# THE NECESSARY UNDERSTANDING OF THE ENHANCED CONSEQUENCES OF A DISASTER

This last volume of 2015 of Ambiente & Sociedade could not leave out a thought about the greatest environmental disaster to have ever occurred in Brazil.

On November 5th 2015, the breaking of the dam owned by the mining company Samarco (product of the merging of Vale do Rio Doce and the English-Australian BHP Billiton) in Mariana, Minas Gerais state, cleared 60 billion liters of iron-mining waste into and across more than 500km of the Doce river, Brazil's fifth biggest river basin.

The *Rio Doce* hydrographic basin has a drain area of 86.715 $km^2$, 86% of which is on Minas Gerais east side, and 14% on north-eastern Espírito Santo soil. It has an extension of 879km, and its springs lie on Minas, at Mantiqueira and Espinhaço mountains. The discharging of the waste has had profound consequences, with its main effect being the silting of the basin's rivers and streams, leaving an environmental damage beyond measure and repair.

This waste avalanche left a devastation scene at Bento Rodrigues, the most affected district. Located 2km away from the breaking spot, 85 of its resident families lost their houses or had their properties affected in some way. By the end of December 2015, 17 people were found dead, buried under the toxic mud, and there are still 3 people missing.

According to researchers of Manuelzão project (environmental project at Federal University of Minas Gerais, which monitors economic activity and its environmental impacts on river basins and conducts studies focused on the main Minas rivers), the environmental recovery will be extremely complex.

There remains a controversy as for the toxic composition of the mud, chemically speaking; however, lab tests performed by environmental management agencies in Minas Gerais throw the presence of arsenic and heavy metals such as lead and cadmium at Rio Doce. A waste tsunami degraded not only the environment, but the life of small farmers, fishermen, and citizens as well, for the mud covered the both the bed of the rivers and its banks, negatively impacting biodiversity too.

The sludge ran downstream, killing fish in a scale never seen before. The Rio Doce biodiversity, with close to 80 diverse species, became seriously affected. Many rivers and streams were completely buried (why not say "cemented") or severely silted, compromising the entire ecosystem. As if this wasn't enough, the mud got to the sea.

The modification of the coastal ecosystem brings further complications to the matter. The impact the mud had, and is still having, on fresh and seawater has not been quantified.

Moreover, every community along the Rio Doce had their water provision compromised. What can be noted is that this social-environmental disaster is an example

of environmental injustice, as it unveils the negligence and inoperativeness of various government entities and of the companies before this kind of events.

This disaster was not treated as such, because it was not handled as an emergency when containing and alleviating damage.

Nonetheless, specialists and technicians in the fields of mining and environment consider this as an announced tragedy, for two reasons. On the one hand, by virtue of the environmental degradation, for there is a visible environmental debt in the soils and waters. And on the other hand, due to negligence, given that supervision by government bodies fell short . Mining norms and regulations and environmental permits were ignored; had the company complied with them, this event might not have happened.

The point cause of the accident hasn't been reported yet. The most likely scenario: a fissure in the dam. However, the problem is previous; lack of planning, and flaws within the mining model, in the monitoring, and in social-environmental supervision.

This accident shows that mining control in Brazil follows a logic in which safety is secondary, together with political omission of supervision, and punishments that do not promote change within the corporations.

When compared to great environmental disasters from abroad, compensation charges collected in Brazil are extremely reduced (British Petroleum paid US$ 26,1 billion in compensation for the Mexican Gulf accident in 2010). Brazil's federal government and Minas Gerais and Espírito Santo state governments, directly affected, are suing the responsible companies for US$ 4 billion in order to create a restoration fund; this value is not final.

Previous studies, years ago, already recommended the execution of annual geotechnical monitoring of the dam, elaboration of risk and accidents contingency plans, and design fool-proofing and rupture analysis, in order to pinpoint destabilization and erosive processes. The lack of actions and solutions unveils how much environmental licensing has been neglected.

The social issue must be considered as worrying, because in addition to the lack of urban water supply, the population is receiving bottled water from donations by the civil society; many economic activities were impaired, and various cities along the Rio Doce had their everyday life altered.

In broad terms, this is the scenario.

Something worth mentioning, Brazilian scientists have voluntarily organized themselves to perform an independent environmental impact assessment. Many of them have displaced themselves to the affected places and they are collecting data and samples for analysis. This is part of a growing idea called Citizen Science (*Ciência Cidadã*), and for this purpose, a crowdfunding initiative has been launched to finance the elaboration of independent and exempt briefs.

The innovation behind all this relies on the independent mobilization by the civil society to tackle one of the greatest environmental disasters in Brazilian territory, given the affected rivers and their communities, and taking into account that the attitude of the public institutions is vague when facing the huge economic power of the involved ones.

The final brief will be publicly owned, becoming a tool to prevent the responsible ones to remain unpunished, the authors say. Also, digital media has been a key actor; it is through them that the teams organized themselves to optimize the collection of water and sediment samples.

The biggest environmental disaster in Brazil deserves an insightful analysis. The catastrophe is already here, but we need to point out the flaws, the gaps, the mistakes. Moreover, we need to learn and elaborate solutions for this serious event, and for disasters like this not to happen again.

