

# Chapter 8

## Education for Sustainability of Water Resources

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**Abstract** In this paper we present an analysis of fundamental aspects to contextualize the environmental education as an essential component to discuss water resources sustainability. First, we point out historical factors concerning the establishment of Environmental Education in Brazil, underscoring water resources in projects, programs and public policies. After that, we discuss social and institutional factors associated with water resources and their interface with environmental education, in reference to the National Policy and Plan for Water Resources (Política e Plano Nacional dos Recursos Hídricos), the National Policy for Environmental Education (Política Nacional de Educação Ambiental) and the National Curricular Guidelines (Parâmetros Curriculares Nacionais). Within the academic context, we present quantitative and qualitative data from research in the field of environmental education, particularly research projects that focus on water resources, indicating their trends and perspectives in knowledge production on a national level. Finally, we suggest perspectives for a critical environmental education and highlight ways under which the approach underlying pedagogical practices and textbooks can be identified, mainly concerning the core concept of river basins that allows a systemic analysis of problems associated with water resources. These suggestions are based on the premises that environmental education may be an important tool to empower participatory management and knowledge exchange, and that this systemic and interdisciplinary approach should be a consistent component of pre-service and in-service teacher education programs.

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## Introduction

The UN's General Assembly declared in December 2002, that the period of 2005–2014 should be considered the Decade of Education for a Sustainable Development, under a global coordination and implementation by UNESCO.

Among the objectives of the program of the Decade, are the reorientation and the revision of the educational programs, from preschool to university, including the development of knowledge, abilities and values regarding sustainability; considered important for current and future societies.

This same document considers one of the challenges of the Decade, or EE as the educational component focused on restoration and environmental protection is internationally referred be going beyond environmental education.

Although the proposition for a sustainable development might be seen as pertinent, as per certain aspects and context according to Sauv  (2005), it is no longer possible to not consider the utilitarian concept of education and how it represents the resources of the environment, encompassed within this model. For some educators, UNESCO'S proposal is throwing out a social and political perspective which is already well set up within the progress of environmental education (Gonz lez-Gaudio 2007). Considerations like these reinforce our understanding that the analysis of these occasional transitions cannot be made without taking into consideration the history of EE in Brazil in the last 50 years, which was a crucial period of environmental crises.

Without ignoring the fundamental role which environmental movement has historically developed and continues to develop with regards to environmental education, the first specific programs of activities destined to protect the environment, come from initiatives of teachers of elementary and middle schools, in some cases, assisted by university professors. As an example, in the 1950s students and teachers of a High School had the objective of discussing and forbidding pollution caused by the dumping of fermented sugarcane bagasse being thrown into the Piracicaba river by alcohol and sugar mills.

In Rio de Janeiro, the preoccupation with the environmental impacts of the urbanization process could already be noticed in a book published in 1958 when the author wrote “beaches where pioneer vegetation should exist being substituted by walls of stone or by the proliferation of vegetation made up of grass and plants substituting native plants” (Santos 1958).

In the decade of the sixties, reflecting the world's situation mid Cold War, projects were developed for schools with the objective of updating contents and graduating scientists, making a considerable contribution towards the teaching of science. In these projects, aspects related to the environmental impacts and their consequences were greatly focused upon. The scientific societies, as for example the American

Institute of Biological Sciences, with the support of the government, produced the so called first generation of projects like the Biological Science Curriculum Study (BSCS). This project was originally produced in the USA, who already focused on the reciprocal relationship between organisms and the environment analyzing what man has done with and to the environment, creating the need for conservation and introducing ecology into the curriculum.

The addition of Ecology as a subject in universities, greatly contributed towards the expansion of the EE programs. As a theme of the Biology curriculum of high schools, it exemplifies the scientific progress which enabled the development of more precise methods for measuring the physical environment, for characterizing organisms physiologically and genetically, for creating models to simulate ecological situations, and to perform studies on relationships of organisms of an ecosystem, among others.

Since that time, one did not intend to restrict environmental issues to biologists, for they could not be confined to one subject alone, and should percolate the entire curriculum and consider the consequences of environmental changes caused or not by humans. The environmental crises of the 1970s, which involved political, social and economic aspects, demolished the belief that science was the panacea to solve the problems of humanity, and influenced the educational programs on environmental education. By the beginning of the 1980s the topic permeated lower schools and Teacher Training Centers, in the area of Science, were created in São Paulo, Rio de Janeiro, Salvador, Belo Horizonte and Porto Alegre.

