang, H-H. (2013). Simulated effects of reduced Headwater flow from the Edwards Aquifer on population size of the fountain darter (*Etheostoma fonticola*). *Ecological Modelling*, 250, 235-243.
- Oliveira, M. B. de O. (2008) *O papel da Educação Ambiental na Gestão dos Recursos Hídricos: caso da Bacia do Descoberto/DF* (Master's dissertation, University of Brasília, Brasília-DF). Retrieved from <http://repositorio.unb.br/handle/10482/3693>
- Pressoti, A. E. P. *Avaliação de Impactos Ambientais da Sojicultura em um Ecossistema Aquático na Microrregião de Chapadinha - MA*. (Master's dissertation, Federal University of Maranhão, São Luís). Retrieved from http://bdtd.ibict.br/vufind/Record/UFMA_84bcdb3c6f5fde317648cf051fb47f70/Details
- Programa das Nações Unidas para o Desenvolvimento – PNUD, Instituto de Pesquisa Econômica Aplicada – IPEA, & Fundação João Pinheiro - FJP. (2012). *Atlas do Desenvolvimento Humano no Brasil 2013*. Retrieved from http://www.atlasbrasil.org.br/2013/o_atlas/idhm
- Rocha, A. da P. (2007). *Projeto Avante Camarada* (Project). São Benedito do Rio Preto-MA.
- Rogério, P. M. (2017). *Caracterização Revitalização da nascente da biquinha no bairro Bromélias*. Retrieved from www.meuartigo.brasilecola.com.br.
- Silva, S. A. da. Nogueira. P. C. (2014). Programa de Limpeza, Recuperação e Conservação dos Córregos e Rios no Município de Barra Mansa. ICTR 2014, Florianópolis. Retrieved from <https://www.ipen.br/biblioteca/cd/ictr/2004/ARQUIVOS%20PDF/05/05-040.pdf>
- Teles, R. de M. *Comunidade de Picos em São Benedito do Rio Preto-MA: Identidade Étnica da Comunidade Camponesa em Busca de Reconhecimento como Comunidade Quilombola*. Monografia (Pós-Graduação *lato sensu*). Centro Federal de Educação Tecnológica do Maranhão. São Luís, 2007.
- Tundisi, J. G. (2003). *Água no século XXI, enfrentando a escassez*. São Carlos, SP: RIMA.
- Trovão, A. C. R. Presznhuk, R. A. de O. Brandani, J. G. (2014, May). *Sustentabilidade: da escola ao rio*. Paper presented at the IX Simpósio Internacional de Qualidade Ambiental, Porto Alegre-RS.