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Countermeasures for Environmental Damage Caused by Drilling Water Sources for The Mineral Water Industry

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ABSTRACT

The mineral water industry has grown rapidly in recent decades, as people have become more aware of the importance of quality drinking water. However, overexploitation of groundwater to meet the needs of this industry can cause significant environmental damage. This abstract discusses various measures that can be taken to mitigate environmental damage due to the drilling of water sources for the mineral water industry. One of the main solutions is to implement stricter regulations related to groundwater extraction. This includes limiting the amount of water that can be withdrawn by mineral water companies, as well as implementing higher water quality standards. The government also needs to conduct stricter supervision of mineral water industry activities to ensure compliance with applicable regulations. Another important effort is to encourage the use of more environmentally friendly technologies in the water intake and treatment process. For example, the use of reverse osmosis systems that are more water-efficient than conventional methods. The mineral water industry also needs to educate the public about the importance of preserving the environment, and encourage community participation in efforts to conserve water resources. In addition, it is important to develop alternative water sources for the mineral water industry, such as treated surface water or seawater. This can help reduce the pressure on.

Introduction

In Indonesia, the need for clean water for the community increases every year in accordance with the dynamics of development, both for drinking water and households, industry, agriculture and supporting other commercial businesses. Alternative sources to meet clean water needs are rainwater, river water, and groundwater. In its development, the largest use of groundwater is the industrial area to carry out the production process. This requires the industry to increase production by opening branches of the mineral water industry in areas where exploitation of groundwater sources is possible. Currently, in several major cities in

Indonesia, there is an increase in the mineral water industry as evidenced by the statistics on the use of bottled water (AMDK), one of which is in Madura, which is located in Bangkalan Regency itself, there are 39 drinking water companies, including 38 small industries and 1 large industry based on the Department of Industry and Manpower (Disperinaker).[1]

The increase in mineral water factories or industries requires them to drill water sources in residential areas for industrial purposes, which has a long-term negative impact on the surrounding community springs. This has already happened in 2013 in Cidahu, Sukabumi, West Java, which has many springs that have a huge water potential but the local community has difficulty getting access to clean water.[2] This was due to one of the effects of over-exploitation of the springs, resulting in an inappropriate balance of groundwater outputs and inputs.

So that the amount of rainwater volume received by the soil will determine whether or not the groundwater balance is achieved if the groundwater input is equal to the groundwater output or in other words the volume of groundwater withdrawal is balanced with the addition of groundwater discharge. Currently in several major cities in Indonesia there has been degradation of groundwater quality and quantity and environmental damage both in recharge areas and in discharge areas.[3] Groundwater is a water resource that has an important role in the problem of supplying water needs for various purposes. Given the increasingly vital and strategic role of groundwater, the utilization of groundwater must pay attention to the balance and preservation of the resource itself, or in other words, the utilization of groundwater must be environmentally sound. Groundwater, as one of the water resources, has now become a national problem, so it is absolutely necessary to take concrete steps to minimize the negative impacts caused by uncontrolled groundwater exploitation activities. This management must be carried out wisely, based on legal aspects, namely the laws and regulations that apply in the field of groundwater, as well as technical aspects concerning the groundwater knowledge of a region.

One of the steps taken by the government to overcome these problems is the existence of legislation no. 32 of 2009 concerning environmental protection and management as a form of solution to preserve the environment and prevent damage or pollution, this is done through planning, utilization, control, maintenance, and supervision and enforcement of applicable laws. Judging from the development of the water industry, which every year has a significant increase in the number of new factories that stand side by side with the community, this has a long-term negative impact on community springs, so Law No. 11 of 1974 concerning Irrigation is expected to function as a solution by the government to protect community rights.

[1] Fitri, "Produsen Lokal Madura Berebut Pasar Menggiurkan Air Minum Kemasan," Kabar Madura, last modified November 27, 2022, https://kabarmadura.id/produsen-lokal-madura-berebut-pasar-menggiurkan-air-minum-kemasan/.
[2] Tifa Foundation, "Air Keruh Untuk Rakyat,Air Bersih Untuk Industri," Youtube, last modified August 27, 2013, accessed April 1, 2024, https://www.youtube.com/watch?v=S9zoZKNdEMU&t=616s,.
[3] Sebuah Ulasan Dan Pemikiran, *PENGELOLAAN AIRTANAH DI INDONESIA*, n.d.

