http://dx.doi.org/10.18623/rvd.v14i30.1185

THE BHOPAL DISASTER: RISKS AND VULNERABILITIES IN TRANSFER OF TECHNOLOGIES AND THE RIGHT TO KNOW

Ellara Valentini Wittckind

Master's degree in Public Law from UNISINOS (São Leopoldo-RS) - Research Line: Society, New Rights and Transnationalization, Postgraduate in Law and Labor Process by URI (Santo Ângelo-RS), Lawyer, Law and Process Work, Critical Philosophy, Critical Sociology, especially from the studies of Axel Honneth and Nancy Fraser.
Email: ellarav@hotmail.com

Juliane Altmann Berwig

PhD student in Law at the University of Vale dos Sinos with a scholarship by the Coordination for the Improvement of Higher Education Personnel (Capes) by the Program of Academic Excellence (Proex). Master in Law from the Vale do Rio dos Sinos University, specialist in National and International Environmental Law from the Federal University of the State of Rio Grande do Sul and a Law Degree from the University of Santa Cruz do Sul. Professor at the FEEVALE University Law School. Researcher in the Environmental area with emphasis on Risk Theory and Nanotechnology. President of the Gaucha Association of Lawyers of Environmental Business Law AGAAE. Author of the book Disaster Law in offshore oil exploration.
Email: juliane@berwig.com.br

Wilson Engelmann

Doctor and Master in Public Law by the Post-Graduate Program in Law (Master and Doctorate) of the University of Vale dos Sinos River - UNISINOS / RS / Brazil; Professor of this same program of activities: "Legal Transformations of Private Relations" (Master's degree) and "The Challenges of Contemporary Transformations of Private Law" (Doctorate); Executive Coordinator of the Professional Master's Degree in Business and Business Law from Unisinos; Leader of the JUSNANO Research Group (CNPq); Research Productivity Scholar at CNPq. E-mail: wengelmann@unisinos.br

ABSTRACT

Technological disasters, since its origin in the Industrial Revolution, are part of the reality of society, with frequent losses from the loss of lives to the compromise of ecosystem services. These events carry the lesson that the development of technologies must be accompanied by the diagnosis of their risks through the balance between knowledge and safety, the likelihood and potentiality of their damages. In this context, the article aims initially at narrating the disaster of Bhopal in Sheila Jasanoff and, in the second moment to analyze the disasters under the systemic aspect that marks the society of risk. Therefore, we will use bibliographical research and the systemic-constructivist matrix as a methodology to demonstrate

the complexity surrounding disaster risk prevention strategies, taking into account technology transfer between states and pre-existing vulnerabilities.

Keywords: disasters; Bhopal; technological risks; right to know.

O DESASTRE DE BHOPAL: RISCOS E VULNERABILIDADES NA TRANSFERÊNCIA DE TECNOLOGIAS E O DIREITO DE SABER

Resumo: *Os desastres tecnológicos, desde sua origem na Revolução Industrial, fazem parte da realidade da sociedade, com frequentes prejuízos que partem da perda de vidas ao comprometimento de serviços ecossistêmicos. Estes eventos trazem a lição de que o desenvolvimento das tecnologias deve vir acompanhado pelo diagnóstico de seus riscos, mediante o contrapeso entre o conhecimento e a segurança, entre a probabilidade e potencialidade de seus danos. Diante deste contexto, o artigo objetiva inicialmente narrar o desastre de Bhopal, em Sheila Jasanoff e, num segundo momento, analisar os desastres sob o aspecto sistêmico que marca a sociedade de risco. Diante disso, se utilizará da pesquisa bibliográfica e da matriz sistêmico-construtivista como metodologia, a fim de demonstrar a complexidade que circunda as estratégias de prevenção de riscos de desastres, tendo em conta a transferência de tecnologia entre Estados e as vulnerabilidades preexistentes.*

Palavras-chave: *desastres; Bhopal; riscos tecnológicos; direito de saber.*

INTRODUCTION

Modern society experiences AN exposure to unprecedented technological risks that have materialized themselves in disasters with a high power of destruction. Bhopal (1984), Chernobyl (1986), Gulf of Mexico (2010), Fukushima (2011) and Mariana (2015) are the best known worldwide. All these events are due to the economic models of dynamic production that, connected by globalization, have facilitated agile development. On the other hand, the deficiency in the management of the risks involved generates serious human and environmental damages that are pulverized in space and perpetuate in time.

In this scenario, anthropogenic (caused by human action) disasters of technological (chemical) nature, produce the containment of their catalyst. Given their technological initiative, they allow and require risk management for the prevention of the event causing the disaster, unlike natural disasters (geological, climatological, meteorological, biological) that do not allow control at the beginning of the event, but only after the consequences appear (emergency response, mitigation and repair).

With these considerations in mind, this article will deal with the technological (chemical) disaster of Bhopal, which occurred on December 3, 1984, one of the most important in history. The initial objective is to narrate the causes and consequences of this disaster, bringing the necessary support, in a second moment, to understand the environmental disasters in the society of risk. With this theoretical framework, the objective is to demonstrate the importance and parameters of risk analysis and vulnerability in disasters caused by transfers of technologies between states and the "right to know" as an important consideration for prevention and disaster mitigation.

