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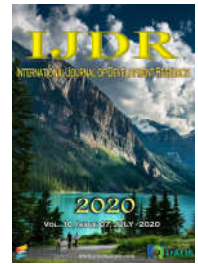
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## GENETICALLY MODIFIED FOOD: THE PRECAUTIONARY PRINCIPLE FOR TECHNOLOGICAL INNOVATIONS IN INTERNATIONAL LAW

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### ABSTRACT

The main goal of this study is to analyze the idea of sustainable development, starting from a detailed reading of the principles that guide Environmental Law, especially the precautionary principle. In this way, we seek to delimit the fine line between the promotion of socioeconomic development and the degradation of the environment, within the paradigm of a Risk Society. A more specific analysis is carried out with regard to genetically modified food in order to seek a balanced decision between its benefits and the irreversibility of the damage caused by them.

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## INTRODUCTION

One of the main issues to be considered by humanity is, undeniably, the preservation of the environment. It happens mainly because it offers living beings the essential conditions for their survival. José Afonso da Silva clarifies that "*the preservation, recovery and revitalization of the environment will be a concern of the State and, consequently, of the Law, because it forms the environment in which it moves, develops, acts and expands to human life*" (SILVA, 2010, p. 21). The State, therefore, must carry out and implement measures aimed at preserving, recovering and revitalizing the environment, so that it is protected for present and future generations. On the other hand, this idea needs to be in order with the economic and social development. So, it is necessary to harmonize these concepts, in order to make development compatible with

preserving the quality of the environment and ecological balance. Thus, it is intended to include the idea of sustainability as an integral part of the development process. That is, without giving rise to the unnecessary depletion of natural resources, providing decent living conditions, as well as promoting the growth and development of existing technological, economic and social means. In this sense, sustainable development aims to preserve the foundations of human production and reproduction, making a combination of economic growth and conservation of the environment, in order to achieve a balanced and harmonious relationship between men and natural resources. Roberto Correia and Jamile Bergamaschine (2016, p. 249-75) stand out that: The set of rules and principles of Environmental Law that we have today is a reflection of the growing problems of ecological imbalances that can occur even in the scope of administrative

activities, which, in turn, reflects the mandatory observance of the environmental pillar as an integral part of the concept of sustainable development, currently considered as one of the foundations of the principle matrix of the Brazilian normative system, as recognized in art. 225, caput, of the 1988 Federal Constitution. The technological advances that occurred, at the end of the 20th century and the beginning of the 21st century, gave rise to numerous scientific benefits, but they also brought degradation and devastation to their core. Thus, new risks to society have survived, risks that are distinct from hitherto existing ones. This rupture of paradigms and the widespread growth of this insecurity, ended up generating numerous impacts on society, opening the way for the emergence of a new model called: Risk Society. This society would be marked by the existence of scientific uncertainties, unknown risks and indomitable damage (KÄSSMAYER, 2008, p. 1-17). Yet, in the last years, emblematic cases began to emerge and discuss, in several areas, such as safety, health and in the environment itself. These new risks that were not even liable to be precisely defined, gained prominence in the international scope, starting to enter the agenda of different sectors, such as, governments, corporations, universities, research centers and social movements.

So, the question is: How to act in the face of a risk in which the level of degradation cannot be calculated? How to work with this uncertainty? In order to answer these questions, we sought to apply the fundamental principles, among them the precautionary principle (MARTINS, 2002, p. 13), which is the object of analysis in this study. The precautionary principle would be a respectful and functional combination of man and nature, to be adopted in the face of these scientific uncertainties, in view of the fact that there is a great development in several fields of science, discovering, every day, a new technology. In the food field this is no different. As an example, its worth to mention genetically modified foods. The consequences of the genetically modified foods for the human organism have been discussed. For this reason, the Law must closely monitor and adapt to the new situations that arise. In this context, genetically modified organisms - GMOs - can be defined as those that have been genetically altered in their natural characteristics and, for this reason, there are fears about the possible negative consequences for the human organism. In this scenario, the precautionary principle is shown as a form of prevention, once applied in the event of scientific and legal uncertainty. After that, using the bibliographic study as a method, this paper will also then analyze the issues that GMOs causes and it will identify causes, importance and ways to apply it. Having made these considerations, it is necessary now to analyze the concept of the precautionary principle.

