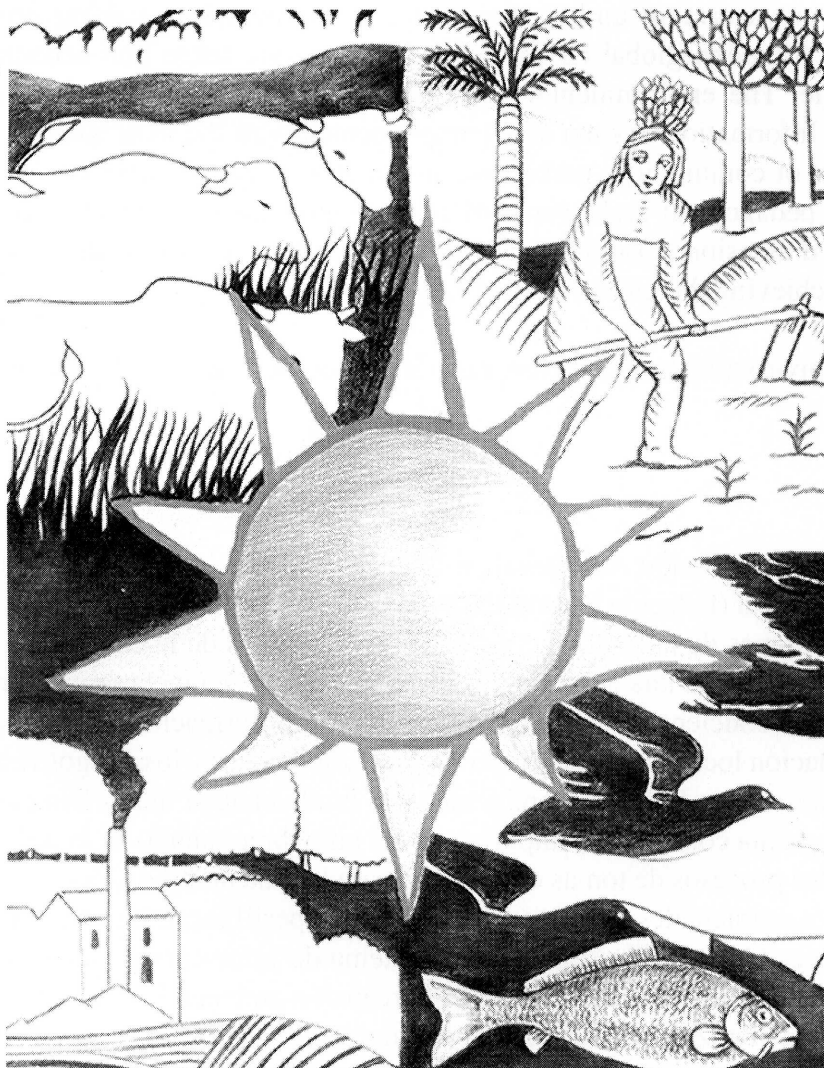


**ENVIRONMENTAL EDUCATION IN PRACTICE:
THE CASE OF THE ECOLOGICAL STATION OF JATAI,
LUIZ ANTÔNIO, STATE OF SÃO PAULO, BRAZIL**

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ABSTRACT

A non-formal Environmental Education (EE) Program has been implemented in the natural conservation area (Ecological Station of Jataí, Luiz Antônio, São Paulo State, Brazil), through EE paradigms which consider the objectives of education “about”, “in” and “for” the environment within cultural and natural perspectives. The aim of this Program is to promote awareness by increasing access to information and scientific knowledge to the local population about the environmental impacts and risks resulting from soil uses that threaten the environmental quality and biodiversity of the Ecological Station of Jatai. This program understands the importance of community empowerment and participation in the decision making process for local sustainability. Although global environmental issues were taken into account, the model is local in profile. The environmental characterization (biophysical components) through a Geographical Information System was complemented with the hydrographic basin analysis. An assessment of community's perception and understanding of their local environment was made and EE pedagogical tools were produced to promote environmental awareness. Being the ecological dimension of EE the main approach, the program intends to integrate the cultural perspective, achieving the global view of EE.

Key words : Environmental Education, natural conservation area, sustainability.