To do so, based on the systemic theory of Niklas Luhmann, the article will use bibliographical research and the systemic-constructivist matrix as methodology, in order to demonstrate the complexity of the society of risks, which comprises disasters for its prevention strategies. Therefore, the problem to be faced is the importance of analyzing the risks faced by the vulnerabilities of the location reached, the transfer of technology between states and the role that the "right to know" may represent in this scenario.

The hypothesis of solution of the problem, based on the systemic theory, will be based initially on the demonstration of the paradigm between economic development and the risks of technology. These, contextualized, allow the understanding of vulnerabilities, from which it is possible to construct the necessary notes for the dissemination of information ("right to know") in the prevention and mitigation of technological risks.

Thus, in the first topic will be approached the disaster of Bhopal under the phatic bias, that is, its causes and consequences. In the second item will be analyzed the particularities of the society of risk with regard to the risks of anthropogenic disasters in the transfer of technologies between states, when there are vulnerabilities. The third topic will deal with the right to know, based on Sheila Jasanoff's studies, specifically on the understanding of vulnerabilities and the need for information, through the "right to know" in preventing the risks of human and environmental damage.

1 THE BHOPAL DISASTER[1]

At dawn on Dec. 3, 1984, in Bhopal, India, a toxic cloud blanketed the city sky and spread through the villages around the Union Carbide pesticide factory. The factory was set up in the capital of Madhya Pradesh in the 1970s. The disaster has caused diseases, deaths, contamination of ecosystem services, and questions about their causes and consequences. The disaster turned 30 in 2014. In the search to understand the facts that contributed to the occurrence of this disaster and its consequences, it is important to realign its past and future events.

Union Carbide was established with the possibility of generating income and jobs, and thus the community of the city and the region was receptive, given the precarious conditions in which they lived. At the beginning of its facilities, the plant was frequently visited by professionals from the American matrix, in view of the large profits made with the sale of the "Sevin" insecticide (now owned by Bayer), produced from "carbaryl", discovered by Union Carbide, which was commercialized in 1958.

After a few years of implementation, a rival company settled nearby, which led to a decrease in sales of agrochemicals by Union Carbide.

1 Information about the disaster was taken from: JASANOFF, Sheila. The Bhopal disaster and the right to know. *In***Soc. Sci. Med.,** vol. 27, n. 10, 1988, p. 1113-1123.

In order to resume sales and reduce maintenance costs, the company has reduced its staff, laid off former supervisors and hired others with less experience. In 1982, inspectors from the parent company found that worker training in Bhopal was insufficient. Also, that there were numerous technical failures, equipment problems and maintenance. The partner of the company left the decisions of the Bhopal plant on security issues under the autonomy of the Bhopal factory. However, in the face of the precariousness of diagnosis, the imported (from a developed country) way of producing, managing and organizing was no longer compatible with the working conditions of the importing (from an underdeveloped country).

From then on, the leaders of Union Carbide, the American headquarters and Indian subsidiary, discussed the maintenance of the Bhopal plant. Local leaders feared the lack of jobs and income for the people who lived there, considering that the majority of the neighboring population depended on the work in the company. As a result, the decision was to maintain the factory.

At this point, it is essential to quote Beck's lesson that progress replaces consensus and also replaces questioning how ends justify means with unknown or inconsiderate consequences. In other words, "the devil of the economy must cross the holy water of public morality and adopt an appearance of saint in relation to social foresight and nature" (BECK, 1998, p. 238).

Soon after the decision to continue the operation of the company, the disaster occurred. The methyl isocyanate was discharged into the open air for lack of maintenance in the machinery. It was estimated that 40 tons of gas was dispersed by the plant pipe, reaching much of the population of Bhopal.

To clarify, methyl isocyanate (MIC) at 0 ° C and under the pressure of 2. 4 liquid bar. At the time of the accident, the pressure of the storage tanks rose to more than 14bar and the temperature of the reservoirs approached 200ºC. The probable cause of increased pressure and temperature was attributed to the inflow of water into one of the tanks, causing a highly exothermic reaction. The vapors emitted, under controlled conditions, would be neutralized in the purification towers. However, one of these towers was deactivated, which led to the release of the product in gaseous form, "pure", and highly lethal (JASANOFF, 1998, p. 1113-1123).

It was estimated that 8,000 (eight thousand) people died as a direct consequence of the gas leak. The initial symptoms reported were: severe head and stomach pains, burning eyes, burning of the airways, dehydration, vomiting, loss of consciousness and, in many cases, instant death (JASANOFF, 1998, p. 1113-1123).

The disaster caused, in addition to immediate victims, transgenerational victims, since, after more than thirty years, people are still born with genetic diseases, degenerative diseases, physical deformities, eye diseases, brain damage, among others. The chair of generations of animals has also been damaged, with deformities and genetic diseases. The contamination reached even the groundwater, reflecting on the health of the population, since the food grown on the site was also damaged, generating a chain of damages.

Before the event, the causes pointed to its occurrence were: plant installed in a populous place; absence of contingency plan; technology not related to the degree of development (economic, social, legal) of the place; workers without qualification; failure in storage and access to methyl isocyanate (MIC); large amount of stored chemicals; unrestricted access to chemicals; products without prior solid knowledge; ineffective legislation in Medhya Pradesh; precariousness and inefficiency of emergency assistance to victims; lack of safety / health control of workers and the population; damage to important machinery in the process of manufacturing pesticides (cooler and purifier); lack of information and knowledge about the MIC, besides the inappropriate use of the MIC and the lack of command and control instruments (JASANOFF, 1998, p. 1113-1123).