### **Precautionary principle: concept, origin and importance**

The guiding principles of Environmental Law have a fundamental task in this subject, which is, to contribute to the understanding of the matter, as well as directing the application of these rules. Also, once they are the basis of the political-legal systems of civilized States, they are internationally adopted even if with some peculiarities. Yet, its common the need for a balanced ecology and the indicative of the appropriate path for environmental protection in accordance with the social reality and cultural values of each State (FIORILLO, 2005, p. 26). Among the various existing principles in Environmental Law, it is worth to highlight the Precaution Principle, which has as its primary scope to prevent

and guide so that no undesirable, difficult to repair or even irreversible harmful event occurs. The main idea of the precautionary concept, therefore, hovers over the idea of incalculable damage, in other words, that cannot be delimited by existing scientific methods. Therefore, this principle is based in the field of uncertainty. Based on this, and according to the definition given by the Ministry of the Environment<sup>1</sup>, precaution would be based on four crucial points: uncertainty, which would be considered in the risk assessment, and, in this assessment, a reasonable number of alternatives to the product would also be raised. or process, and should be studied and compared (second point); the burden of proof, which now rests with the proponent of the activity; and, not least, the point that explains being precautionary, the decision that is democratic, transparent and constituted with the participation of those interested in the product or process. The origin of this principle predates the Constitution of the Republic of 1988, having developed in 1970, in Germany, known as *vorsorgeprinzip* (FIORILLO, 2012, p. 131) and gained strength in the following twenty years. Despite having been thought of as a response to industrial pollution, the aforementioned principle has been applied in all sectors of the economy that, in some way, may have adverse effects on human health and the environment.

If considered together with the origin the premise that it is part of a fundamental right of the third dimension, that is to say, as a right of fraternity, it is possible to say that its goal is to protect the common good of humanity (NOVELINO, 2016, p. 273). Therefore, the precautionary principle is in the vanguard of defenses, given that it is concerned with the potential and risks before there is a certainty of the damage or the damage itself. In 1992, in Rio de Janeiro, the UN held a Conference on Environment and Development, in which measures were discussed to minimize and reduce environmental degradation, as well as to establish policies that would enable its effective application and make the concept of sustainable economic development viable. In this context, a serie of principles were established, being in the 15th<sup>o</sup>2, of the Declaration of Rio de Janeiro / 92, determined that the States, according to their capacities, apply preventive measures to protect and avoid environmental degradation. It can be seen, therefore, that the Precautionary Principle aims to identify the imminent risks and dangers in order to avoid significant destruction of the environment. It drows on a preventive environmental policy, given the presence of risks that - currently - cannot be identified, such as: the release and disposal of genetically modified organisms, use of fertilizers or pesticides, installation of activity or work, etc.

At the same time, the Precautionary Principle is found in other international agreements and conventions that have been duly ratified and promulgated by Brazil, with the same definition in title, namely: United Nations Framework Convention on Climate Change, of May 9, 1992, Convention on Biological Diversity, of June 5, 1992 and Cartagena Protocol on Biosafety, of May 15, 2000. The Federal Constitution of 1988

<sup>1</sup> MINISTRY OF THE ENVIRONMENT. Precautionary Principle. Available in: <<http://www.mma.gov.br/clima/protacao-da-camada-de-ozonio/item/7512>> Accessed on Aug 28th. 2018.