The urgency is to look at the impact that drilling for water sources has on the surrounding environment and how to overcome this impact by considering legal aspects. This is important to maintain environmental sustainability, community welfare, and preservation of water resources. Legislation such as Law No. 32 of 2009 on environmental protection and management and Law No. 11 of 1974 on Irrigation are very important to maintain the balance of the environment and the welfare of society.

The author realizes that the theme of drilling water sources has been widely discussed, it's just that there are differences in the focus of the study and the ideas offered in government action regarding the impact of this exploitation. Some of these studies include:

First, research conducted by Mutia Dewi and Laily Wahyuni Djalaluddin published in UNY Journal Vol. 46 Number 2 Year 2016, entitled "Analysis of Public Relations Strategy of PDAM Ternate City in Handling Complaints and Complaints of Residents of North Ternate City and Central Ternate City Districts Against the Impact of Exploitation of Ake Gaale Springs". This study concludes that the handling of spring water problems due to seawater infiltration (intrusion) which resulted in the wells of residents around the factory becoming brackish, while the research that the author examines refers more to how the law plays a role in this matter.

Second, research by Monica Amadea and Agus Winarno published in the Journal of Information System Vol. 1 No. 1 Year 2016, entitled "Prediction of Drinking Water Debit Production Per Month with Backpropagation Artificial Neural Network Method (Case Study: PDAM Tirta Moedal Semarang). This research concludes that the calculation of recapitulated data on water usage by customers every month. while the research that the author examines refers more to how the law plays a role in this matter.

Third, research by Thomas Triadi Putranto and Kristi Indra Kusuma published in the Scientific Journal of Engineering Science Vol. 30 No. 1 Year 2009, entitled "Groundwater Problems in Urban Areas". This study concluded that excessive exploitation of groundwater has a negative impact on the balance of nature itself universally to the biological aspects and how to handle it. while the research that the author examines refers more to how the law plays a role in this matter.

Methods

The research method used in this study is a normative approach. This approach involves two main steps. First, desk research which aims to collect data and information from various sources such as books, journals, scientific articles, and other sources. After the data and information are collected, the next step is to analyze the data to gain an in-depth understanding of the topic under study. Second, legal analysis aims to examine laws and regulations related to environmental damage mitigation. This analysis is conducted to evaluate the suitability and effectiveness of existing regulations in overcoming environmental problems. With this normative

approach, the research is expected to provide a comprehensive overview of the legal aspects and theories relevant to the topic under study.

Discussion

Negative Impact of Water Source Drilling on the Neighborhood

Water is a compound of two hydrogen atoms and one oxygen atom, which becomes H2O. Water is a natural resource that has an important function for life, especially for humans. For humans, water is used to fulfill daily needs. Almost all human activities require water, including bathing, washing, cooking, and drinking. Water is universal or comprehensive from a life perspective, making it a valuable resource both qualitatively and quantitatively. Water used by humans to fulfill basic daily needs must meet the requirements of Permenkes RI Number 32 of 2017. Water sources are the main component of a clean water supply system. Without a water source, clean water supply cannot function. Water on this planet comes from various sources. Based on the location of the water source, water can be divided into space water (rainwater), surface water, and groundwater.

1. Space water/rainwater
   Rain is the event of the arrival of water in liquid or solid form poured out from the atmosphere to the earth's surface. This is because the water points contained in the clouds increase more and more until the situation where the cloud is no longer able to accommodate these water points, it will be dropped back to the earth's surface in the form of rainwater or precipitation.[4]
2. Surface Water
   Surface water is water that collects on the ground or in springs, rivers lakes, wetlands, or the sea.[5]
3. Groundwater
   Based on Law Number 7 of 2004 concerning Water Resources which defines groundwater as water contained in the rock layer below the ground surface.