According to Morone and Woodhouse, the volume of this list of errors is reminiscent of the "Three Mile Island" accident (TMI). The difference between the two disasters is that the IMT had disaster control systems that prevented serious health effects for people, while in Bhopal thousands died or were injured / sick / intoxicated. Thus, although the chemical industry in the United States is largely self-regulating, most domestic plants employ relatively sophisticated security tactics, but are often not installed in the subsidiaries (MORONE; WOODUSE, 1998).

Following the disaster, in the words of Jasanoff, Union Carbide did not assume responsibility for the damages. It paid only to the government of India, after five years of judicial dispute, a derisory indemnity in the face

of the seriousness of the contamination. Union Carbide was incorporated by Dow Chemical (MORONE; WOODHOUSE, 1998).

India's attempts to transfer legal sanctions for the failure of the Bhopal plant back to the risk-exporting country proved itself to be arduous. The lawsuit filed by the Indian government on behalf of the victims of Bhopal has never gone to trial. Instead, after the judicial discussion on where the case should be tried, the matter was settled in favor of Union Carbide, designating the Indian justice as competent, then the plaintiff of the action (Government of India) on behalf of the citizens accepted the proposed $470,000,000 from the Union Carbide agreement in May 1989. This agreement not only put an end to all pending claims against Union Carbide, resulting from the gas leak, but also brought an end to investigations into the facts (JASANOFF, 2008).

Deva mentions that the Bhopal disaster killed more than 20,000 people, among other medical problems and environmental degradation. The catastrophic event not only exposed the limitations of legal norms in the accountability of a multinational company for a number of human rights violations, but also triggered the change of laws and the evolution of new legal principles (DEVA, 2012).

Thus, along the lines of Jasanoff's studies, dependency relations were inscribed twice. Not only did India need to import innovations from Union Carbide regarding the technology for producing agrochemicals, but Indian courts also had to accept the conceptual framework of US corporate law in the mode of control (PATEL; PETLAKH, 2014).

Finally, from the description of the Bhopal disaster, it is possible to understand the security flaws represented in the risks, as well as the preexisting vulnerabilities in the place that increased the human and environmental damage at the time. That said, in order to meet the objectives of this article, it is important to understand the society from the systemic view and its reflections about the events of disasters from the transfer of technology.

2 THE DISASTERS OF RISK SOCIETY IN THE TRANSFER OF TECHNOLOGIES BETWEEN STATES

Initially, it should be mentioned that the event in Bhopal was not exclusive; in addition to countless other disasters in different technologies, the transfer of technologies between states is the subject of recurrent discussion. Many people in India, especially those who live in rural areas, do not have adequate knowledge, making them an easy target for exploitation. As the author Deva mentions, Indian society is a "survival society" (DEVA, 2012). In the same sense, in Mexico, there are no regulations for the protection of workers exposed to asbestos; the levels of dust in Mexican factories are not monitored, and workers do not use specific safety equipment (respirators). Employees receive only the minimum wage and are not informed about the dangers they face in carrying out the work (JASANOFF, 2008).

Morone and Woodhouse cite other cases, such as that of Dow Chemical (company that bought Union Carbide) and Chevron, which used the third world as a "dump" for hazardous chemicals, especially DDT (agricultural defense widely used worldwide)). For example, Ortho (a division of Chevron and a Standard Oil of California) in Costa Rica is the main importer of eight banned or severely restricted pesticides: "paration", "DDT", "aldrin", "dieldrin "," Heptachlor "," chlordane "," endrin "and" benzenehexa-chloro "(BHC). In Ecuador, Shell, Velsicol, Bayer, American Cyanamid, Hercules and Monsanto are the major importers of pesticides banned in the United States. In Colombia, fourteen different companies import practically all agrochemicals banned in the United States since 1970 (MORONE; WOODUSE, 1998).

Morone and Woodhouse suggest that the fundamental moral problem raised by Bhopal can be translated into these questions: Are companies obliged to ensure equal protection against risks across national boundaries? Are companies only required to provide the protection required by the law of the country receiving the technology? (MORONE; WOODHOUSE, 1998).

The ideal scenario would be that the development process would be transparent, participatory and humane, with participation of all stakeholders in the business decision-making process (DEVA, 2012).

On the contrary, "transfers of dangerous technologies are based on the fact that risk assessment in developed countries is isolated and separated from analogous moral requirements in developing countries," unleashing what the authors call "isolationist strategy. "That is, transfers of risk technologies to other countries occur frequently, but recipients impose security conditions or sanctions, which are, however, "typically minimal or non-existent". (MORONE; WOODHOUSE, 1998).

Therefore, risks arising from technologies as well as those involving chemicals should be investigated, evaluated and managed considering their probability and magnitude of causing serious environmental damage (BERWIG, 2015, p. 211-233). Reactions of the various other chemicals, as well as air, water, under different control conditions, may generate other damages or even cause a damage amplifier effect.

As a consequence, risk analysis must be incorporated into development processes that logically can disadvantage some sectors of society. In this regard, it is essential, in taking stock of pros and cons, that the government properly consider the interests of those affected by development projects, in addition to expanding and strengthening the scope of human and environmental impact assessment. The State should not relinquish its duty to protect only the interests of the business sector (DEVA, 2012).