<sup>2</sup> Princípio 15: "Para que o ambiente seja protegido, serão aplicadas pelos Estados, de acordo com as suas capacidades, medidas preventivas. Onde existam ameaças de riscos sérios ou irreversíveis, não será utilizada a falta de certeza científica total como razão para o adiamento de medidas eficazes, em termos de custo, para evitar a degradação ambiental".

also addresses this topic, especially in its art. 225, items IV and V, § 1 and art. 170, item VI. It is important to emphasize that one of the striking characteristics of precaution principle is the inversion of the burden of proof, as mentioned above. Thus, it is necessary to point that it is up to the author of the damage to prove that his activity will not cause damage to the environment. Milaré (2004, p. 145), in view of this, clarifies that *scientific uncertainty militates in favor of the environment, placing on the interested party the burden of proving that the intended interventions will not bring unwanted consequences to the considered environment.*

Concomitantly, precaution principle is used as a postulate that seeks to avoid risk, in cases of scientific uncertainty about its potential degradation. Therefore, when there are scientific doubts about the harmful potential of environmental damage, the precautionary principle is applied as a means of protecting against future risk. Obviously, one cannot overlook the importance of scientific evolution, which is why it is based on not only temporality, but also the need for precautionary measures. Its permanence is linked to the maintenance of the insufficiency and imprecision of the scientific data, or to its potential for danger. The measures, therefore, must be changed or suppressed, if new scientific data eventually emerge that allow this identification analysis, which makes it imperative to analyze another principle for the understanding of environmental protections in the principiological context.

### Distinction between Precaution and Prevention

The principle to be studied in this topic is that of prevention, which, despite having a terminological similarity, is not to be confused with the precautionary principle, although both act in the sphere of protection before the existence of damage. Prevention applies to a known risk, that is, that is identified through research, data and environmental information. Based on the analysis of this risk, which is therefore identifiable, measures are taken to prevent or minimize damage to the environment. Therefore, measures to prevent these aggressions are anticipated (TRENNEPOHL, 2007, p. 39-40). The idea of prevention, therefore, concerns the anticipated knowledge of the serious damages that can arise in certain situations and the search for ways to minimize them. Thus, there is a scientific causal link between the action and the achievement of environmental damage. One of the ways to analyze these risks is precisely the use of EPIA / RIMA, provided for in item IV, §1, of art. 225 of CF / 88. These studies aim to identify and clarify such possible impacts that may affect the environment, as well as to suggest measures that help in this recovery. The precaution principle, in turn, acts when these risks are not identifiable, referring to the idea of the absence of formal scientific certainty. In this line of reasoning, Oliveira (2009, p. 46) points out that *in the precautionary principle, what is configured is the absence of conclusive scientific information or research on the potential and the effects of an intervention on the environment. There is scientific uncertainty here, uncertainty about the effects of potential damage.*

Thus, given the lack of studies and the present uncertainty, interventions in the environment cannot be authorized. Examples of these cases include the production and planting of transgenic substances and foods, on the grounds that there is no evidence that this intervention causes effective environmental damage. The idea of reversing the burden of proof is referred here, that is, it will be up to the applicant

itself to prove that its products do not give rise to such damages. It is true that the environmental recovery will hardly return to its status quo, however, it seeks to minimize these impacts and recover what is possible and feasible. There is, therefore, a concern with technological innovations as long as they are associated with protecting the environment. In this way, an attempt is made to find a balance. That's why the distinction between the institutes of precaution and prevention is clear. Although they appear to be synonyms, they show peculiar characteristics and must be taken into account when applying environmental legislation.

### Precautionary Principle and its role in a Risky Society

The Risk Society can be conceptualized as a way of realizing the threats produced by the industrial society (LEITE, 2010, p. 125). The human discovery about the dangers arising from these interventions came through catastrophic natural events that, until then, were unimaginable. Ulrich Beck points out that *risks are systematic ways of dealing with the dangers and insecurities induced and introduced by the modernization process itself* (Beck, 1997, p. 21).