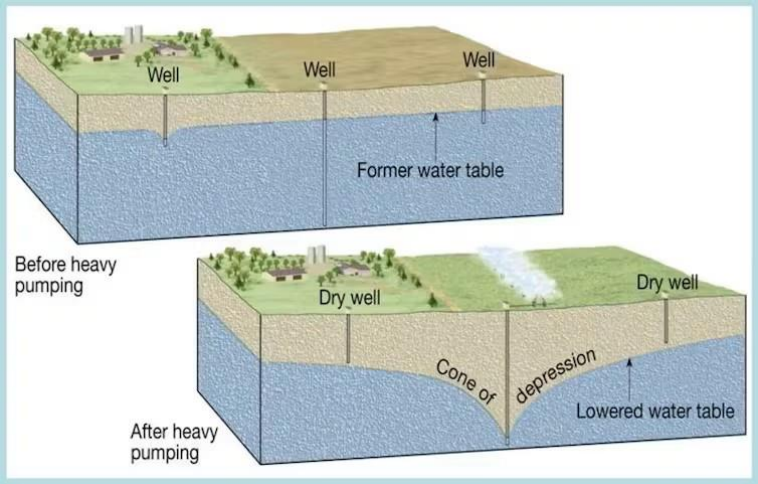
According to Bouwer in 1978, groundwater is an amount of water below the earth's surface which can then be collected by wells, tunnels, or drainage systems by pumping. It can also be called a stream that will naturally flow to the ground surface through seepage or a jet.[6]

Groundwater is water that is often used by factories engaged in the production of mineral water for public consumption. Drilling water sources, especially groundwater, is one way for these factories to take the water and turn it into mineral water. Drilling these water sources does not alone have no impact on the surrounding environment. According to Law No. 7 of 2004 article 34 on Groundwater states that groundwater is one of the water resources whose existence

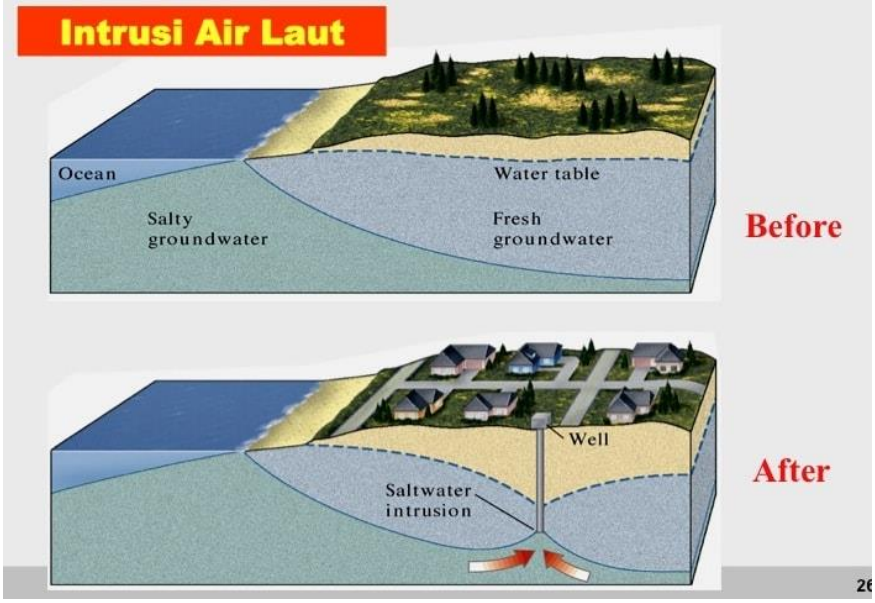
[4] *Pengertian Air Hujan Dan Macam-Macam Hujan*, 86.
[5] Mochammad Harris, "Air Permukaan : Pengertian, Karakteristik, & Jenis," *Gramedia Blog*.
[6] Mochamad Harris, "Air Tanah: Pengertian, Manfaat, Jenis-Jenis, Kandungan Air Tanah Dan Kerusakannya," *Gramedia Blog*.