In this phase, the Teacher Training Center of São Paulo prepared a Project for the teaching of Science in the fifth to eighth grade,<sup>1</sup> in which aside from dealing with issues related to ecological and environmental problems (i.e. trash, water pollution, energy), it also suggested modifications to the pedagogical strategies recommending games, debates, lab experiences, etc. to lead students away from being passive and memorizing content, which is common in science courses. Several of these activities are used up until today by teachers and authors of academic books.

From this context, and influenced by several international movements such as UN conferences like the “First UN Conference on Environment and Development” held in Stockholm, Sweden, in 1972; the Belgrade Congress held in 1975, in which its final document determines the goals and principles of EE; the Ybilisi-Georgia Conference held in 1977, which established the guiding principles of EE and reinforces its interdisciplinary nature, and defines it as critical, ethical and transforming; the second UN conference on Environment and Human Development, held in Rio de Janeiro in 1992; and through initiatives of the Ministry of the Environment and the Ministry of Education among other institutions, that several strands of work have been opened, catalyzed by public policies and initiatives from schools, the media and organizations.

At the same time, universities started to perform researches, within their post-graduation courses, to analyze objectives, conceptions, values and meanings of Environmental Education, not only within the school, but extracurricular as well. Table 8.1 below, contextualizes evolution in various phases. It is important to observe

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<sup>1</sup>“Ciências Ambientais para o primeiro grau”, of 1982, under the responsibility of SEPS/PREMEN/FENAME.

**Table 8.1** Main aspects of the evolution of environmental education in Brazil

Period	1950–1970	1970–1990	1990–...
World situation	Cold War	Social and economic crisis	Technologic competition. Globalization.
Brazilian situation	Industrialization	Dictatorship	Democratization
Education objectives	Formation of scientists	Formation of working citizens	Formation of engaged citizens
Environmental Education Objectives	Ecology	Nature conservation.	Sustainable development.
		Sustainable development.	Sustainable societies.
Main methodology	Transmission of knowledge	Games, debates, laboratory	Government projects.
			Study of the environment acting in the community.
Social actors	Environmentalists and teachers	Environmentalists and teachers	Environmentalists, teachers, entrepreneurs, media, etc.
Conferences and documents	Silent Spring—Rachel Carson	Tbilize Belgrade	Rio 92
	Rome Club	ONU 1971	Rio+ 10 Environment Education Conferences I, II, III and IV
Public policies	Support to projects of Centers of Science by MEC	Sparse in some environment legislation and presence in the 1988 Constitution	Laws, resolutions, and proper curricular proposals
Main Environment Education conception	Conservative	Pragmatic	Pragmatic and critical
Research	Projects evaluation	Projects evaluation, research	Post-graduation in the universities

that in this summary only the predominant trends were included, and that in many cases they overlap and coexist depending on the policies, values and current conditions.

Today it is possible to identify an ample scope of initiatives that reflect the interest and the worries causes by the current environmental situation, and the role of education in this needed transformation. The governmental agencies try, at several levels, to implement public policies by means of mechanisms of control, publications, and continuous programs for qualification of teachers and community leaders. Without a doubt, research today plays an important role in analyzing the causes and consequences of environmental problems, and education is concerned in preparing well informed citizens who will take action towards seeking change.

It is interesting to observe, however, that some issues have occupied a place of prominence in the projects and environmental education programs, and among those, undoubtedly, the so called water resources. This fact which can be observed in our country as well as in foreign countries can without a doubt be explained due to the significance of this element of nature in the processes of maintaining life on Planet Earth, and probably because of the levels of impacts in the bodies of water caused by human activities as well. This concern, which is reflected in the proposals for environmental education in our country, can possibly explain the attempts, in terms of public policies, of providing an integrated approach to the several and complex dimensions involved in the management of the issue called water.

## **Social and Institutional Aspects of Water Resources and Their Interface with Environmental Education**

The process of institutionalization of the water resource systems is based on historic background of the legislation, which reached its peak with the passing of Law number 9433/97, dealing with the National Policy of Water Resources, and, in accordance with the discussions held in several international conferences about the subject, adopted an integrated and participatory management system of the waters.

Supplement to this policy, in 2006 the federal government proposed to strengthen it by means of a National Plan of Water Resources, aiming at improving the integrated management system in the country. Among the critical issues and challenges, the policy highlights that the consolidation of a participative management requires a systematic process of education and cooperation among the agents and the public and private actors, as well as dedicating effort towards the qualification of the participants within the system, including the qualification of new professional profiles and consequently the adaptation of the curriculum (Brasil 2006).