The idea of risk, therefore, is linked to modernization and technological evolution, and also to capitalism, once its important changes have been brought about in the production and driving system of the market. Therefore, in this model, there are some scientific uncertainties, fear, unknown risks and irreparable damage, given the perception that scientific knowledge is not able to predict the consequences of human interference in the environment. In this context, the emergence of this new society brings with it the need to reflect on the current situation of humanity and its development, with the mission of formulating questions - of the present and the future - to seek answers to the risks arising. Thus, the evolution process creates these risks, but at the same time it also seeks to find ways to solve them. It is undeniable that we currently live in a global environmental crisis, where new risks arise all the time. Preserving the environment, therefore, proves to be an essential attitude in order to achieve balance, improve people's quality of life and enable future generations to enjoy these benefits as well.

The natural resources scarcity, combined with the intensity of environmental impacts and with the disorganized development of the population, has raised the conflict of sustainability of the economic and natural systems, making environmental protection a strategic and urgent issue.

Sirvinskas argues that (2003, p. 3):

The evolution of man was long until it reached a full and complete awareness of the need to preserve the environment. Not only because of the threats that our planet has been suffering, but also because of the need to preserve natural resources for future generations [...] For the preservation of the environment to happen, it is necessary to make humanity aware of the relationship between man and environment. The importance of preserving natural resources has become a worldwide concern and no country can escape its responsibility. This need to protect the environment is ancient and arose when man started to value nature, even if not as strongly as today. Perhaps not much importance was given to the extinction of animals and flora, but there was a respect for nature, since it was understood as a divine creation. Only after

man began to know the interaction of microorganisms in the ecosystem did his responsibility increase.

The protection of the environment has become one of the most relevant themes for all humanity, mainly because it became essential to think about human quality of life. This importance is even more keen in the face of the presence of this new model of society, which relates daily in nature, emerging from it new risks.

In this scenario, the precautionary principle appears as a mean of guiding the suspension of activities while pending scientific certainty about the occurrence - or not - of the damage. Machado (1993, p. 211) argues that *if there is doubt about the future possibility of harm to man and the environment, the solution must be favorable to the environment and not in favor of immediate profit - no matter how attractive it may be for present generations*. The principle, then, would function as a “dubio principle for the environment”, in other words, if there is doubt about the harmful potential of a given enterprise, one must decide in favor of the environment. The burden of proof, therefore, belongs to the potential polluter.

Precautionary principle would therefore be a rational principle, which would seek to mitigate legal uncertainty in risk management, being duly founded on responsibility for the future and balanced on the importance of scientific development.

This principle, therefore, would be a rational principle, which would seek to mitigate legal uncertainty in risk management, being duly founded on responsibility for the future and balanced on the importance of scientific development.

In this conception, it is necessary to highlight that there is no need for the threat to be real, once its plausible possibility of serious and irreversible damage is sufficient for the need for intervention to be justified. It is emphasized that the risks must be considered serious or irreversible, being the analysis of the specific case. However, it is also necessary to clarify that the protection of the environment is not absolute, we do not seek to deny the importance of socioeconomic development here, but to reconcile it, in order to promote sustainable development.

In this sense, Silva (2004, p. 78-9) points that:

[...] If, on the one hand, scientific research and technological innovations bring promises, on the other hand, they also bring threats or, at least, a potential danger. In this sense, some questions can be asked: should everything that is technically possible be accomplished? There is a need to reflect on the path of scientific research and technological innovations. The precautionary principle appears, thus, to guide actions, enabling environmental protection and management in the face of scientific uncertainties.

As can be seen, precaution plays an important role within this idea of a Risk Society, serving as an instrument to minimize unpredictable environmental impacts that cannot be delimited by existing scientific means.

Ademais, em consulta ao Decreto nº 4.339, de 22 de agosto de 2002, do Brasil, é possível verificar a presença expressa do princípio derivado da Declaração do Rio de Janeiro de 1992,

*precaução*, sendo inserido, no item 12.1.2 de seu anexo, como um elemento a conjugar esforços com a *análise de risco dos potenciais impactos sobre a biodiversidade, a saúde e o meio ambiente, envolvendo os diferentes segmentos da sociedade*, e não como um adversário, sustentando assim que a evolução tecnológica é positiva, mas que deve ser empregada com cautela, uma vez que não necessariamente produz efeitos benéficos.