RESUMEN

Un Programa de Educación Ambiental (EA) no formal ha sido implementado en el área de conservación natural (Estación Ecológica de Jataí, Luiz Antônio Estado de São Paulo, Brasil) a través de paradigmas de la EA que consideran los objetivos de la educación, "sobre", "en" y "para" el ambiente desde una perspectiva cultural y natural. La meta de este Programa es promover la toma de conciencia aumentando el acceso a la información y al conocimiento científico de la población local acerca de los problemas ambientales y los riesgos resultantes del uso de suelo que amenazan la calidad ambiental y la biodiversidad del la Estación Ecológica de Jatai. Este Programa considera la importancia del empobrecimiento de la comunidad y la participación en los procesos de tomas de decisión para la sustentabilidad local. Aunque se consideraron asuntos ambientales globales, el modelo tiene perfil local. La caracterización ambiental (componentes biofísicos) a través de un Sistema de Información Geográfico se relacionó con el análisis de la cuenca hidrográfica. La percepción ambiental se utilizó como la principal herramienta para analizar la comprensión del ambiente local y se desarrollaron herramientas pedagógicas de EA para promover la conciencia ambiental. Siendo la dimensión ecológica de la EA el enfoque principal, el Programa pretende integrar la perspectiva cultural, alcanzando una visión global de la EA.

Palabras claves: Educación ambiental, área de conservación natural, sustentabilidad.

INTRODUCTION

Environmental Education was first used in 1965 by the Royal Society of London, with a definition associated to the preservation of life systems (Gayford & Dorion 1994). In 1970 the International Union for the Conservation of Nature (IUCN 1971) restricted the usage of Environmental Education to the conservation of biodiversity (Sato 1994). The incorporation of new concepts and the rise of countless environmental institutions gave Environmental Education with a wider scope highlighting the human being as responsible in the maintenance of the planet (Stockholm Conference 1970), associated with the requirement of interdisciplinarity (Belgrade Conference 1977), in the context of not being claimed by only one area of knowledge, culminating with the most used and known concept (Tbilisi Conference 1977), “as a process of recognition of values and classification of concepts, towards the development of skills and modification of attitudes in relation to the environment, to understand and appreciate the interrelations between human beings, their cultures and their biophysical environment; and further with the practice of making decisions and the ethics that lead to a change in quality of life”. Environmental Education came to represent a tool to be employed by diverse socio-cultural community groups according to their needs and interests, in order to move the perception of the social actors through the modification of attitudes, of new knowledge and criteria in relation to environmental problems (UNESCO 1977).

In a way this expanded notion of the

concept aligned Environmental Education with Sustainable Development and its goals of improving the quality of life through economic growth, without damaging the natural environment (WECD 1987). In this context, the guidance of UNESCO (1997), of the substitution of the term Environmental Education for “Education for Sustainable Development”, clearly demonstrates the economic emphasis given to environmentalism, withdrawing its educative and ecological functions, of maximum importance to answer to the challenges demanded in this era of globalization. These considerations determined a clear orientation of Environmental Education to “ecological sustainability” (Sterling 1990, IUCN/WWF/UNESCO & PNUMA 1992, Tilbury 1995). More recently, Environmental Education has been associated to a process of awareness and consciousness of environmental problems, leading the participation and the recovery of citizenship in decision-making, aiming at intervention through autonomous methodologies in the use of development strategies and a consequent improvement in quality of life (Leff 1997).

The highlight in the valuation of nature enabled three paradigmatic perspectives in the Environmental Education practice. The first one, (Fig. 1a), considering that this must be “about” the environment, establishing the ecological subject as fundamental (Hungerford & Volk 1990); the second (Fig. 1b), considering the immediate environment in the building of knowledge, prioritizing education “in” the environment (Van Matre 1979); the third (Fig. 1c), that Environmental Education

must be critical, purposeful and must permit participation “for” the environment (Fien 1993). In some way, these paradigms in Environmental Education seem to be, respectively related to positivism (knowledge about the environment), constructivism (activities in the environment) and the critical theory (actions for the environment) of education (Robottom & Hart 1993). At the same time, these perspectives can also be identified in the paradigmatic concepts of the term “environ-

ment” (Table I), whose influence is reflected in the scope and strategies used in Environmental Education theory and practice (Sauvé 1996).

The forms, ideologies and methodologies considered within these approaches demonstrate difficulties in unification due to their epistemological differences suggesting that the practice in Environmental Education should not be restricted only to construction of the ecological knowledge, but also to recover mechanisms to support the community participation, turning possible a constructivist dialogue in the educative process for the environment. In this context, Tilbury (1995) discusses the opportunities of effective involvement of the community in the construction of a more responsible society, in considering the implementation of Environmental Education “about”, “in” and “for” the environment, incorporating the cognitive, affective and technical (participative) domains, through the proposition of six basic stages (Fig.1d). That is, the awareness for obtaining ecological knowledge inserted in the process of educative competencies, interacting with the involvement of social actors, who, through responsibilities, will look for action and participation for the effective exercising of citizenship. However criticisms of the orientation of Environmental Education via economical perspectives had arisen (Sauvé 1996), due the difficulties in demonstrating the social-economic value of ecological resources and environmental functions (Leff 1997, Santos et al. 1998).