Jasanoff records that the Bhopal disaster reveals "the human costs of globalization," and that this disaster also illustrated the inability of law and science to restore order after the result of the radical clash between different cultures, knowledge and justice of the implantation of the American technology in Indian soil) (JASANOFF, 2008). Morone and Woodhouse mention that the risks of technology transfer are viewed by large companies as disengagement, not being responsible for the protection of all people, but the recipient state. That is to say, in setting up in another State, because of the benefits, they would have no responsibility with regard to safety (MORONE; WOODHOUSE, 1998).

Another thesis defended is that of consent. That is, even if the risk transferred may threaten personal safety, it is argued that the beneficiaries of the technology consented. This thesis rests, in part, on the classical economic theory of compensation wages, because when people take positions of risk to receive higher wages, they are implicitly

accepting them. By analogy, proponents of the consent argument argue that institutionalizing greater public health risks is acceptable because citizens voluntarily agree to trade some security for greater public benefits such as a stronger economy or a better standard of living. (MORONE; WOODHOUSE, 1998).

While there are theories in favor of accepting risks in exchange for economic and / or social benefits, this point of view must be analyzed with due accuracy. This is because, although especially in developing countries, the desire for material prosperity is significant, this does not mean that workers, the population and the environment are willing to submit to risks and suffer losses and harm Human Rights. In Beck's line, the transfer of Union Carbide's technology to the Bhopal plant was no coincidence; what happened was a "pulling force" between extreme poverty and extreme risks, in a place where the needy and unemployed population was more receptive to technology, which was seen as an opportunity for work and prosperity (BECK, 1998, p. 48-53).

The conflicts arising from the distribution of wealth are replaced by the problems arising from the production, definition and distribution of technical and scientific risks. The process of modernization, then, becomes reflexive and fails to focus on the questions of application of technologies and becomes concerned with their management (BECK, 1998, pp. 25-26).

According to Georgi, underdeveloped countries are only considered so from the perspective of the developed countries. While they impose their policies by virtue of their economic power, they may legitimately have as their development objective the maintenance of underdevelopment in other countries (GEORGI, 1994, p. 45-54). Thus, in the case analyzed, as the local population was not aware of the risks, Bhopal's choice was indeed the "best" for the American company, since "the evidence of misery hinders the perception of risks" (BECK, 1998, p. 51). Also, the threat of job loss served as a pretext to increase production and thereby the emission of industrial waste and the failure to research and publicize its toxic effects.

Risk production and ignorance of its effects find an interest in the advantages of productivity, or, according to Habermas, an increasingly productive interest in knowledge (HABERMAS, 1975, p. 291-302). In this sense, Georgi (1994, p. 49). points out that:

> Modern society is characterized by its great capacity to control indeterminations. And thus, of its production. This paradox adds to the need for protection and security. It is the need to act so that the indeterminations do not acquire structure value: the need to prevent the deviation from stabilizing. Let's say it is the need to avoid that lower-grade normality, which flows below the normalcy we know when reason is in tune with time. This lower grade normality produces insecurity. Of course, as the certainty grows that the indeterminations that enter again into the sphere of this second normality can be imputed to the decisions, search for other decisions.

Thus, the objective of modern society, based on development without the monitoring of risk management, has already been proven inefficient, given the potential human and environmental damages that can be caused. Therefore, disasters, given their magnitude and complexity, with the achievement of a large part of a society, various goods and services, are considered as systemic events. Given this perspective, the theory developed by Niklas Luhmann proves to be effective for understanding disasters and seeking ways to prevent (BERWIG, 2015, p. 32-33).

Thus, from the systemic view of Luhmann, society presents itself with the characteristics of a system, allowing the understanding of social phenomena through the interdependence bonds that unite them and constitute them in a totality. Subsequently, society is formed by several functionally differentiated systems, which are connected by communication. The limits of society are the limits of communication; since it is no longer possible to isolate itself within society by virtue of communication, modern society constitutes itself as global (ROCHA, 2007, p. 51).

The process of modernization made the social system even more complex and multifaceted, and it was no longer able to control itself. The process, then, is applied to itself, since society lives under the absolute control of the modernization of industry. This modernization, however, by virtue of its autonomization, subtracts from itself the very foundations. It is born, then, a second modern age, which is the risk society. This society begins where the social norms systems that promise security fail because of the inability to control the threats that come from decisions in the face of new challenges. The threats are diverse, of an ecological, technological and political nature (GEORGI, 1994, p. 45).

The answer to these facts lies in the imminent preoccupation with

the accumulation of power of the technological-economic "progress" that increasingly overshadows the production of risks. In this respect, it can be said that late modernity and the social production of wealth were systematically accompanied by the social production of risks (BECK, 2010, p. 23). In this equation, velocity is directly proportional to the risk production. These events, which stem from disordered growth, are actually generating risks to society, with effects that establish links with the future, that is, consequences borne by future generations (BERWIG, 2015, p. 28). These facts are clearly seen in the Bhopal disaster, where the social vulnerability presented by underdevelopment was the fuel for the accelerated and careless pursuit of development.

Thus, in the risk society, disasters are becoming increasingly common, which is why there must be adequate legal guidance to ensure that disasters are regulated and predicted, as well as to be covered in command and control actions for risks, that is, the legislation should be extensive and comprehensive. As advocated by Farber, Law (Environmental) requires a complex, multifaceted process that demands a systematic approach. Moreover, according to the author, disasters represent a global problem, so solutions must be equally transnational (FARBER, 2012, p. 2-15).