Furthermore, in the Brazilian Decree nº 4,339, of August 22, 2002, it is possible to verify the clear concept of the precautionary principle, derived from the Declaration of Rio de Janeiro 1992, and inserted in item 12.1.2 of its annex as an element to combine efforts with the risk analysis of the potential impacts on biodiversity, health and the environment, involving the different segments of society, and not as an adversary. From the Decree, it is also possible to extract that technological evolution is positive, but that should be used with caution, as it does not necessarily produce beneficial effects.

### **TECHNOLOGICAL INNOVATION: Risk or development?**

The question to be discussed in this topic is an essential dilemma in the environmental scope. From now on, the concepts of technological innovation and the risks of irreversible environmental degradation will be analyzed. Technological innovations tend to be seen as a key piece for the economic growth of nations, being fundamental to distinguish their levels, given that the higher the index is, the greater the economy of that country tends to be. This phenomenon arises, once that innovations end up boosting the entrepreneurs' capacity for initiative and fostering new scientific discoveries. As a result, therefore, there are opportunities of investment and positively impacts i the growth and employability of nations. The conception of development, therefore, ends up referring to the idea of innovation that brings other components: uncertainty and constant experimentation. The change in the direction of technology and the destabilization of technical systems ends up being stimulated, a priori, through predetermined policies and normative institutions. Technological innovations, coupled with industrial activity, characterize the presence of uncertain economic processes that generate instability in human life and conditions. Protection of the environment and risk theory, by conditioning innovation and subjecting it to precaution, seek to achieve something similar, that is, to launch one of its richest and most essential components, indeterminacy. It should be noted that the types of environmental innovations and the way in which they arise depend on the economic scenario, the direction and speed of the research being propagated. Nevertheless, the State is also an important figure in this scenario. Pollution reduction policies aim to reduce current pollutants, as well as invest in the development of new technologies for the future. Technology, therefore, proves to be important and of great value for human development, especially in the creation of new means and methods to preserve the environment. Therefore, we do not seek to deny the need for innovations, but to condition and limit them, in order to balance both interests and promote sustainable development.

The term sustainable development originated in 1980, but its concept was widely known only in 1987, through the World Commission on Environment and Development (CMMAD),

which produced the so-called Brundtland Report. In the words of this report:

[...] sustainable development is a process of transformation in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are harmonized and reinforces the present and future potential, in order to meet the needs and future aspirations [...] is one that meets the needs of the present without compromising the possibility for future generations to meet their own needs. (Our Common Future, 2nd edition, 1988, p.46).

There is, therefore, a clear concern for future generations. Sustainable development seeks to combine economic growth with preservation of the environment, although it is not an easy mission, especially given the unrestrained use of natural resources and the clear relentless pursuit of profits, disregarding environmental aspects. O paradigma capitalista, que se consolidou e vem sendo consolidado desde a década de 1960, tem como suas principais características a supervalorização do capital, avanço de telecomunicações, aumento de produtividade, flexibilização dos meios de produção e uma internacionalização econômica. A globalização, nesse contexto, atinge todos os tipos de relacionamento, sejam em distintos países, povos e culturas. E mais, percebe-se que a crise que atinge diversos setores, seja ele ambiental, comercial, social, não são crises isoladas. São uma só.

The capitalist paradigm, which was consolidated and has been consolidated since the 1960s, has as its main characteristics the overvaluation of capital, advances in telecommunications, increased productivity, flexible means of production and an economic internationalization. Globalization, in this context, affects all types of relationships, whether in different countries, peoples and cultures. Furthermore, it is clear that the crisis that affects several sectors, whatever it is environmental, commercial or social, are not isolated crises. They are all just one. It is necessary to think if this context means risk or innovation? It is known that it is necessary to reach a point of intersection between the need to develop and the preservation of the environment. Therefore, sustainable development would reveal itself as an ecological practice to be applied by the population in their daily lives, in order to integrate society in all its aspects, meeting the current human needs without harming future generations. As an example of technological developments that aim to minimize environmental impacts are renewable energies and clean energies - which do not release waste.