Based on the recovery of the concepts

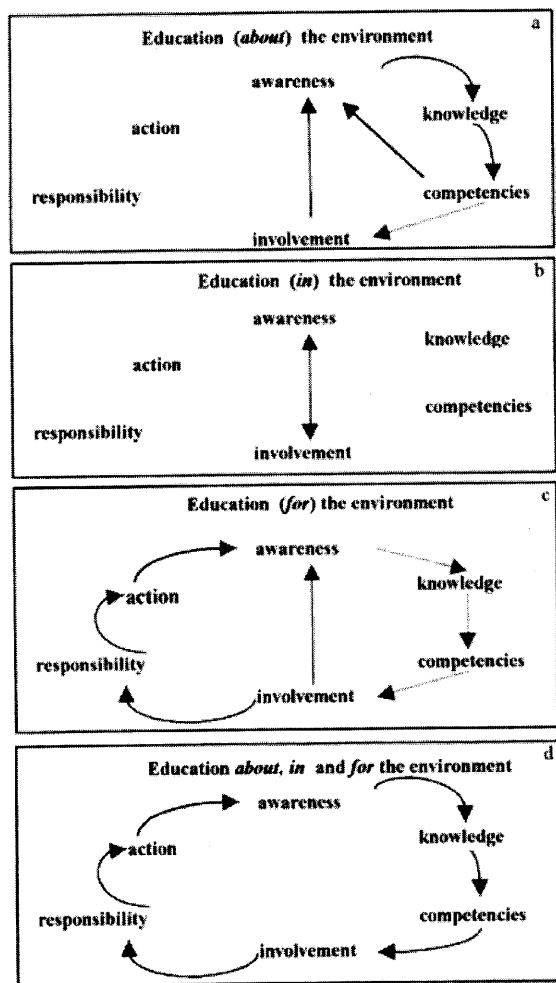


FIGURE 1. THE FOCUS OF THE ENVIRONMENTAL EDUCATION (MODIFIED FROM TILBURY 1995).

TABLE 1. THE TYPOLOGY OF PARADIGMATIC PERSPECTIVES RELATED TO THE TERM "ENVIRONMENT" IN ENVIRONMENTAL EDUCATION (EE) (MAKING FROM SAUVE 1996).

Environment	Relation	Characteristics	Methodology
As nature	To be appreciated and preserved.	Nature as a cathedral, pure and original.	Immersion in nature.
As a natural resource	To be managed.	Collective biophysical inheritance.	Campaign of the 3" Rs". Case studies.
As a problem.	To be resolved.	Emphasis on pollution, deterioration and environmental threats.	Problems resolution. Case studies.
As a place to live	EE , " about", "in" and "for" taking care of the environment.	Nature with its social and technological components.	Gardening projects. Places or legends about nature
As a biosphere.	As a place to be shared.	Spaceship Earth, "Gaia", the interdependence of live beings with inanimate objects.	Case studies of global problems. Stories with different cosmologies.
As a community the project.	To be involved.	Nature with a focus on critical analysis, in the political participation of community.	Research and participation for community transformation. Discussion forum.

and orientations defined by Environmental Education, this paper presents a new approach for implementation, in its "non formal" category targeting a natural conservation area, Ecological Station of Jataí, Luiz Antônio, SP. The approach comes from an educative process whose complexity does not finish with this proposal. It was based on an activity program to disseminate scientific information and knowledge, to promote awareness of the local community regarding the environmental impacts and risks that threaten the environmental quality and biodiversity of the Ecological Station of

Jataí (ESJ). This program understands the importance of community empowerment and participation in the decision making process for local sustainability.

MATERIALS AND METHODS

Location of the study area

The ESJ (Fig. 2) is located in the city of Luiz Antônio, São Paulo State, Brazil, and was created by the Decree of Law 18,997 (June 15, 1982, SP), as a response to a general concern: preserving remains of Cerrado vegetation and Riparian Forest, which has been long succeed to coffe

plantation in the beginning of the century, and more recently, by sugar-cane plantation. This conservation area has 4,532.18 ha., bordered to the immediate east and mediate north with the Experimental Station of Luiz Antônio (Fig. 2), with an area of 6,240 ha. Inside its limits the ESJ includes three types of ecosystems: 1. Aquatics, represented by the Mogi-Guaçu river, the streams, the reservoir, the swamps and marginal lagoons; 2. Flooded terrestrial ecosystems that separate the lakes from the river, and 3. Terrestrial ecosystems represented by the native vegetation and the semi-deciduous latifoliated forest (Santos et al. 1995). The category of an Ecological Station conservation area is one of the most restricted and also the one which guarantees better protection for the biodiversity and integrity of ecosystems included in it.