However, the connection with education is presented in quite an incipient way in this plan. Upon analyzing the coordination of the integration of Water Resource Policy with other correlated public policies, the document does not mention the public policies related to education, even though it includes other areas of extreme relevance such as health, sanitation and energy.

Although even without including it in this coordination, the plan has one of its sub-programs (that is part of the IV Program, Technological Development, Qualification, Communication and Spreading of Information on Integrated Management of Water Resources) that deals with “Qualification and Education especially Environmental, for Intergrated Management of Water Resources” and has as its main scope, the perspective of qualifying multiple agents, for different target audiences, so that the National Policy of Water Resources is spread throughout the country. However, it emphasizes that, with regards to environmental education, its development will remain restricted to themes and methodology which concern GIRH, maintaining execution decentralized from the states and the water basins, taking into consideration the basic guidelines of Agenda 21, of the Environmental Education for Sustainable Societies Treaty and the Carta da Terra (Brasil 2006).

This way, despite not having a partnership with public policies, and without an implementation strategy, EE is still considered to be a tool for the strengthening of a participative management of water resources.

With a participative management qualification in mind, the Environmental Education for Sustainable Societies of Global Responsibility Treaty, signed during the Rio-92, highlights the permanent nature of environmental education in the goal towards building socially fair and ecologically sustainable societies. Several principles of the treaty supply elements that lead towards a collective participation in the management processes, such as those that indicate that environmental education should be planned in order to qualify people to solve conflicts in a fair and human way, as well as promoting cooperation and dialogue among individuals and institutions, with the objective of creating new ways of life based on meeting everyone's basic needs.

Specifically about the curriculum, the National Curricular Parameters, edited by MEC as of 1996, refer to the environmental issue as a transversal theme. In one of the chapters, called "The Cyclical Characteristic of Nature", water is used as an important axis to study the idea of cycle. Some of the topics proposed, address the understanding of the physical and socioeconomic factors; the understanding of the concept of watershed, identifying the school's location within that basin; the issue of water and its history; knowledge about oceans; the use of water in different cultures and the waste of water by industrial societies. This proposal has the objective of supplying subsidies to students to advocate changes in the management of this natural resource, guiding towards sustainability and the development of coherent personal attitudes (Brasil 1998).

The National Policy of Environmental Education, established by Law number 9795/99 considers environmental education to be "a process in which the individual and the group builds social values, knowledge, abilities, attitudes and skills aimed towards the conservation of the environment and of common use assets, essential to a healthy quality of life and to sustainability". This concept of environment as being an asset or a resource despite not being consensual among environmental educators is similar to what is adopted by the National Policy on Water resources, and reflects the understanding of the Brazilian Constitution of 1988.

It is important to highlight that the understanding of watersheds and watershed committees, are crucial to the policies and actions which are currently being implemented in Brazil, and particularly in the State of São Paulo.

As an example of the importance that understanding the concept of river basin represents to EE, the São Paulo Network of Environmental Education, which started as of the Rio-92 conference, is composed of people and institutions who develop EE activities and who are considered as links of the network. The links are organized according to river basins or UGRHIs, Units of Water Resource Management. REPEA has the objective of coordinating, in other words, of working together in order to strengthen Environmental Education in the State of São Paulo.

As it was emphasized, the basins are stages of natural and social processes, seeing that, although they are characterized by physical factors, they are influenced by human occupation and by the actions of several social groups who live there.

However, upon analyzing continued education and all the support material, one can observe that the concept of watershed is still very far from professors and academic books. The issue of water is frequently dealt with through the behavioral aspect related to economy and to the rational use in homes, without a greater context of understanding of the social and historical relationships which occur within the basin where they are found (Otalara 2008). It is important that the qualification processes of environmental education, emphasizes that there are no isolated problems; they are all part of a network that constitute a chain of successive events. Upon analyzing projects for environmental education under the perspective of management of water resources, Bustos (2003) highlighted that, according to the current legislation, the search for solutions is no longer the exclusive responsibility of experts, it now encompasses the participation of citizens, the integration of the socio-environmental problems and the qualification of partnerships which are crucial to the participatory management process. In this aspect, environmental education takes on an irreplaceable nature.