Many ways to promote ecological development have started to be implemented. Rio +20, for example, brought several plans and sustainable alternatives. It is clear the need to establish measures that aim to provide environmental protection, in view of the Risk Society that we are currently in. In this sense, Altvater (1995) warns of imminent global risks, emphasizing the importance of socioeconomic development and the environment going together, in view of the growing demands for production and the finitude of environmental resources that have become increasingly scarce, compromising, thus, not only the economic dynamics, but also the future of the planet. Thus, it is also clear that technological innovations have abandoned their highly degrading profile and acquired a facet

of green and sustainable economy, which seeks to use natural resources effectively and with due environmental responsibility.

### **Prós e cons of modern Technology**

Technological development undeniably brought facilities, comfort, access to knowledge, increased expectations and quality of life. However, although there are countless benefits from technological innovations, they have also brought negative impacts on the environment, intensified its degradation and drastically reducing the planet's bio-capacity, whether by increasing waste generation, either by polluting the atmosphere. It is important to highlight that this phenomenon occurred due to the Industrial Revolutions, a time when abundance of resources still prevailed, which is why they were not concerned with their finitude. Only after more than a century and a half of the beginning of the industrialization process did the scarcity issue begin to be discussed as a threat to the development of modern economies. The measures to adopt sustainable technologies have mostly occurred in the most developed countries, even though these are the ones that pollute the most. In less favored nations, the incorporation of clean technology is still showing a high value. In the Brazilian background, it is possible to envision two different situations, in spite of being a country with one of the greatest biodiversities in the world, its rapid economic growth, especially throughout the 20th century, ended up intensifying environmental degradation and favoring the impoverishment of services ecological, especially given the precarious investments in technology. Only after the 20th century it was possible to see a greater expansion of scientific development in the country and the presence of a greater incentive for the development of clean technologies.

It is known that without investments in innovation there is no way to go in a different direction from degradation, as it will end up significantly reducing natural resources and perpetuating the country's condition as an importer of external technologies that are highly harmful to the environment. Yet, this practice ends up generating repercussions in the economy and, consequently, the entire population. Therefore, in order to develop, Brazil needs, through the efforts of all society, companies, governments and other agents, to break with the conception that the environmental issue would be a setback to socioeconomic development, to include it as an essential instrument for the promoting sustainable development. Taking advantage of these opportunities, Brazil could take a new path towards global sustainability. In this perspective, it is noted that innovations have a twin-track approach, whereas, over the years, ended up contributing to the unbridled destruction of most of the protection areas. However, with awareness of the finitude of these resources and the finding of the Risk Society we currently live in, it was realized the need to reduce these impacts and visualize the implementation of sustainable development.

It is worth to mention some innovations that contributed to the preservation of the environment, namely: (i) information technology (satellites, GPS, internet); (ii) solar energy; (iii) biofuels and (iv) water treatment, among others. Technological innovation, therefore, if used correctly and thought from the perspective of sustainable development, can indeed bring great benefits. It cannot be forgotten, however, that all technological solutions are also agents of pollution, but

if used correctly, the same devices that attack the planet can also contribute to sustainable practices.

### Precautionary Principle and Genetically Modified Food

Initially, it is important to understand the concept of genetically modified foods. For Bruno Gasparini (2009, p. 17):

Transgenics, or genetically modified organisms (GMOs) as evidenced at Brazilian law 8,974 / 95), are the result of recent experience in genetic engineering, which was able to discover and develop new forms of use for this branch of technological development from the mapping and sequencing of recombinant DNA / RNA molecules, in the early 90s, which culminated in the development of a technique called transgenia, inserted in the field of biotechnologies. It should be noted, however, that the advent and use of a new technology raises numerous questions and reflections [...]