The Experimental Station of Luiz Antônio is an area of public domain, categorized as a Permanent Preservation Area and considered as a Unit of Production (vegetable production). The Experimental Station includes plantations of Pinus and Eucaliptus, which provide wood for resin extraction, and the manufacture of stretchers and posts for agricultural use.

Approximately 40,763.30 ha (63.37%) of the surrounding area of the ESJ is occupied by agroecosystems, including sugar cane monoculture, Pinus and Eucalyptus reforestation, citriculture, cattle rearing and other cultures. The natural vegetation included in it and its surrounding area represented by Riparian Forest, Cerrado vegetation, marshes and overflow areas and hillside and hilltop vegetation areas, totalize 18,900.82 ha. This means about 31.71% of the total area of the Luiz Antonio municipal district (Pires et al. 1998a).

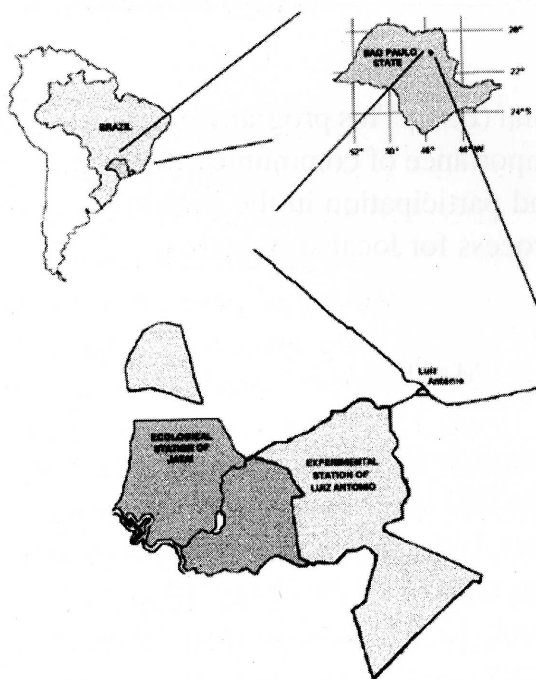


FIGURE 2. LOCALIZATION OF THE STUDY AREA.

Experimental outline

The Environmental Education practice is being implemented under a paradigmatic "natural perspective" (Fig. 3), which nevertheless takes into account the aspects "about", "in" and "for" the environment (Fig. 1.d). These paradigms support a pedagogical reflection, bringing the genuine sense of participation to environmentalism. The concepts "as a resource" and "as a problem adopted for the term "environment" complements this theoretical bases, identified in the paradigmatic concepts of Sauv  (1996), utilized in theory and in practice of this