is limited and whose damage has a wide impact and whose recovery is difficult.[7] The following is the impact of water source drilling on the surrounding environment:

1. Groundwater Level Subsidence
   Groundwater subsidence is a geological disaster in the form of naturally occurring land subsidence. One of the causes of land subsidence is caused by groundwater exploitation activities. Example of nearby wells experiencing drought.[8]

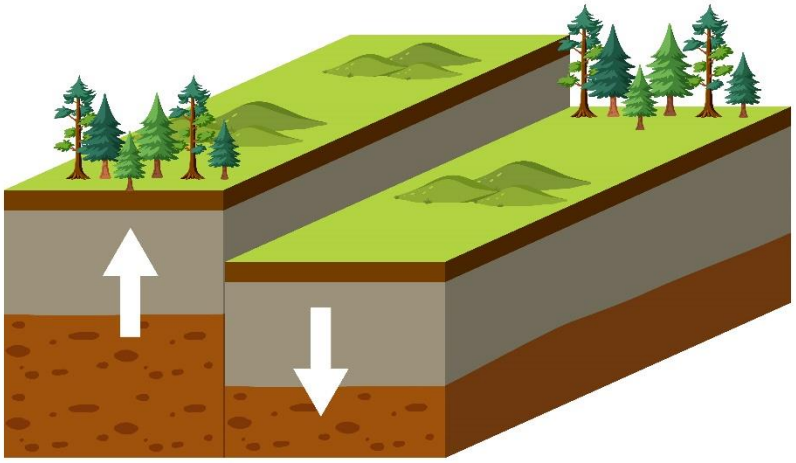


2. Saltwater Intrusion
   Saltwater intrusion is the rise of the boundary between the groundwater table and the sea level inland. In short, it is the infiltration of seawater or saltwater into groundwater. (PPT ITS)



[7] Kurniawan, "Dampak Eksploitasi Air Tanah Oleh Air Mineral Terhadap Suplai Air Pertanian Kecamatan Madapangga" (*Universitas Muhammadiyah Mataram, 2020*).
[8] Fajriani Fajriani, Teuku Andi Fadlly, and Tisna Harmawan, "Prediksi Penurunan Muka Tanah Melalui Pendugaan Potensi Air Tanah Menggunakan Metode Self-Potential," *PHYDAGOGIC Jurnal Fisika dan Pembelajarannya* 2, no. 2 (April 30, 2020): 49–54.

3. Ecosystem Damage
   Environmental degradation is the destruction (causing degenerative damage) of the environment through the depletion of natural assets such as water, soil, and air including ecosystems, habitat intrusion, wildlife extermination, and environmental pollution.
4. Land Subsidence
   Land subsidence is a process of land subsidence movement based on a certain datum (geodetic reference frame) where there are various variables that cause it.[9] Geotechnically, land subsidence is caused by an extracted groundwater basin (aquifer) resulting in an increase in the intergranular tension of the soil in the unconsolidated aquifer.



From these four impacts, the social impact that is felt by the community is the use of water that is usually used by the local community for activities such as farming and others. With the existence of mineral water factories that exploit groundwater continuously without thinking about the long-term impact. There are often conflicts between the community and the mineral water factory that makes the place or area of the local community to be used as production land. Socially, this impact can worsen the economic condition of the community, increase social inequality and create instability in the community. Therefore, it is important for the government and communities to manage water resource drilling wisely to minimize its negative impacts and ensure the sustainability of water resources for future generations.

Appropriate Countermeasures for Impacts Caused by Water Source Drilling

The solution to prevent the excessive use of groundwater at this time of its development in each region is growing rapidly, this needs special attention because the procurement of mineral water factories that increase rapidly every year has a negative impact on the lives of people who live side by side with factories that are

[9] Dr. led Veda R. Sitepu, SS. MA Dr. Aartje Tehupeiory, SH. MH Dr. ErniMurniati, MP.d Thomas Abbon, SH. MH Elly A.M. Pandiangan, SH. MH Poltak Siringoringo, SH. MH 1. DewaAyu Widyani, SH. MH Humanpanjaitan, *Kumpulan Karya Ilmiah Dosen Universitas Kristen Indonesia Delapan Windu*, 1st ed., vol. 1 (jakarta: UKI Press, 2017).