The food's modification aims to improve these products through genetic manipulation, looking for one or more characteristics of different organisms that are combined in an artificial way and that such combination would not occur by natural methods. This procedure can be performed with plants, animals and microorganisms. It can be highlighted as positive points of transgenics: increased production, greater resistance to pests and pesticides, longer storage time, etc. The other side, as negative points, are mentioned: the suppression of the original flora, the elimination of natural populations of insects and animals, among others. GMOs are accompanied by great uncertainties, which is why it is necessary to provide greater security to those who consume such organisms. In Brazil, the legislation that regulates the matter is the Law n°. 11,105 / 2005, which establishes safety rules and mechanisms for the inspection of activities involving genetically modified organisms - GMOs and their derivatives. It is in this context that precaution arises as an attempt to minimize the damage caused to human health. There is concern about safety in view of the still insignificant number of certainties in the face of quantitative technological developments. It is true that the law is not able to keep up with the speed of these updates, which is why the principle principle must take care of legal security and human health.

One of the objectives of the Biosafety Law is to control the risks of the technologies used in the laboratories, protecting not only human health, but also the environment itself. An example is the control of agrochemical manufacturers when producing seeds with insecticidal plants. From a productive point of view, innovation brings considerable dividends, with low cost and a more comprehensive distribution of food, which makes it possible to combat hunger that affects humankind. However, it cannot be forgotten that these foods are genetically modified and that the use of these different organisms raises doubts about their food efficiency. There is, therefore, an issue full of uncertainties regarding these damages, whether long or short term. According to the principle of beneficence - or non-maleficence - the human being is the recipient of all scientific productions that can bring benefits to human health. Precautionary measures in relation to genetically modified organisms are used as instruments at an international level, based on the preamble to the Convention on Biological Diversity held in Rio de Janeiro in 1992 and the 1999 Cartagena Protocol on Biosafety. It takes reasonable

scientific uncertainty for the principle to be applied, it is not enough to just emotion and waves of collective hysteria to draw attention to - possible - risks. At this point, a reasonable and effective scientific uncertainty is essential for the application of the precautionary principle, from the perspective of professionals engaged in propagating socioeconomic development that does not violate the dignity of the human person and the environmental good as a fundamental right.

### Conclusion

There is a constant concern in various sectors and segments of society that leverage the technological race. These new tools have proven to be valuable and of great help in many aspects, but they also bring impacts and losses to the environment. That is why it is necessary to look for ways to harmonize these concepts, making development compatible with the preservation and protection of environmental resources. It is sought, therefore, to constitute the idea of sustainability as an integral part of the development process. It is necessary to preserve the foundations of the production and reproduction of human beings and their activities, making a combination of economic growth and conservation of the environment. It thus requires a balanced relationship between men and nature. In this scenario of balance and in view of the scientific uncertainties arising from the processes of technological innovations, the precautionary principle emerges as a driver to guarantee and minimize the impacts arising from these changes. As an example, mention is made of what happened in the food sector with GM foods. The modification of these foods aims to improve these products, whether to increase production, greater resistance to pests / pesticides or for longer storage times. Through genetic manipulation, we seek to change its characteristics, which would not occur naturally. These changes, however, bring numerous scientific uncertainties, mainly because it is not possible to define the impact of these foods on human health, whether in the long or short term.

In the meantime, one of the ways to face these uncertainties is through the use of the precautionary principle that, using means such as the inversion of the burden of proof, tries to minimize and give more certainty to this new technological field. States have applied this principle and demonstrated that it is of great importance, both in practice and in legal matters. It is undeniable that GMOs are necessary as long as the safety criteria are observed, when applied. It is concluded, therefore, that from a productive point of view, innovation brings considerable dividends, with low cost and more comprehensive distribution of food. However, it cannot be forgotten that these foods are genetically modified and that the use of these different organisms creates doubts about their food efficiency. Hence the importance - and the necessity - of applying the precautionary principle in concrete cases.

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