For any environmental education Project, the diagnosis of the local situation, including social, cultural, natural and historical aspects, among others, becomes essential, seeing that there are no models of EE which adapt to all situations. The inclusion of the topics water resources and environmental education in laws, decrees and curricular programs do not in itself guarantee an effective coordination in schools and within the communities. Considering the public nature and the equal rights over natural assets granted by the constitution, water, similar to the majority of the issues related to the environments, is liable to conflicts. An Environmental Education, in its critical perspective, should provide qualification elements for a person to not only be able to identify the extent of the conflicting relationships, but also to be able to have an opinion about them (Carvalho 2004).

These conflicts are reflected in the current water crises, which, as indicated by Tundisi (2008), has local, regional, continental and planetary dimensions, contributing towards the increase and exacerbation of the contamination of sources; altering the sources of water resources — watersheds — with scarcity and decrease of availability; the increase of human population's vulnerability due to contamination and the difficulty to access quality water; and the interferences to public human health, with the deterioration of quality of life and of the social and economic development. The author emphasized the central focus of water resources with regards to energy, production of food, sustainability of biodiversity and global changes. We further emphasize the historical importance of the issue of water resources not only in defining public policies related to environmental issues but also for environmental education.

## **Environmental Education and Water Resources: The Context of the Research**

Actually, issues related to water, water resources, river basins or watersheds have been the most focused upon by historic preservationist and conservationist movements, being, even in current times, the central focus of discussions or proposals of

policies related to environmental protection (Millenium Ecosystem Assessment 2005, Sutherland et al. 2006, 2009).

The same process can also be observed when dealing with environmental education research, in other words, researches which aim at analyzing and understanding environmental education processes. Several researches discuss these processes related to water resource, as can be seen through a simple search through CAPES' Dissertation and Thesis Files. By searching the key words "Environmental Education" one will find over 2600 Master thesis and PhD dissertations. The context of the research of environmental education has shown an amazing scenario in some aspects. Some authors have brought our attention to the staggering growth in this area. It is interesting to observe that, although the so called greening process of society is fairly recent, with the development of practices within the so called environmental education, the work we recently performed aiming at defining a panorama of this production in our country, indicating certain tendencies in the area and identifying some of their dilemmas, are according to our evaluation not at all different from those identified in our research on education in our country (Carvalho et al. 2009). Anyhow, it becomes quite evident, in a numerical point of view, the staggering expansion based on the number of dissertations and thesis related to environmental education developed in the different programs of the national system of post-graduation (Fracalanza 2004; Fracalanza et al. 2005).

A search on the crossing of the words "water" and "environmental education" identified 353 documents, which corresponds to 13.5% of all thesis and dissertations written, related to environmental education, in the several post-graduation programs of the country. Crossing the word with "water resources", we reach a total of 135 documents, which represents 5.19% of the total of thesis and dissertations. These numbers are significant, at least in a numerical point of view, when one considers the diversity of the themes within environmental issues. Another quite interesting data is that today, there are 103 research groups registered in the Directory of Research groups of CNPq, that in some way incorporate the subject "environmental education" and water within the lines of their research. The efforts of the academic community are evident, in the sense of strengthening the field of research in environmental education and in spreading the knowledge acquired through researches. Thanks to the coordination of researchers, it was possible to put together a study group in 2003, together with the National Association of Post-Graduation in Research and Education (ANPED)—an association acknowledged as being a representation of the area not only by the institutions who work with research in environmental education in Brazil, but also by researchers in the field of education. In 2005, the study group became a work force, which is today known as GT-22 "Environmental Education" together with ANPED that in their annual meetings, gather several research groups of environmental education to discuss the works of the area and the paths for post-graduation and for research in education in the country. It is also worth mentioning the creation of the GT of Environmental Education in the National Association of Post Graduate and Research in Environment and Society (ANPPAS) who, similarly, deal with Environmental Education research. In several scientific meetings held in our country, there are several works done on environmental education, and in several of



these events, work groups are organized to discuss the tendencies and the perspectives on several dimensions of environmental education. With regards to scientific events, it is worth highlighting the joint effort of several research groups linked to three public universities of the State of São Paulo (UNESP/Rio Claro, UFSCar, USP/Ribeirão Preto) in proposing and organizing the Meetings on Environmental Education Research (EPEA), previously mentioned, which has been occurring since 2001 and had its fifth meeting in the end of October 2009.