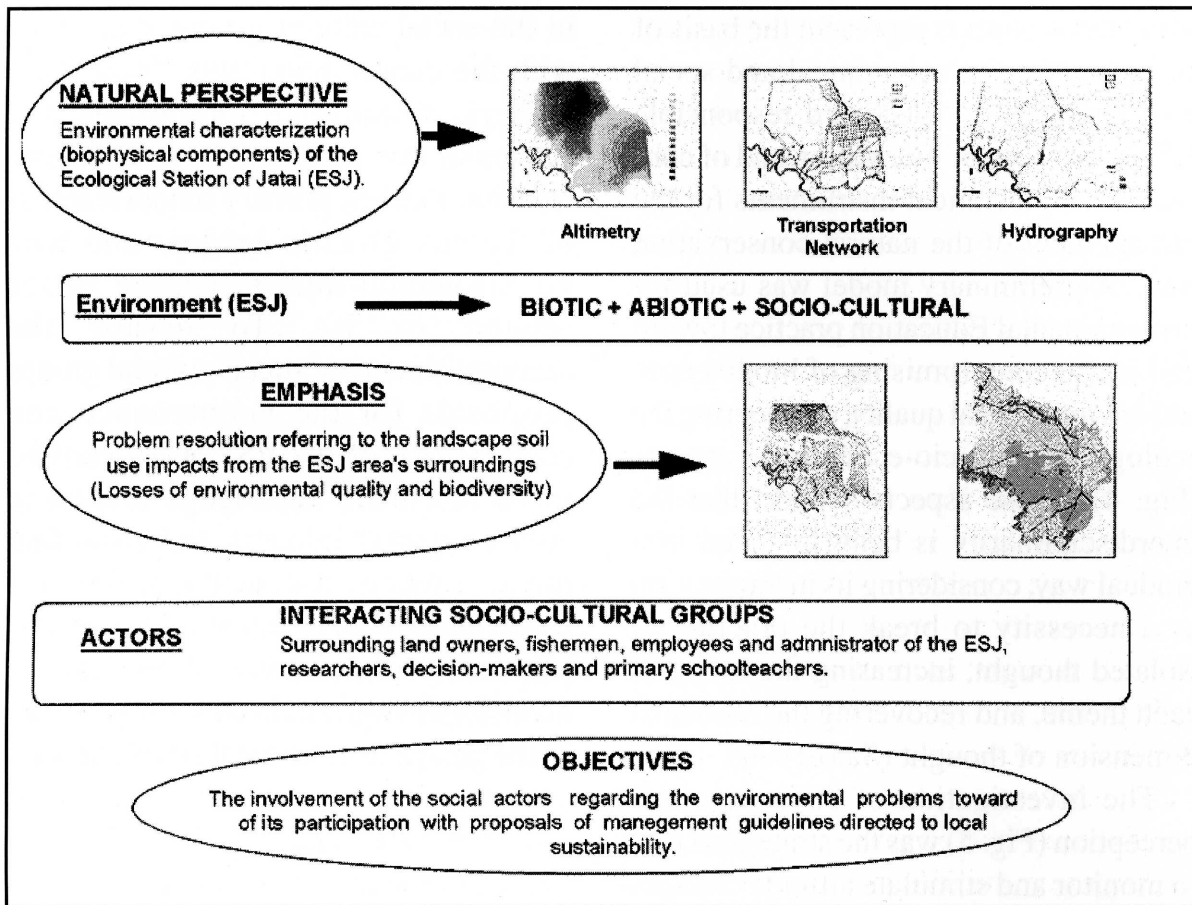


FIGURE 3. METHODOLOGICAL APPROACH FOR ENVIRONMENTAL EDUCATION PRAXIS TOWARD A NATURAL CONSERVATION AREA (ECOLOGICAL STATION OF JATAI/ESJ)

approach, as well as in the perspective to obtain an integrated view of the natural-cultural environment, through the concepts: “as a place to live, as a biosphere and as a community project” (Table 1). In this context, not only the aspects related to environmental quality and biodiversity of the ESJ, but above all, the use of an approach that allows the manifestation of natural and cultural diversity through an educative process, are objects of study. With its holistic perspective and particular ethical framework, the model has the purpose of generating new links with the natural environment (ESJ).

The proposed model is being applied in three stages: 1. Environmental characterization involving the biophysical and social aspects of ESJ; 2. Investigation of the environmental perception of the ESJ’s interacting groups, through non-patterned interviews, questionnaires (open and closed questions) and use of mental maps; and 3. Implementation of Non-Formal Environmental Education Program.

The model is local in profile, considering the total scope of the environmental system (ESJ), through the union of its biophysical, economical and social aspects. Even though the

biophysical aspects represent the basis of the activities, the economical and social complexities are considered responsible for the diffusion of orientation and of conceptual and technical instruments for the management of the natural conservation area. A preliminary model was used for Environmental Education practice toward ESJ in the compromising of biodiversity and environmental quality, considering the ecological and socio-economical aspects (Fig. 4). These aspects support that the interdisciplinarity is being realized in a gradual way, considering its incorporation as a necessity to break the practice of isolated thought, increasing the scope of each theme, and recovering the humanist dimension of thought (Sato 1994).

The investigation of environmental perception (Fig. 5) was the strategical tool to monitor and stimulate attitude changes

in the social-cultural groups interacting with the conservation area (local land-owners, fishermen, employees and administrator of the ESJ, researchers, decision-makers, primary school teachers of the city of Luiz Antônio and with governmental administration office related to it). To assure the accomplishment of social-cultural groups proposals for the maintenance and conservation of the ESJ, were verified theirs scientific knowledge related to environmental impacts and risks that threaten its environmental quality and biodiversity. This methodological process allows the valuation of the cultural diversity through environmental planning in the perspective of local sustainability.