In addition, according to Carvalho, "the current situation is bringing us to a normalization of the consequences of that social format (Post-Industrial Society), that is to say, we face the concretization of neglected risks, in a normalization of disasters" (CARVALHO, 2013). Beck, in this sense, mentions that innovations are projected without their consequences being considered, since they are often not even known (BECK, 1998, p. 241):

> Las ciências experimentales, al proyectar innovaciones, quedan separadas en su concepción y en su relación institucional de las consecuencias técnicas y de las consecuencias de las consecuencias que genaran. El desconocimiento de las consecuencias y la ausencia de responsabilidad forman parte del programa de desarollo de la ciencia. El potencial transformador de la modernidad empieza a resquebrajarse por los "efectos secundários latentes", que, por una parte, generalizan los riesgos para la existência y, por otra, actualizan lo que era latente. Lo que no vemos ni queremos sienpre cambia el mundo clara y amenazadoramente.

In the case of the Bhopal disaster, the lack of organization in the plant was evident, even before the fateful one occurred. In Beck's line, the division of labor would be a general irresponsibility. The causes of accidents have been diluted within the working system, each stage of production being a cause and also an effect. Thus, the idea of the system in the analysis of risks is extremely valid for the perception that "se puede hacer algo y seguir haciéndolo sin tener que responsabilizarse personalmente de ello (...) Se actúa fisicamente sin actuar moral y políticamente. (...). De este modo se busca un culpable a la vista del inminente desastre ecológico." (BECK, 1998, p. 39).

According to Farber (2010), disasters, in addition to what has been mentioned, are potentiated due to the economic interdependence between companies of the same or another State, the social and economic vulnerability of workers and the population of developing countries, occupation of risk areas and the commitment of essential sectors, as a result of the absence of inventories, as Carvalho and Damacena also point out (2013, p. 56)

From this perspective, the risk of damage is unevenly distributed; in general, cheap residential areas are located in the vicinity of industrial areas; On the other hand, risks do not nullify, but strengthen class society (BECK, 1998, p. 39). In the case of Bhopal, this was what happened: the workers lived close to it, vulnerability being the crucial factor for the great extent of the consequences of the disaster.

According to Carvalho and Damacena (2013, p. 47), using the systemic theory of Luhmann, the combination of factors causes "compromise of systemic stability", repercussions on social stability, generating "irradiation and feedback of its causes and political contextually (economic, political, legal, scientific). " Thus, in Bhopal, lack of knowledge, information, training, maintenance of machinery, adequate treatment of the victims, added to the vulnerability of the local population, caused a worsening of the damages due to the irradiation and feedback of the catastrophic results of the disaster.

It adds to this the fact that disaster triggers a series of effects over time, which may be in minor magnitude of the initial catastrophe, in numbers but not less important (SMITH, 2005). In the object of this study this characteristic is strongly marked by the consequences of the disaster,

which caused many immediate deaths, but also deaths and later illnesses. It also caused the damage to ecosystem services in the short, medium and long term and to the health of people and animals, before the birth of beings with deformities and mental problems.

Disaster design focuses on "unexpected" and significant events in terms of loss of human lives and material losses (CARVALHO; DAMACENA, 2013, p. 22). But, as Dauber points out, "'disaster' is, in practice, a malleable term. " Disasters are often seen as unexpected and surprising. However, they should be expected and prevented through the effective use of available information, communication and knowledge by the actors involved (DAUBER, 1998, p. 967).

In response to this, Farber (2010) argues that effective disaster risk management planning must account for "acts of nature […] weaknesses of human nature, and... effects of technology. " Besides, it should be considered that disaster damage cannot be seen as random, but as a reflection of society's failure to adequately mitigate risks (FARBER, 2012, p. 2)

Taking this analysis, the present point aimed to analyze the causes of the environmental disaster in Bhopal and in what way this disaster can be interpreted from the systemic theory of Niklas Luhmann. In this sense, it was verified that the disaster of Bhopal was due to a series of facts, which, combined with the vulnerability of the local population for the ignorance of the risks, had their damages potentialized when the fires of the technological disaster.

3 LEARNING FROM BHOPAL DISASTER: THE RIGHT TO KNOW

Soon after the Bhopal disaster, the discussion about the risks of technology transfer between states and the need for information about products, technologies and risks became more present. One of these articles, entitled "The Bhopal Disaster and the Right to Know," (JASANOFF, 1988, pp. 1113-1123) by the Indian Sheila Jasanoff, aimed to address the obstacles to the creation of efficient information policies when technologies are transferred beyond the borders of the States. The article reached world-wide fame, since it approached the theme of the disaster

with great propriety, and, thus, was chosen to serve as base for the present article.

Turner suggests that the information necessary to prevent disasters is of four orders: 1) totally unknown: it is not known how to prevent; 2) known but not fully appreciated**;** 3) known, but not analyzed and evaluated together with other information, at the appropriate time, or 4) possible to be known, however, cannot be appreciated because there is still not enough knowledge, or because there is no case to apply them (JASANOFF, 1988, pp. 1113-1123). That is, the information rightly enshrines the importance of knowledge about the risks involved in a given activity, in favor of the demonopolization of scientific or technical information. Therefore, this connects with the possibility of participation in the prevention of risks and damages (CARVALHO; DAMACENA, 2013, p. 44-45).