established in areas adjacent to settlements The role of law is crucial in regulating and supervising the development of the mineral water industry that is rampant, especially in overcoming and preventing the damage caused. Therefore, efforts to protect and manage the environment are an obligation for the state, government, and all stakeholders in the implementation of sustainable development so that the Indonesian environment can remain a source and support of life for the Indonesian people and other living things. The provisions of Article 1 point (3) of Law Number 32 of 2009 concerning Environmental Protection and Management, stipulates that sustainable development is a conscious and planned effort that integrates environmental, social, and economic aspects into development strategies to ensure the integrity of the environment as well as the safety, ability, welfare, and quality of life of present and future generations.

1. Monitoring and Law Enforcement
2. Regulations related to the procurement of bottled water factories are tightened to ensure that bottled water must meet established quality and safety standards.
3. Public awareness Environmental protection and management will not run optimally.

In Indonesia, groundwater is actually a national wealth with a vital role controlled by the state. The use of groundwater is intended for the welfare of the people covering all fields. As for the impact of excessive groundwater exploration, the government should take a firm stance. Especially after knowing the problems that arise from the excessive use of groundwater and the real actions of the government in dealing with these problems including:

Creating Legal Aspects that Underlie Groundwater Management One of the government's concrete efforts is to create legal aspects that underlie groundwater management. There are several regulations related to groundwater management. Such as the 1945 Constitution article 33 (3), MPR Decree on GBHN, Law No. 7 of 2004 on Water Resources as a substitute for Law No. 11 of 1974 on Irrigation, Government Regulation No. 43 of 2008 on Groundwater as an Implementation Provision especially articles 10, 12 (3), 13 paragraph (5), 37 (3), 57 (3), 58 (2), 60, 69, and 76.

There are also local regulations that apply to certain regions. For example, the government of Maluku Province has a fairly strict policy that might be emulated. Where the Maluku Provincial Regulation No. 8 of 2004 concerning Tax on the Extraction and Utilization of Underground Water and Surface Water is enacted, the implementation guidelines are regulated in Maluku Governor Regulation No. 383 of 2005. Without adequate legal instruments that specifically regulate the protection of the environment. The environment will experience tremendous destruction without any efforts to prevent and punish those who violate it. The law has an important role to provide a deterrent effect to people who violate environmental laws. If there is no law governing the environment, it will cause tremendous damage to the environment. People arbitrarily use protected forests for personal interests without

caring about others. With the existence of environmental laws accompanied by strictness to violators, it will minimize environmental damage. This is because the penalties given by law to violators are very severe.[10]

Law Enforcement Tools Regulated in Law No. 32 of 2009 in order to Preserve the Environment in Indonesia Law No. 32 of 2009 concerning Environmental Protection and Management, law enforcement in the field of environment can be classified into 3 (three) categories, namely:

1. Administrative law enforcement, which includes administrative sanctions such as government coercion, forced money, closure of business premises, termination of company machinery activities, and revocation of licenses;
2. Civil law enforcement, which includes civil sanctions such as compensation and damage recovery;
3. Criminal law enforcement, which includes criminal sanctions such as imprisonment and fines;

In Law No. 32 of 2009 concerning PPLH Article 71 paragraph (1) states: (1) The minister, governor, or regent/mayor in accordance with their authority shall supervise the compliance of the person in charge of the business and/or activity with the provisions stipulated in the laws and regulations in the field of environmental protection and management.[11] Administrative sanctions are also mentioned in Article 76 paragraph (1) of Law No. 32 of 2009 concerning Environmental Protection and Management states: (1) The Minister, Governor, or regent/mayor applies administrative sanctions to the person in charge of the business and/or activity if the supervision finds a violation of the environmental permit; (2) administrative sanctions consist of: a. Written reprimand; b. Government coercion; c. Suspension of environmental license; or d. Revocation of environmental license. Revocation of environmental license.

