

Environmental Science: A Proposal for Constructing New Knowledge for Ecotourism Itineraries

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Abstract—The principle of sustainability has been studied by different sciences with the purpose of formulating clear and concrete models. Much has been discussed about sustainability, and several points of view have been used to try to explain it; environmental science emerges from various environmental discourses that are willing to establish a new concept for understanding this complexity. This way, we focus on the activity of ecotourism as a way to integrate sustainable practices proposed by environmental science, and thus, make it possible to create a new perspective for eco-tourists and the managers of tourist destinations towards nature. The aim of this study was to suggest a direction for environmental awareness, based on environmental science, to change the eco-tourist's view of nature in ecotourism tours. The methodology used was based on a case study concerning the Jalapão State Park - JSP, located in the State of Tocantins, Northern Brazil. The study was based on discussions, theoretical studies, bibliographical research and on-site research. We have identified that to incite the tourists' awareness, they need to visit nature to understand the environmental problems and promote actions for its preservation. We highlight in this study actions to drive their human perception through environmental science, so that the ecotourism itinerary tours to the JSP, promote a balance between the natural environment and the tourist, making them, in this way, environmental tourists.

Keywords—Science, environmental, ecotourism, Jalapão.

I. INTRODUCTION

DURING the 1970s, the world population started to become aware of an environmentalist consciousness. They began discussions about the current development model, the capitalist system analyzed by Marx, seen on one side by the capitalists (who had the necessary means of production to transform nature) and on the other side, the workers, per Marx, the capitalist system exists only because capitalists and workers get into a relationship. It is from this relationship that environmental problems begin to emerge, the way of production aimed at profit has led to an environmental crisis.

The use of natural resources in the development process concerns the whole world, which was aware of environmental problems and held the first world's conference about the human environment and development, through the 1972 Stockholm Declaration in Sweden, which is a set of principles about the rational use of natural resources.

Humans and the natural world are on a collision course. Human activities cause serious and often irreversible damage to the environment and to crucial natural resources. If they are not stopped, many of our activities seriously endanger the future we desire for human society and for the plant and

animal kingdoms, and can alter the world of living beings so much that it will become incapable of sustaining life the way we know. Fundamental changes are urgent if we wish to avoid the collision, our current route will cause [1].

The alert was published during an event considered a milestone in the history of discussions upon Development and Sustainability at Rio-92, an international conference about development and the environment, held in Rio de Janeiro, Brazil, with the proposal of sustainable development in production and consumption of goods and services. It is in Rio-92 that Agenda 21 was approved, a document containing commitments to change the pattern of development for the coming centuries. More than a document, Agenda 21 is a participatory planning process that analyzes the current situation of a country, state, municipality and/or region, and plans the future in a sustainable way. Countries then began to think about sustainable development concerning the use of natural resources, and many definitions on sustainability were established:

"Sustainability involves the natural environment and its interrelations developed between the elements that compose it and also with the environment" [2].

"Improving the quality of human life without reducing the carrying capacity of the ecosystems that sustain it, or without degrading or depleting the resources that make it possible" [3].

"A process of transformation in which the exploitation of resources, the direction of investments, the orientation of technological evolution and institutional change harmonize and reinforce present and future potential to meet human needs and aspirations" [4].

The discussion of development from the viewpoint of sustainability leads to the construction of a new paradigm, analyzes as a system of relations (ecological, technological and social), being a reconstruction of social reality through the reorientation of norms and values policies. The new paradigm proposes an environmental rationality, which orient the environmental purposes, forming a new knowledge and the interdisciplinary integration of the knowledge, as well as "an articulation of the natural resources system with the appropriate technological system" [5].

The new paradigm has broken the view of the dominant paradigm as irrational "it is a totalitarian model, insofar as it denies the rational character to all forms of knowledge that are not guided by its epistemological principles and its methodological rules" [6]. It is in this context, environmental science has emerged with the objective of discussing complex problems (human-nature relation) based on different fields of

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knowledge, to give rise to methods, theories and concepts concerning the complex problems that involve the new paradigm.