In Bhopal, information was of the second order. That is, many *experts* could have contributed to the prevention or mitigation of disaster damage through knowledge about: the toxicity and reactivity of methyl isocyanate, the risks of the on-site production of agrochemicals, the conditions of the operation in the plant and how to deal with a catastrophe involving methyl isocyanate. On the contrary, ignorance and lack of information coexisted with the apparently deliberate knowledge and desire to avoid responsibility for knowledge (JASANOFF, 1988, p. 1113-1123).

Thus, the chemical disaster in Bhopal has raised the issue of the right to know, the right to information, the right to knowledge, with the aim of re-adjusting legislation so that those involved could have information about the use of dangerous technologies.

From the experience of Bhopal, the author intended to answer questions regarding the right to know. Initially, it establishes that those who have the right to know about operations that could cause harm are those directly exposed to risks: employees and society. These people did not have the opportunity to make a choice in accepting or rejecting risks. In the same way, the information would have made possible precautionary measures on the part of them (JASANOFF, 1988, pp. 1113-1123).

Deva argues that the Bhopal disaster could have been avoided, or at least had much smaller consequences, if people had access to the correct information to take appropriate preventive measures (DEVA, 2012). Thus, knowledge would also help the government, doctors and nurses, police,

firemen and others responsible for emergency care and help those affected. In this case, physicians had no knowledge of emergency procedures, emergency care and medications to treat workers and the population that was affected by the gas leak. They had to deal with the victims without knowing what they needed to alleviate the suffering resulting from the poisoning (JASANOFF, 1988, p. 1113-1123).

Bhopal has made discussions about the right to know seen as important, including the right of people in developing countries to become aware of the technologies employed by foreign companies in their territory. Therefore, information about risks should be made available to workers and the population in appropriate language so that lay people can understand them. Communities should know about disaster risks and be informed about what to do and what to do if a disaster occurs. In the same way, non-governmental organizations could also act in the defense of workers and communities, both informing them about risks, and on prevention actions and post-disaster actions (JASANOFF, 1988, p. 1113-1123).

In this regard, mention should be made of the United Nations Special Report on Cultural Rights, in which Farida Shaheed suggests that the right to science encompasses four distinct elements: the right of access to the benefits of science by all without discrimination; the opportunity for all to contribute to scientific research; the obligation to protect all people against the negative consequences of scientific research on food, health, safety and the environment; and the obligation to ensure that scientific priorities focus on research on key issues for the most vulnerable (UNGA, 2011). Therefore, this passage is intimately related to the right to know, since the vulnerability of those affected in the disaster should have been a priority in the company's action, through the disclosure of clear and correct information.

In addition, the information should become public, especially when this responsibility is divided among several actors, enabling the people involved to appeal, question and charge. In the case of Bhopal, it was shown that the line of communication between operators and those who should have the information about the products handled at the plant was very tenuous. Soon after the disaster, the United States voted against a UN resolution on the compilation of banned or restricted products in several countries. This demonstrated that the policies of action in Bhopal

were built on the policies of the US-based multinational, without regard to local peculiarities (JASANOFF, 1988, p. 1113-1123).

With this, we have lacked integration and communication between the actors, so that Bhopal ended up being the result of total lack of care of those involved, which greatly affected the already vulnerable community and extends its harmful effects of the leak until today, after more than 30 years.

Manfredi argues that limited liability leads to inefficiencies in outsourcing costs (disasters). The risk of a financial activity depends on the degree of variability of the possible outcomes. The greater the degree of variability, the greater the risk. So when investors decide whether an investment is positive and how much they would be willing to pay for it, they should evaluate the possible future results, both positive and negative. Thus, one factor influences the understanding of externalities: these arise from the only limited liability of the shareholders, since they lead to inefficient behavior, with little incentive to avoid potential disasters, given the limitation of compensation to the victims, when processing their shareholders (MANFREDI, 2017).

Finally, regarding what should be known to people, in the case of Bhopal, the toxicity aptitude of the MIC should have been reported[2]. Harmful consequences to victims could have been minor, physicians could have acted more efficiently in treatment (JASANOFF, 1988, p. 1113-1123).

Guzman believes that assessing hazards, vulnerability and risks, structures the estimation and identification of risks, their likelihood of occurrence and consequences. These data, analyzed in conjunction with existing or potential vulnerabilities, give estimates to decide whether it is desirable to reduce probabilities to protect people and the environment (GUZMAN, 2002).

In Bhopal's case, it was necessary to know: (i) how many people could die if a major accident occurred in Bhopal; ii) that the disaster could be worse if the weather conditions were unfavorable; iii) the need to carry out an environmental impact study prior to the receipt of a governmental permit for construction and hazardous installations; (iv) the need to conduct studies on potential damage to plants and animals, soil and food and water supply, in the short, medium and long term (JASANOFF, 1988, p. 1113-1123).

2 Acronym for methyl isocyanate in English, as explained above.

Taking the above into account, the main lesson of Bhopal is that the risk of industrial catastrophe can be reduced only if knowledge is combined with preventive action. However, in the case, the knowledge did not accompany its transference to India. The company used the site's vulnerability to gain advantages. (JASANOFF, 1988, p. 1113-1123). In this sense, the Bhopal example should serve to address the discriminatory prevention of results, by prioritizing the needs of the vulnerable and protecting against the negative consequences of technology transfer (MORGERA; NTONA, 2017).