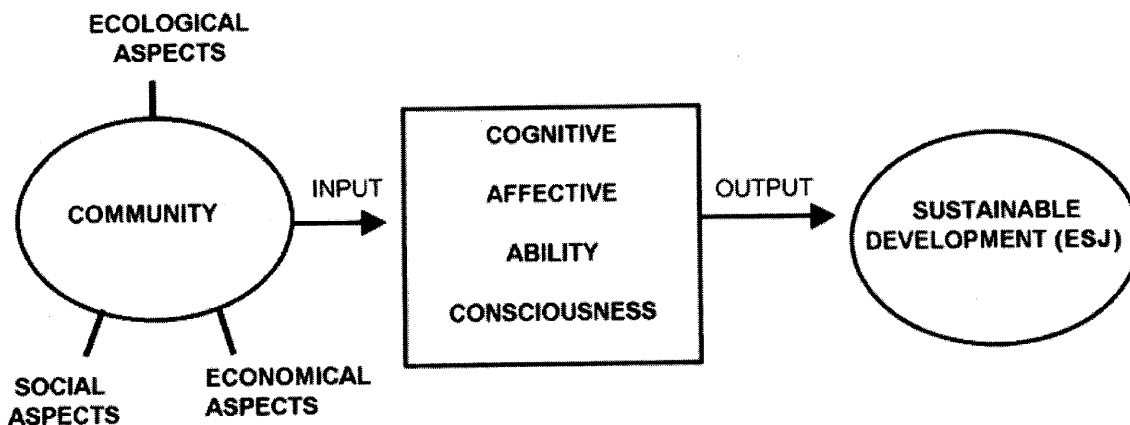


FIGURE 4. PRELIMINAR MODEL USED FOR ENVIRONMENTAL EDUCATION PRAXIS AT THE ECOLOGICAL STATION OF JATAÍ (ESJ) CONSIDERING THE ECOLOGICAL AND SOCIO-ECONOMICAL ASPECTS IN THE COMPROMISING OF BIODIVERSITY AND ENVIRONMENTAL LIFE QUALITY IN THE LOCAL SCOPE.

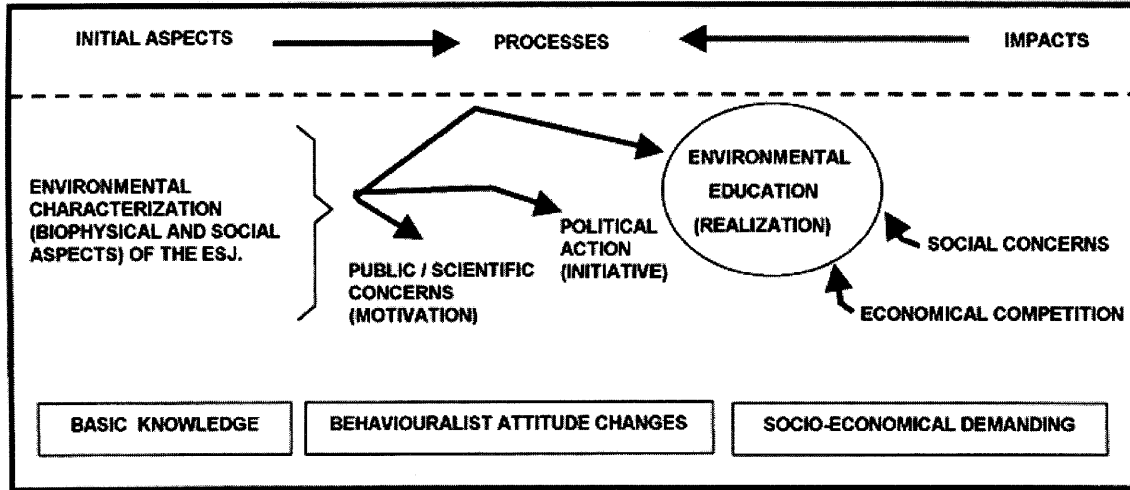


FIGURE 5. INVESTIGATION OF ENVIRONMENTAL PERCEPTION OF THE ECOLOGICAL STATION OF JATAÍ (ESJ) THROUGH INTERACTION OF SOCIO-CULTURAL GROUPS (SURROUNDING LAND-OWNERS; FISHERMEN; EMPLOYEES AND ADMINISTRATOR OF THE ESJ; RESEARCHERS; DECISION-MAKERS AND PRIMARY SCHOOLTEACHERS).

RESULTS AND DISCUSSION

Several concepts have been attributed to Non-Formal Environmental Education. The majority of them not associated to cycle programs of the teaching system, but involving rules and pedagogical planning.