This present article is the result of a study consisting of two main objectives: the first, to analyze the consumerism of a postmodern society, to relate it to ecotourism consumption and to analyze the practices of ecotourism found in the tour itineraries for the region of Jalapão State Part – TO / Brazil. Secondly, to appoint a new look towards the application of activities in nature that are capable of sensitizing tourists, to the natural environment, and that can also be included within the itineraries of the State Park of Jalapão – TO / Brazil, in coordination with the knowledge of environmental science.

A. Environmental Science

Environmental science can be considered a fully important scientific discipline, which, just as other scientific disciplines, is attempting to establish itself during a turbulent scientific period, a period that can be characterized by many uncertainties concerning the way in which natural resources are used. This science has taken on new characteristics due to epistemological and paradigmatic ruptures that occurred in the seventies, these resulted in the construction of a new paradigm, difficult to be explained and with complex relationships; environmental science arises to understand this complexity.

The degradation of the environment has led man to look towards a new science in which a holistic vision can be built taking into consideration factors such as; living organization, nature, man, society and ethical consciousness. This new science brings with it principles of organization. Before the conception of nature could be explained by ecological theories that have spontaneous self-organization (order). It is in this complex relationship that humankind is part of, and interferes, causing such a disorder that the effects are often irreversible, thus ceasing to be self-organizing.

Nature, in a holistic conception, of which man is certainly integrated into, is seen as a complex totality, that presents itself as, and with, difficulty and uncertainty. Environmental science holds as one of its principles the construction of environmental rationality, which is guided by ecological principles. This construction will form new knowledge and the interdisciplinary integration of knowledge that will demystify the existing complexity.

The environmental knowledge is a process of management; it is generated through a process of awareness, of theoretical production and of scientific research. When new knowledge is constructed, it combines with existing areas of knowledge and of disciplines to create the construction of new knowledge that effects the reappropriation of nature, and of the practices that embody sustainable development. It is with this context that the production of knowledge, within several areas of knowledge, is built into a new science, environmental science [5].

Discussions concerning the impact of the relationship between man and nature can now be seen by environmental science in a totalized manner. The areas begin to interrelate,

that is, the fragmentation of knowledge, the Cartesian logic (which starts from abstract models and experimentation to explain things), has been questioned in the face of complex problems, failing to explain them.

Environmental science undergoes a paradigmatic transition, in which it tries to break the disciplinary view, in other words, it seeks knowledge of several points of view to deepen the knowledge seen as complex, so that the relationship between man and nature (production and consumption) can be understood. A more than disciplinary view is required, an integrative vision that gives rise to methods, theories and concepts around these scientific problems.

The new science emerges from an environmental discourse - “in which it mobilizes a set of social changes and institutional transformations to internalize the ecological and social bases of sustainable development” [5].

Sustainability has been discussed, as well as many other theories, models and concepts have been formed, but nothing concrete, that really guides development, has been established. Which gives rise to the question: How do we achieve sustainability? In order for environmental science to be able to answer this question, it will need to go through stages that the project will be constantly questioned and reworked until something concrete is constructed, since a complex problem will always be marked by uncertainty. The stages in which have to be reached are described as “Paths of difficult access”, that have to be trodden with a strong conscience on part of the scientific society.

The direction that environmental science is taking are still in their beginning stages, they are marked by sensitization, which now had shown its theory of understanding the world based upon the integration of knowledge. This awareness has already been able to gather varying knowledge that together try to construct a more concrete view of environmental knowledge and thus move onto the next steps so that one can unravel the complex problems and arrive at a consistent model of sustainability. The ways of this new science are still uncertain, are still in formation and have, as a principle, to try to break down dogmas and interests that are present in the new paradigm.

Protagonists of the new paradigm lead a passionate struggle against all forms of dogmatism and authority [6]. Although the paths are still an uncertainty, its methodological principles can already be characterized by an interdisciplinary, that tends to abandon the Cartesian model, because it fails to explain the problems that have arisen as a result of this new paradigm. In this sense, we point towards ecotourism activity, as an activity that involves a “responsible trip to natural areas, aiming at preserving that environment and promoting the well-being of the local population” as a new segment of nature “exploitation” that it has not been practiced under its real meaning [7].