Thus, a challenge for right-to-know policies is to bridge information gaps and communication gaps that may arise in the course of technology transfer. The *design* of the new right-to-know laws for transferred technologies should be a major concern; in addition to being more systematic, it is necessary to cover more the risks. In addition, probabilistic risk assessment and environmental impact analysis should be made as prerequisites for the deployment of hazardous facilities (MORGERA; NTONA, 2017).

In addition, importing countries have to build a technical and administrative infrastructure capable of generating and transmitting information for risk control. In order to expand this partial view, importers, consumers and potential victims of technology have to arm themselves with knowledge so that they can judge the adequacy of the different technological options.

At the 20-year Anniversary Conference of the Bhopal Disaster in 2004, the following recommendations were made: a) "that information about the disaster should be publicly known, as it relates to the causes of the disaster and the deaths, in the weeks, months and years since 1984 "; b) "the lessons of Bhopal should be subject in the courses of Engineering, Medicine and Economics," before its importance as a model to be followed; c) that "countries that do not have advanced technology should be very concerned about the execution of the operations, creating command and control instruments and economic instruments in order to implement safe production plans"; d) that "governments should create public policies and conditions in order to inform the population about the risks and not to establish their residences near industries"; e) that "industries should demonstrate safety concerns at all levels of the operation" and "prepare

contingency plans and evacuation of the population living near the factory, as well as informing local communities about appropriate responses on the release of the substance "; f) that "the community should be aware of potential hazards and familiarize themselves with appropriate emergency response practices" (LABANCA, 2010).

In 2005, the Government of India also enacted the Right to Information Act to allow citizens to access information under the control of public authorities in order to increase transparency and accountability in governance (DEVA, 2012).

UNESCO (MELDEL, 2009) also proposed principles of the right to information, with the right to know:

> PRINCIPLE 1 - MAXIMUM DISCLOSURE. Freedom of information legislation should be guided by the principle of maximum disclosure;
>
> PRINCIPLE 2 - OBLIGATION TO PUBLISH. Public bodies should be obliged to publish essential information;
>
> PRINCIPLE 3 - PROMOTION OF OPEN GOVERNMENT. Public agencies need to actively promote the opening of government;
>
> PRINCIPLE 4 - LIMITED SCOPE OF EXCEPTIONS. Exceptions must be clearly and strictly defined and subject to rigorous "harm" and "public interest";
>
> PRINCIPLE 5 - PROCEDURES THAT FACILITATE ACCESS. Requests for information must be processed promptly and fairly, with the possibility of independent examination if there is a refusal;
>
> PRINCIPLE 6 - COSTS. People should not be prevented from making inquiries because of the high costs involved;
>
> PRINCIPLE 7 - OPEN MEETINGS. Meetings of public bodies shall be open to the public;
>
> PRINCIPLE 8 - DISCLOSURE HAS PRECEDENCE. Laws that are not in accordance with the principle of maximum disclosure should be reviewed or revoked;

> PRINCIPLE 9 - PROTECTION FOR DENOUNCERS. Individuals who bring to the public information about illicit acts - the complainants - need to be protected.

Equally, an important recommendation is that adaptation plans should prioritize the most vulnerable, that is, places with less developed infrastructure, commonly in underdeveloped countries. In disaster risk management, these sites should be designed and implemented with significant involvement of all societies. Issues of inequality and environmental justice must be associated with impact and adaptation studies for disaster prevention (PROGRESS REPORT, 2010).

CONCLUSION

The Bhopal disaster caused the deaths of thousands of people; contamination of soil, air and water; demonstrated the inefficiency of justice in responding to victims; has shown that the irresponsible transfer of technologies between developed and developing countries causes harm to the populations of these countries, as it does not respect the social, economic and cultural differences between them, whether in its operation or after the closure of activities.

In this sense, the operations occurred without the proper training of workers and supervisors, as well as without information (minimums that are) to the workers and the population, regarding what was happening in the enterprise. This transfer of technology and risk is the portrait of society at risk, a complex society in which the damage from industrialization spreads in space and perpetuates itself over time. In this sense, disasters do not have a single cause, but are a consequence of the combination of several facts that combine, generate the irradiation and feedback of their causes and done polyontexically.

The problem proposed for this article was to analyze the justification of the investigation of the risk and the right to know before technological development and its harmful consequences, when technology transfer between states. In this sense, the solution hypothesis was confirmed, therefore, the current society, according to the systemic theory of Niklas Luhmann, is a society marked by complexity and its systemic risks. This model of society does not control the magnitude of the damage in the event

of a disaster, especially in the case under study, when technology transfer between states did not address local vulnerabilities and knowledge. Thus, in the case analyzed, in order to reduce the damage caused by disasters, the right to know is of exponential importance, allowing the dissemination of information to possible risk targets.

Therefore, as it was explained, if the dissemination of information on the risks involved in the transferred technology were prioritized, disaster damage could have been avoided, mitigated and repaired more efficiently.

REFERENCES

BECK, Ulrich. *La sociedad del riesgo* – Hacia una nueva modernidad. Barcelona: Paidós Ibérica, 1998.

BERWIG, Juliane Altmann. *Direito dos desastres na exploração off shore do petróleo*. Curitiba: Juruá, 2015.

CARVALHO, Délton Winter de. Por um direito dos desastres ambientais. *In* STRECK, Lenio Luiz; ROCHA, Leonel Severo; ENGELMANN, Wilson (orgs.), *Constituição, Sistemas Sociais e Hermenêutica*, n. 9, São Leopoldo: UNISINOS, 2012.