Opening up this volume, the article "*Harmonization of legal environmental standards in Mercosur Countries*", by authors **Celso Maran de Oliveira** e **Isabela Battistello Espíndola**, discusses how this harmonization process can promote advancements in regional integration in Latin America and in environmental protection of the whole continent.

Using semi-structured interviews, authors **Lara Cristiani Rocha** e **Vanessa Barbisan Fortes** identified and analyzed existing conflicts between rural population of Ibarama, Rio Grande do Sul state, and the company Dona Francisca Usina Hidrelétrica. The increased number of macacos-prego, due to the habitat alterations caused by the dam construction, is focus of the article called **"***Perceptions and attitudes of rural residents towards Capuchin monkeys, in the area of influence of the Dona Francisca Hydroelectric Power Plant, South Brazil*".

On the basis of questioning the concept of sustainability through ecology, economics, sociology, and anthropology, the article "*Amid hybridism and polysemy: a sociological analysis of sustainabilities*", by authors **Roberto Donato da Silva Junior, Leila da Costa Ferreira** e **Thomas Michael Lewinsohn**, proposes a sociological analysis about sustainability, adopting a methodology which can articulate interdisciplinary proposals and practices.

Authors **Rodrigo de Azambuja Brod e Jane Márcia Mazzarino** discuss the relationship between urban space and the construction of identities and social relations in public space in the article *"Whatever stays, flows or talks: identitary places within the urban environment".*

The article "*The Environmental Health Field: An Opportunity to Reach Science Education Goals*", by authors **Silvia Lizette Ramos De Robles**, **María Guadalupe Garibay Chávez** e **Arturo Curiel Ballesteros**, highlights, by means of a historical analysis, the importance of the connection between environmental health and scientific literacy, seeking to form individuals capable of taking responsible social-environmental decisions.

Based on the analysis of secondary data, authors **Rubana Palhares Alves** e **Natalia Hanazaki** discuss a relationship between protected areas and local human populations for the improvement of the management of these territories, in the article "*Coastal-Marine Protected Areas in Santa Catarina under the local people's perspective: contributions of the literature*"

The article "*Now under new administration: fishing agreements in the Brazilian Amazon floodplains*", by the authors **Antonio Francisco Perrone Oviedo, Marcel Bursztyn e José Augusto Drummond**, takes the theory of the common resources and uses it to analyze the origins and the functioning of the fishing collective agreements of the inhabitants of Brazilian Amazon wetlands.

Authors **Helbert Medeiros Prado** e **Rui Sérgio Sereni Murrieta** analyze the transformations of local ecological knowledge from its cognitive, historical, and Newtonian-science interface dimensions in the article "*Ethnoecology in perspective: the origins, interfaces and current trends of a growing field*".

Through an exploratory study, the article *"A call for reflection on the category of wildlife refuge conservation unit"* investigated the origins of this category of conservation area as well as its effectiveness, since these areas are compatible with both productive activities and wildlife protection. The authors are **Marcia Casarin Strapazzon** e **Nilvânia Aparecida de Mello**.

As he analyzes the conservationist speech present in Caribbean music lyrics in the article *"Salsa with Coconut: Challenges for conservation biology, food emphasis and ethno--ecology of Afro-caribbean dance music"*, author **Edgardo I. Garrido-Pérez** argues about communication efficacy of music and dance languages in valuing elements of nature.

By means of bibliographic survey, document research, and interviews, the authors **Amanda Silveira Carbone**, **Sonia Maria Viggiani Coutinho**, **Stephan Tomerius** e **Arlindo Philippi Junior** analyzed green area management in São Paulo city and its advancement towards sustainability, in the article "*The management of green areas in the municipality of São Paulo: advances and limitations*".

Author **Thiago Bandeira Castelo** evaluated the effect government programs on fighting deforestation have on the Amazon, and the likely damage that can be inflicted to the biome with the forest code amendment, in the article *"Brazilian Forestry Legislation and to combat deforestation government policies in the Amazon"*.

Aiming to draw an overall picture of composting in São Paulo state, aside from identifying and characterizing experiences and practices, the authors **Thais Menina Oliveira de Siqueira e Maria Leonor Ribeiro Casimiro Lopes Assad** grouped and analyzed different composting modalities, based on the process management criteria, in the article "*Composting of Municipal Solid Waste in the State of Sao Paulo (Brazil)*".

The authors **María Luz Endere** e **María Laura Zulaica** analyzed, by means of indicators, the social-cultural sustainability at the archeological spot Agua Blanca, Centro de Turismo Comunitario, in the Manabí province, Ecuador, under the point of view of the government program "Buen vivir", in the article "Sustentabilidade sociocultural e "*Socio-cultural sustainability and "Buen Vivir" (Good Living) at heritage sites: assessment of the Agua Blanca case, Ecuador*".

Closing this number, the article "*Conflicts among second homes, protected areas and traditional communities in Southeastern Coast of Brazil*" by author Sidnei Raimundo, analyzes the conditions that improved access to a second home in these areas, in addition to identifying conflicts among local actors and proposing solutions.

We wish you all a pleasant reading.

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