We will discuss below the proposed new environmental knowledge that may be a possibility to integrate sustainable practices in the ecotourism activity in conservation units. Thus, bringing a new look to ecotourism and managers towards nature.

II. METHODOLOGY

In the accomplishment of this study, the scientific parameters of the applied social sciences were followed, in which are found the theoretical - technical principles of touristic knowledge and of the interdisciplinary sciences that form the base principles of environmental science.

The research focused on a case study of the Jalapão State Park – JSP. Jalapão is a region that is located in the east of the state of Tocantins, Brazil and comprises 1/5 of its territory, occupying an area of 34,113 thousand km².

The region is bordered by the states of Bahia, Piauí and Maranhão and is formed by the municipalities of Rio Sono, Lizarda, Novo Acordo, São Félix do Jalapão, Mateiros, Lagoa do Tocantins, Santa Tereza do Tocantins and Ponte Alta do Tocantins.

It possesses a diverse vegetation the composition of which consists of *cerrado*, fields, and plants of great, ornamental, medicinal and timber importance. The fauna is composed by three biomes, because it is influenced by the *caatinga*, the *cerrado* and the Amazonian climate. It possesses extinction-risk species like jaguars and otters. Considered by the document "priority actions for biodiversity conservation of the *cerrado* and *pantanal*" [8], the region needs a planning in order to be exploited in a sustainable way.

In Jalapão, through the Federal Law 9.985 of July 18, 2000, conservation units and ecological corridors were founded with the purpose of preserving its ecosystem, which is very fragile and rare, in order to foster the development of scientific research, to guarantee sustainable development.

One of the conservation units is the Jalapão State Park that consists of approximately 150,000 hectares, and being considered the largest Park of the State, with a fragile ecosystem, with sandy rocks, formed by marine deposits over billions of years, and representative fauna that houses rare and endangered, extinction-risk, species [9].

The place has attractions such as dunes, the *ferveidouro* pool, waterfalls and rivers, which promote the practice of ecotourism, and tourism is being disorderly explored, because the directed efforts for planning tourism showed ineffectiveness. Research developed in the region aiming to analyse the effectiveness of public tourism policies for the Jalapão region, from the perspective of the local authors, revealed the need to implement public policies for the sustainable development of ecotourism in the area [10].

The study was based on discussions, theoretical studies, bibliographical researches and on-site field researches.

III. OBTAINED RESULTS

Tourism, before representing leisure, represents an economic activity of great impact, which can occur in the community and in the natural environment. Efforts have been made to plan it in the vein of sustainability, but to reach the expected result we have to think within integrated touristic practices upon an environmental education program, which is seen in this study as being an integration proposal of environmental knowledge that proposes the new science, the

environmental science.

According to a survey carried out by Dutra about the perception of the tourists that visit the Jalapão region, it was discovered that a significant portion of the tourists that visit the Jalapão State Park do not have the habit of visiting conservation units. Concluding that this "may indicate the need to invest on education programs of the visitor and divulgation of the minimum practice impact in order to guarantee the conservation of the JSP attraction" [9]. In addition, to highlight the results of the study carried out by Senna which takes into account the environmental perception of the tourist guides/drivers who work within the Jalapão State Park and of the tourists who visit the region [11].

One of the study's results showed that behaviours the tourist guides are inadequate, indicating the lack of environmental orientation given to tourists during the ecotourism tours. While interviewed, the guides claimed to perform orientations about the cares for the natural environment, but 48% of the interviewed tourists reported the opposite, that they have not received any guidance about appropriate behaviour in the place.

The research concluded that the environmental education activities practiced in the itineraries of the region are still not very effective, due to the lack of sustainable planning of the ecotourism activities and programs focused on conserving the natural environment and the well-being development of the local population. Thus, it was recognized there is a need to discuss ecotourism practices in the JSP itineraries and propose an environmental education program for them, in order to build awareness among all stakeholders (community, tourists and tourist guides) of this practice and new forms of engaging with nature.