CARVALHO, Délton Winter de; DAMASCENA, Fernanda Dalla Libera. *Direito dos Desastres*. Porto Alegre: Livraria do Advogado, 2013.

DAUBER, M. L. 1998. Let Me Be Next Time 'Tried By Fire': Disaster Relief and the Origins of the American Welfare State. *InNorthwestern University Law Review*,1998.

DEVA, Surya. *Access to Justice***:** Human Rights Abuses Involving Corporations – India. International Commission of Jurists, 2012. Disponível em: < https://ssrn.com/abstract=2034813>Acesso em: 10 set. 2017.

FARBER, Daniel, et. al.. *Disaster, Law and Policy*. New York: Aspen Publishers, 2010.

FARBER, Daniel. ***Disaster l****aw and emerging issues in Brazil. In Revista de Estudos Constitucionais, Hermenêutica e Teoria do Direito (RECHTD),* jan./jun./2012, São Leopoldo: UNISINOS, 2012.

GEORGI, Rafaelle de. O risco na sociedade contemporânea. *InSequência*, nº 28, junho/94, Florianópolis: UFSC, 1994.

GUZMAN, Mannuel M. *Towards total disaster risk management approach.*2002. Disponível em: <http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan009657.pdf>. Acesso em: 31 maio 2017.

HABERMAS, Jürgen. Conhecimento e interesse. *InTextos escolhidos*.São Paulo: Abril Cultural, 1975.

JASANOFF, Sheila. The Bhopal disaster and the right to know. *InSoc. Sci. Med***.** vol. 27, n. 10, 1988.

JASANOFF, Sheila. Bhopal's Trials of Knowledge and Ignorance. *InNew England Law Review*. 2008. Disponível em <http://www.nesl.edu/userfiles/file/lawreview/Vol42/4/Jasanoff_%20Final.pdf>. Acesso em: 24 jan.2017.

LABANCA, Bruno, et. al.. *Acidente de Bhopal*.2010. Disponível em <http://pt.slideshare.net/labancah/bruno-labanca-gean-chagas-luis-guilherme-laino-e-yakini-tavares-mam-261-acidente-de-bhopal-final>. Acesso em 24, jan.2017.

LUHMANN, Niklas. *La sociedad de la sociedade*. Tradução Javier Torres Nafarrete. México: Herder/Universidad Iberoamaricana, 2007.

MANFREDI, Mario. *The Inadequacy of Existing Concepts of Corporate Group Liability and New*Doctrines, 2017 Disponível em<https://ssrn.com/abstract=3030101>Acesso em: 10 set. 2017.

MENDEL, Toby. Liberdade de informação: um estudo de direito comparado, 2009. *In UNESCO*. Disponível em <http://portal.unesco.org/ci/en/files/26159/126398551119freedom_information_pt.pdf/freedom_information_pt.pdf>. Acesso em: 24, jan.2017.

MORONE, Joseph G.; WOODHOUSE, Edward J.. *Averting Catastrophe Strategies for Regulating Risky Technologies*. Berkeley: University Of California Press, 1988.

PATEL, Nehal A.; PETLAKH, Ksenia. Gandhi's Nightmare: Bhopal and the Need for a Mindful Jurisprudence. *In Harvard Journal on Racial & Ethnic Justice*, vol. 30, 2014. Disponível em <http://ssrn.com/abstract=2458678>. Acesso em: 24 jan. 2017.

Progress Report of the Interagency Climate Change Adaptation Task Force: Recommended Actions in Support of a National Climate Change Adaptation Strategy.*InThe White House Council on Environmental Quality*, 2010. Disponível em <http://www.whitehouse.gov/sites/ default/files/microsites/ceq/Interagency-Climate-Change-Adaptation-Progress-Report.pdf>. Acesso em: 24jan.2017.

ROCHA, Leonel Severo. *Notas sobre Niklas Luhmann*. In: Revista de Estudos Jurídicos. São Leopoldo: Centro de Ciências Jurídicas – UNISINOS, 2007.

SMITH, Denis. In the eyes of the beholder? Making sense of the system(s) of disaster(s). *In* PERRY, Ronald W. Perry; QUARANTELLI, E. L. *What is a disaster? New answers to old questions*. Estados Unidos da América: Xlibris Corporation, 2005. Disponível em: <http://www.saarcsadkn.org/downloads/what%20is%20disaster.pdf>. Acesso em: 12 jan.2017.

UNGA, *Report of the Special Rapporteur in the field of cultural rights:* the right to enjoy the benefits of scientific progress and its applications, 2011. Disponível em: < Http://www.ohchr.org/EN/HRBodies/HRC/RegularSessions/Session28/Documents/A_HRC_28_57_ENG.doc>Acesso em: 10 set. 2017.

Artigo recebido em: 20/10/2017.
Artigo aceito em: 21/11/2017.

Como citar este artigo (ABNT):
WITTCKIND, E. V.; BERWIG, J. A.; ENGELMANN, W. O DESASTRE DE BHOPAL: RISCOS E VULNERABILIDADES NA TRANSFERÊNCIA DE TECNOLOGIAS E O DIREITO DE SABER. *Veredas do Direito*, Belo Horizonte, v. 14, n. 30, p. 293-316, set./dez. 2017. Disponível em: <http://www.domhelder.edu.br/revista/index.php/veredas/article/view/1185>. Acesso em: dia mês. ano.