The guidelines for an Environmental Education Program for the ESJ is extremely dependent on knowledge of the regional values, on the environmental theme and social scope, and on biophysical descriptors (Fig. 3), to promote awareness by increasing access to information and scientific knowledge to the interacting socio-cultural groups. The environmental characterization of the ESJ was based on a physical area description, through the use of thematic maps (hydrography, altimetry, pedology, soil use and occupation, transportation

network and zoning proposal) via a Geographic Information System (GIS-IDRISI), permitting the elaboration of a geo-referenced data base (Pires et al. 1998b) for interpretation, evaluation and decisions regarding the management of the ESJ. The natural conservation area was separated in 4 watersheds, defined by its topographical limits on the planialtimetric map. The losses of environmental quality and biodiversity of these watersheds was analyzed in function of the environmental impacts and risks resulting from landscape soil uses (Pires et al. 1998a).

The involvement of interacting socio-cultural groups with natural conservation areas has been considered of great importance as a maintaining natural resources of these areas (Pádua 1995), as well as a participative element of the

established conservationist goals, since the majority of people do not understand, through ignorance or through inadequate information, the relationship between human activities and environmental quality (Sato & Santos 1997). The investigation of environmental perception of the socio-cultural groups (Kataoka-Silva 1997; Maroti & Santos 1998 a,b; Santos et al. 1996), show clearly the necessity to work for clarification of ecological concepts related to conservation, biodiversity, and impacts resulting from soil use, among others. This work supports information for social-cultural groups formulate proposals concerning the compromising of environmental quality and of biodiversity of the ESJ. Under local and regional identification of available natural resources and how environmental impacts and issues are developed in municipality, there will be greater viability for environmental conservation. This involvement implies the development of actions that enable the analysis of the natural and social realities, allowing actions in the environment (ESJ), but differentiated by the conditions that define the various socio-cultural groups. The process of "awareness" triggers "involvement" through mechanisms that favor the participation of the social-cultural groups, in an educative process "for" the natural conservation area. In other words, the building of a more participative community for problem resolution, referring to the soil use impacts, from the conservation area's surroundings, in the compromising of biodiversity and environmental / life quality in the local and regional scope.

The implementation of Non-Formal Environmental Education in the scope of the ESJ was initiated with the elaboration of technical-pedagogical material, delivered to various interacting socio-cultural groups, highlighting the effects of soil use impacts in the city of Luiz Antônio resulting mainly from sugar-cane monoculture, in the compromising of biodiversity and environmental quality of the conservation area "Guará Wolf; Ecological Station Mammals; Land Use in the City of Luiz Antônio; Historical Aspects of the Waterway and of the Jataí Harbour; the Legend of Mogi-Guaçu River; Knowing the Environment. The organization of lectures for the various groups of the community was also used as part of this strategy, working themes specific to the environmental reality of the city of Luiz Antônio, contributing to the comprehension of the necessity and importance of maintenance and conservation of the ESJ. The activities in Environmental Education with the elaborated materials do not consider a simple dissemination of information and fragmented knowledge about specific problems of contamination or environmental degradation, or even the extinction of animal or vegetable species of the ESJ. Since environmental conditions depend much more on political, social, economical and technological decisions than on biophysical factors only, the implemented activities should provide a new system of values for the community, enabling them to exercise their right to information about management options proposed for the conservation area. Considering that the Environmental

Education practice should not only prioritize the conservation of nature as an indicator of sustainability, but also should enable manifestations of natural and cultural diversity, and of the development of individual and collective potentials for the transformation of an educative project, it is necessary to highlight and discuss the pedagogical basis used in the developed actions. Beyond the traditional models available (Table 2) and still under construction, a guidance towards comparative analysis of the evolution of Environmental Education has been evidenced, with the tendency of substituting the behaviouralist focus of attitude changes for professional qualification orientations and their actions (Smyth 1995).

The union of the aspects contained in these models, within critical pedagogy, seems to be the most used path in Environmental Education, considering the

TABLE 2. PRIVILEGED PARADIGMS IN ENVIRONMENTAL EDUCATION (SATO 1997)

Authors	Used classification	Privileged paradigm
MEC 1996	Traditional, renovated, technical and critical	Critical
MininI 1994	Traditional, behaviouralist, socio-cultural humanist, historical-critical and cognitive	Cognitive
Sato 1992	Utilitarian, post-positivist, humanistic and liberating	Liberating
Sauvé 1996	Rational, humanistic and inventive	Inventive
Robottom & Hart 1993	Positivist, post-positivist, interpretative and critical	Critical

involvement of the community and the increase of participation of the different socio-cultural groups (Sato 1997). An approach towards at human relations among themselves and with nature, giving greater emphasis to human solidarity than to environmental problems (Table 3).