The perfect ecotourism practice should be implemented in tourist attractions by a conscious and sensitized society, working for the planet's sake; nevertheless, Would that not be a myth? In order for tourists to enjoy the natural resources according to these principles, it would be necessary for them to fully aware of the widespread damage the natural environment suffers around the globe. It is necessary to touch the emotion of each individual with the aim to encourage a sense of awe as they gaze on nature.

A traveller typically selects a tourist package based on its originality; that is, the individual has to satisfy their physical and psychological needs, and the selected destination has to provide the fulfilment of the individual's desires. In this context, tourists see the conservation units as a place where they can have a deeper contact with nature. The sale of touristic packages focused on nature happens based on those facts; the greater the possibility of fulfilling a desire is, the greater the sale of the package is, and thus, the term "Eco" is being used as a marketing term, and not as a conservation term.

It is necessary "to work" the human perception through education. The tourist has to understand that the units of conservation are not created to satisfy their needs, but to preserve the environment and the right to live of thousands of species. In this sense, the environmental science can be seen

as the incentive of attitude changes in ecotourism practices and to be part of itineraries that contemplate their knowledge through environmental education practices.

At the International Conference of Natural Environment and Society, held in 1997, it was claimed that "environmental education was a way of bringing behavioural and lifestyle changes, aiming to disseminate knowledge and to develop training public skills, to support changes towards sustainability arising from other sectors of society" [12]. Thus, it becomes increasingly important to combine to this activity and environmental education programs that involve all stakeholders of this practice in natural areas; the community, tourists, companies, professionals and active organizations, because according to the author, "there is a need to develop habits, values and attitudes of respect for the natural environment and to the communities that live there" [13].

By analysing ecotourism as an activity to be proposed, which arouses the practitioners' interest in learning about nature and being motivated to conserve it, we can consider that environmental education is an important strategy to be introduced in the practice of ecotourism. The aim is to enhance the chances of conserving protected areas and integrating knowledge of environmental science in the field. Ecotourism "values" excursions, walks, and fieldwork where people are able to experience direct contact with nature, giving them a unique and important opportunity to learn about the natural environment, establish social relations with the environment and to develop attitudes that tend to be responsible [13]. Thus, we will present an environmental education program that is in line with the ways of thinking of environmental science, in order to enhance and deepen the experience of tourists visiting JSP and give them opportunity to view nature with a new perspective. At the same time, it hopes to change the attitudes and understanding of visitors of the natural environment, while guaranteeing for the local community, conservation of the natural environment, as well as the indigenous culture and lifestyle of the area; thus, assuring that their "heirs" will be able to enjoy them for generations to come.

Prior to visiting the region, visitors should be educated on the natural environment and its conservation. Visitors would receive a "class" on the region with the aim of not only informing, but of stimulating diverse feelings that will lead them to reflect on its significance. These educational classes should not only be informing, but should be engaging and thought provoking; this can be done through the use of videos depicting the environmental degradation and testimonials from the local community impacted. This in-depth introduction encourages a more personal or "emotional" connection with both the indigenous community but also the natural environment, which it is hoped will instill in visitors the importance of environment conservation.

On the problem of garbage, as we understand rubbish is everything that cannot be reused, including paper, plastics, cans etc.; tourist taking part in ecotourism should be encouraged to take (or the agency itself leads) garbage bags and to dispose of their waste appropriately. However, beyond

simply telling tourists to collect their rubbish, they should be encouraged to take a more sustainable approach; this can be done through educating on recycling activities. Going beyond the notion of garbage, local artisans can incorporate recycled waste into their crafts. Thus, visitors are educated in a participatory, fun and cultural way.

The paths made by eco-tourists also cause some kind of impact, and should not be seen simply as a "walk". They should be seen as a "dialogue" with nature. Thus, we emphasize the importance of not picking up plants, flowers, or leaves etc., or disturbing the natural environment, as much as is possible. The contact with nature would be much greater if the tourist felt that they were collaborating with it. It could be done a program for tourists, where anyone who made the trail, should, in the end, plant a seedling of some tree or plant typical of that space. Therefore, they would be collaborating with the continuation of species that exist there. They would also receive information about the fauna and the flora of the place.