With the objective of seeking a closer interaction with the researches on environmental education that has dealt specifically with the issue of water resources, we have tried to identify among the works presented in the four EPEA editions, those with specific characteristics. The idea behind this analysis is not to determine a panorama which indicates the representation of the tendencies of the works in the area of Environmental Education that deal with the issue of water resources or water, but to indicate paths and perspectives for the production of knowledge in these areas at a national scope. This way, despite recognizing the limits that an analysis of texts published in the annals of a specific event can bring to our discussion, we believe that such source can allow us to determine tendencies and perspectives, bearing in mind its national outreach, the specificities with regards to the objectives of spreading and discussing the research on environmental education, and the number of works which have been forwarded for widespread and discussion in the different editions of the event.

Based on the data systematized by Rink (2009) in her PhD dissertation called “The analysis of academic production presented in Meetings of Environmental Education Research (EPEA)” one can obtain the first information on the group of work on environmental education research with water resources, published in the Annals of EPEA.

While classifying the analyzed texts based on the theme or on the main area of knowledge of the articles, Rink (2009) identified 23 texts (7.6% of the total of works presented in the four EPEAS already held) which have the issue of water resources as one of their central themes. This number is only inferior to the number of works which focused on the area of Ecology (in a more ample approach). This data is evidence that confirms the previously enunciated fact that water resources are one of the issues which has gained special attention from researchers. The analysis performed by Rink (2009) revealed other interesting aspects. Among the works which deal with the themes related to water, one can observe certain preponderance of the reports which analyze and discuss educational works in school contexts, in particular those related to the final grades of Middle school. Another observation of the author is that the majority of the works of the referred theme is focused on attempts of identifying conceptions, representations, perceptions and concepts of the public involved in the research about water resources (Rink 2009). The same has also been observed with regards to other issues approached in the research presented at EPEA, a tendency called by Carvalho and Schmidt (2008) as the search of the meanings given to environmental education.

It is also worth mentioning that one has observed, in the works published by the Annals of EPEA, that many who analyze and assess a specific Project on environmental

education for Lower and Middle schools have water resources as their central theme. The same can be said about the works that analyze the pedagogical potential of the projects focused on environmental education (Rink 2009).

## Perspectives of Environmental Education, Critical for Water Resources

It is important that the professor or any other actor, who seeks to work with participatory management of water resources using environmental education as an element for its strengthening, is able to identify what is the predominant conception of the proposed activities. With the objective of assisting teachers in analyzing the action proposals in environmental education, maintaining a critical perspective, we present a classification into three categories of environmental education (Silva 2007) conservative, pragmatic and critical, summarized in Table 8.2.

**Table 8.2** Conceptions of environmental education (adapted from Silva 2007)

Conservative	Pragmatic	Critical
<ul style="list-style-type: none"> <li>• Dichotomy human being-environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Anthropocentrism (human being as the center of everything).</li> </ul>	<ul style="list-style-type: none"> <li>• Human being belongs to a network of social, natural and cultural relationships and lives in interaction.</li> </ul>
<ul style="list-style-type: none"> <li>• Human being as a destructive dimension.</li> </ul>	<ul style="list-style-type: none"> <li>• Fatalist perspective—need to protect the environment (in order to survive).</li> </ul>	<ul style="list-style-type: none"> <li>• Relation with environment is historically determined.</li> </ul>
<ul style="list-style-type: none"> <li>• Contemplative activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Action-reaction law (Nature revengeful).</li> </ul>	<ul style="list-style-type: none"> <li>• Proposition of activities obligatorily interdisciplinary.</li> </ul>
<ul style="list-style-type: none"> <li>• Return to the primitive Nature.</li> </ul>	<ul style="list-style-type: none"> <li>• “Technical/instrumental” activities without reflection propositions (e.g. separate recycling goods or get bonuses for it).</li> </ul>	<ul style="list-style-type: none"> <li>• Solution of problems as themes generators.</li> </ul>
<ul style="list-style-type: none"> <li>• Human being is part of Nature in its biological dimension.</li> </ul>	<ul style="list-style-type: none"> <li>• Solution of environmental problems as an end activity.</li> </ul>	<ul style="list-style-type: none"> <li>• Local/regional environmental potentialities are explored.</li> </ul>
<ul style="list-style-type: none"> <li>• Contemplative activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Propositions for individual activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Recognition of conflicts.</li> </ul>
<ul style="list-style-type: none"> <li>• Commemorative dates and other punctual activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Proposition of models of environmental behavior.</li> </ul>	<ul style="list-style-type: none"> <li>• Emphasis on the collective participation.</li> </ul>
<ul style="list-style-type: none"> <li>• External activities of “contact with Nature” as an end in itself.</li> </ul>		<ul style="list-style-type: none"> <li>• Questions of equality of access to the natural resources and unequal distribution of environmental risks are discussed.</li> </ul>

This categorization becomes important since there is no consensus or homogeneity of the practices and the academic materials which stand for Environmental Education. Therefore, one attempts to allow educators or other social actors related to the environment, to be capable of identifying the concepts which they wish to explore in their practices, as well as having the elements to analyze the academic material and projects and guide their decisions about the use and the means of using and the ways of appropriation and re-signification in different contexts.