TABLE 3. EVOLUTIONARY ASPECTS IN THE APPROACHES OF ENVIRONMENTAL EDUCATION (MODIFIED FROM SMITH 1995)

Components	Traditional paradigm	Modern paradigm
Social actors	Teachers and specialists	Teachers specialists and community
Epistemological base	Transmission of knowledge	Reconstruction of reality
Focus	Behaviouralist "attitude" changes	Participation (action)
Relation of actors with nature	Direct (human being - nature)	Mediated (human being-society-nature)
Emphasis	Environmental problems	Human solidarity
Scientific paradigm	Exclusively natural	Natural inclusive
Research centralisation	Life systems	Community experiences
Sustainability emphasis on	Natural resources	Cultural resources
Society with equity	Little emphasis	Much emphasis

It is fundamental that the Human Sciences do not incorporate Environmental Education as exclusive to that area. Although the Natural Sciences do not in-

clude the social components in their investigation, the Human Sciences are not able to incorporate and deal with ecological questions of fundamental importance in Environmental Education (Smyth 1995). The tendency of Environmental Education towards the aspects of the conservation of nature can be related to the phenomenon of “imprinting” (Morin 1996), determining those institutions that suffer less “imprinting”, that is, that consider Environmental Education as an educative process, are considered as opponents or dissidents. However, the dialectic and practice in Environmental Education demonstrate that it must articulate both Sciences, demanding a polyvalent competence able of initiating a new paradigm.

The recent criticism about Environmental Education has caused the reflection about its evolution by the diverse professionals acting in the area. This evolutionary process has evidenced disordered actions in the perspective of valuation of nature, within a determinist ecologism, with little attention to the educative aspects of Environmental Education. This is a fundamental aspect for the awareness and action in the search for development that prioritizes human quality in relation to economic quantity.

Considering the aims, the problems, the premises, the social actors and goals of the natural perspective in Environmental Education (Fig. 3), the incorporation of the “cultural perspective” in this approach (Fig. 6) is fundamental, seeing that these are all complementary. While the environmental problems damage and compromise the environmental quality of

the ESJ, the educative action has its commitment in personal relations for social development. It is in this challenge that Environmental Education appears to be inserted: “in the dialogue between nature and culture”; that is, in the responses to environmental problems to human development and to the educative process. The comprehension of some ecological concepts, allied to the educational process awakening the ethical and environmentalist concern of the social groups, will be able to conduct the community to a more rational interaction with the ESJ. Perhaps of greater significance, is to enable changes of individual and collective attitude with the ESJ,

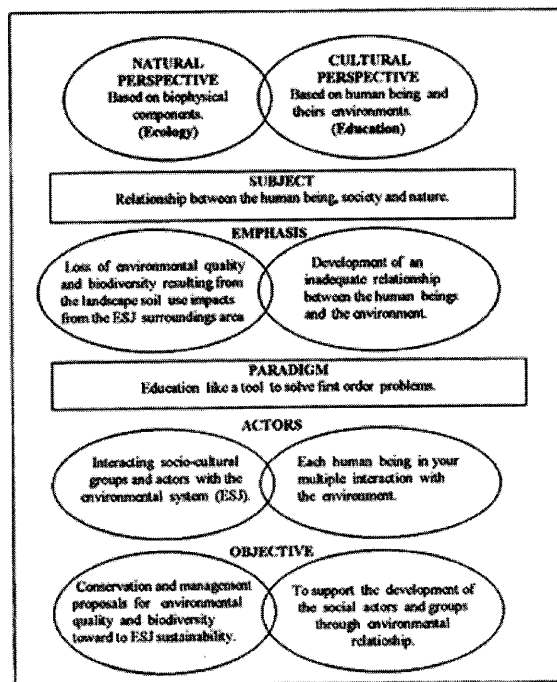


FIGURE 6. NATURAL AND CULTURAL PERSPECTIVES ON THE ENVIRONMENTAL EDUCATION APPROACH IN A NATURAL CONSERVATION AREA (ECOLOGICAL STATION OF JATAI / ESJ) (MODIFIED FROM SATO 1997).

providing the construction of abilities for local sustainability.

The Environmental Education Program implemented for ESJ intends to incorporate the responsibility of Environmental Education for the maintenance of the environmental quality and for the improvement of living conditions of the community. The experience obtained with this program will allow its enlargement with neighbouring municipalities of Luiz Antônio, in the perspective to promote awareness to their respective populations of the necessity and benefits of conservation of biodiversity and of local sustainability.

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