The cultural characteristics of the Jalapão region should be explored in a deeper way. The golden grass, which stirs the curiosity of many people who visit the region, should not only be sold to the tourist, but must express something more. Instead of stopping at the communities that make the handicrafts from golden grass to buy it and then leave, the tourists should receive some cultural information about it. They could also learn about the places where the golden grass sprouts, how it grows, the periods of harvesting etc. Moreover, from there, follow the process of manufacturing the craft. In addition to giving greater importance to the manufactured objects, the true sense of tourism would be awakened in this community; that is, the involvement with the place and the conservation of its culture. It would make the itinerary tours not only a diversion for the tourists, but also the construction of cultural knowledge.

We can also observe that current tourists are not interested in contemplating nature. So how could we develop a proposal that would arouse their interests? Well, the region, as seen in the previous items, is conducive to such an activity, since it is an environment full of natural landscapes. We must revive the delight in the look of these tourists towards nature using some means that approximate them to these landscapes. Providing information about the Jalapão landscapes, how they were formed (their historical process), photography workshops and so on, could be included in the tours to educate tourist to better observe and understand their visited environment.

Tourists need to feel that they are not just taking part in a tour in the middle of nature. They did not buy a new product when they decided to visit the region, rather they wanted to have a new experience, something that interacts with their feelings, and which gives them a sense of responsibility in taking care of the visited sites, while at the same time, find in those activities the leisure and the fun that they also seek.

IV. CONCLUSION

The search for new ways of developing makes that, consequently, sciences perform an important role, the one of

disseminating the transformations that occurred on our planet.

The threat of an environmental crisis incites the world to come together, attempting to solve the environmental problems that are occurring, giving rise to a great challenge for humanity; sustainability.

The principle of sustainability has been studied by various science disciplines that have tried to formulate concrete and correct models. Much has been discussed about sustainability, several views have been put forward to try to explain it, and environmental science has emerged from various environmental discourses that have tried to establish a new conception for the understanding of this complexity.

A science with an interdisciplinary deepening, aiming to studying solutions to the enormity of the environmental impacts generated by man. This new science brings into the debate the dominant paradigm, the dominant forms of production, their implications, confronting sustainability with production and consumption, and thus, generating a complex object of study that must be studied in a fragmented way by the various areas of knowledge.

Based on the knowledge proposed by the environmental science, also proposed in this study is a new ecotourism practice in the JSP region that would be capable of integrating knowledge and emotions, seeking for an environmental rationality.

The author wrote about how ecotourism is practiced in JSP, and concluded that site promotion, both, by the state government and the national media, is generating an idea of an environment conducive to extreme activities. That idea has attracted many people looking for adventure. As there is no formal planning of this environment, these activities are engendering destruction and misuse of natural areas. Thus, the tourism that is taking place is disordered and unstructured and cannot be considered as authentic ecotourism. The infrastructure would need to receive and focus people in specific areas that currently do not exist or are insufficient.

Starting from the assumption that for being sensitized the tourists need to "know" nature and promote actions for its preservation. We highlighted actions to work the tourists' human perception through education and ecology; subsequently, the ecotourism itinerary tours to Jalapão will possibly promote a balance between the natural environment and the tourists, thus making them environmental tourists.

We understand that to change this framework, it is necessary to begin a process of transformation by adopting measures that are within the reach of each one and that are of vital importance for the environment conservation. For this, it is necessary that guides, agencies, the community and management bodies act together, so that tourism in this location can come to a level of organization that will reap benefits.

We must change the practice of these itinerary tours, beginning with the sensitization of tourists, making environmental education part of their itinerary in an effective and life-changing way.

Environmental science is still being constructed; its conception of sustainability and the current mode of

production have been challenging the interests of a consumer society. The challenge for its practice and dissemination in ecotourism activity is to attempt a transformation in the exploratory consumption notion of society into a consumption focused on conservation, and thus guaranteeing for the tourist, a new perception of the environment.

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