Among the different aspect revealed by the research in this field, and the values considered significant, we have briefly indicated those which to us seem most relevant to the development of educational works in the field of environment within a critical perspective.

The observed tendency of proposing watersheds as a reference for the analysis of aspects related to water or water resources. This perspective represents a significant progress, since it recommends a discussion of the problems related to water resources in a spatial scope, which is where degradation occurs. The regional outreach of this treatment emphasizes the need for an integration of the discussions on the different environmental issues, for example, the conservation of the land, and of the riparian forests, increasing the outreach of Environmental education programs. With more integrated analysis of these different issues, one can work in a more concrete way, on concepts considered difficult by teachers, especially when dealing with students from lower and middle school or with communities who have little experience in dealing with abstract concepts. As proposed by Bacci and Patacca (2008), to work within the context of watershed allows for coordination between the singular and the historical, creating opportunities for learning experiences.

To use the watershed as a unit of analysis also allows teachers to place students in direct contact with different social agents and different social sectors that are responsible for the management process of water resources. Experiences like these can assist those involved in the educational process to have a better dimension of the need for integrating efforts, so that the measures which are in fact effective in the process of mitigation of environmental impacts or which aim at finding a solution to problems related to preservation and conservation of waters can be implemented.

In addition, these experiences render valuable experiences in understanding the need for participation of the entire community in the transformation process we seek, contributing to avoid the approaches which focus on and reinforce changes of habits and on individual attitudes which currently are very present in the environmental education proposals.

The contact with different agents, with social sectors and with several community groups, leads us to consider another principle which can greatly benefit from a more systemic approach such as: the much needed dialogue among the knowledgeable in dealing with environmental issues. One example is the project "The building of a participatory process of education and change" developed in Espírito Santo do Turvo and Vera Cruz, in the State of São Paulo, by a team composed by professors from ESALQ, FSP, FE and the Agronomy Institute of Campinas (Krasilchik et al. 2006). For proposals where one attempts to have several groups involved and feeling like they participate in the process, it is necessary to grant recognition to the

different specialists and to give them the necessary consideration in the game of knowledge and Power, present in our society. It is not about not taking into consideration the role of the scientific knowledge in these processes. It is in fact about preparing scientists who participate, to listen and dialogue, in order to consider the possibilities of different interpretations of the complex phenomena we deal with when working with environmental issues.

It is worth taking note on the frequent mentioning of the potentials and possibilities of the works which utilize the watershed as a unit of study open for the development of field activities. Although it is important to repeat our understanding that there are no prior research procedure considered adequate for environmental education, field works offer paths to alter or pedagogical practices not only when we find ourselves within school contexts, but also in other educational contexts.

Upon analyzing environmental education projects with water resources performed in the Upper Tietê River Basin, Bustos (2003) noted that the lack of effectiveness of the projects was due to the lack of coordination, integration, monitoring and continuity, focusing on the need for a systemic planning for such actions and the difficulty in working on a Project of integrated and participatory management.

The challenges of these paths become evident, especially when we analyze the background of our educational systems and the strength of recurring practices in their processes of dealing with the challenge. Each one of the previously mentioned items puts us in contact, for example, with one of the principles, taken on with the highest consensus when we deal with environmental education, regardless of its interdisciplinary perspective. The research texts presented at the EPEA and used as documents for this analysis, show the great difficulty in the approaches which require the integration of the different areas of knowledge. The can also clearly be seen in Rink's work (2009). The author brought to our attention, regarding researches held within the school context, that although they insist and emphasize on the interdisciplinary perspective, they end up being done involving one subject only. Many times the integration efforts manage to involve more than one area of knowledge, yet without actually achieving interdisciplinary characteristics.

There is no possibility of qualifying an educator for an interdisciplinary work if he does not possess practical experiences in formative spaces where he could experience the principles and interdisciplinary practices. Facing these challenges, requires a joint effort of all levels, spaces and qualification of key people who are dedicated to environmental education.

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