Administrative sanctions mainly have an instrumental function, namely controlling prohibited acts. In addition, administrative sanctions are primarily aimed at protecting the interests safeguarded by the violated provisions. Some types of administrative law enforcement tools are: a. Government coercion or forced action (Bestuursdwang); b. Forced money (Publiekrechtelijke dwangsom); c. Closure of business premises (Sluiting van een inrichting); d. Stopping of company machinery activities (Buitrechtelijke dwangsom). Cessation of company machinery activities (Buitengebruikstelling van een toestel); e. Revocation of license through the process of warning, government coercion, closure and forced money.

This is regulated in Law Number 32 Year 2009 in Chapter XII regarding Supervision and Administrative Sanctions. The second instrument that is applied after administrative sanctions are not moved by the perpetrators of environmental violations or crimes is the use of civil instruments. Settlement of environmental

[10] Shira Thani, "Peranan Hukum Dalam Perlindungan Dan Pengelolaan Lingkungan Hidup," jurnal warta (n.d.), accessed June 2, 2024, file:///C:/Users/caspe/Downloads/240-466-1-SM.pdf.

[11] Himpunan Peraturan Perundang-undangan, disusun oleh anggota IKAPI, Undang-Undang Perlindungan dan Pengelolaan Lingkungan Hidup, Cet. 1, Bandung: Fokusmedia, 2009, 44

disputes can be pursued through two channels, namely: First: through the court and Second: through out of court The regulation of environmental civil law enforcement in Law Number 32 of 2009 is regulated in Chapter XIII concerning Environmental Dispute Resolution.

Environmental disputes can be pursued through the courts or out of court based on the voluntary choice of the parties concerned. If the chosen out-of-court effort is unsuccessful, one or more of the parties can take the court route. As stated in Law No. 32 of 2009 concerning Environmental Protection and Management Article 84 (1) Environmental dispute resolution can be pursued through the court or outside the court. (2) The choice of environmental dispute resolution is made voluntarily by the parties to the dispute. (3) A lawsuit through the court can only be pursued if the chosen out-of-court dispute resolution effort is declared unsuccessful by one or more of the parties to the dispute. And the last instrument that can be taken in environmental law enforcement is through criminal instruments that have the aim of punishing the perpetrator with imprisonment or fines.[12] Criminal law enforcement does not function to improve the polluted environment.[13] However, this criminal law enforcement can create a very effective deterrent factor and is regulated in Law Number 32 of 2009 CHAPTER XV regarding criminal offenses in the environment. The imposition of criminal sanctions against polluters and environmental destroyers in terms of the relationship between the state and society is very necessary, because the goal is to save the community (social defense) and the environment from prohibited acts (verboden) committed by development actors.[14] According to Helbert L. Packer, as quoted by Muladi and Barda Nawawi Arief, that specifically the punishment is intended to: (1) prevent the occurrence of crime or unwanted actions or wrong actions; and (2) impose suffering or appropriate retaliation on the violator.[15]

Conclusion

Impact on the surrounding environment. According to Law No. 7 of 2004 article 34 on Groundwater states that groundwater is one of the water resources whose existence is limited and whose damage has a wide impact and whose recovery is difficult. The following is the impact of drilling water sources on the surrounding environment: a) Groundwater Table Depletion; b) Saltwater Intrusion; c) Ecosystem Damage; d) Land Subsidence. Without adequate legal instruments that specifically regulate environmental protection. The environment will experience tremendous destruction without any efforts to prevent and punish those who violate it. The law has an important role to provide a deterrent effect to people who violate environmental laws. If there is no law governing the environment, it will cause

[12] Hermien Hadiati Koeswadji, "Hukum Pidana Lingkungan," in *Hukum Pidana Lingkungan*, ed. Hermien Hadiati koeswadji, 1st ed. (bandung: Citra Aditya Bakti, 1993). 97.
[13]Komang Trie Krisnasari, "Penerapan Undang-Undang No.32 Tahun 2009 Perlindungan Dan Pengelolaan Lingkungan Hidup Dalam Upaya Penegakan Hukum Lingkungan Di Indonesia" (n.d.), accessed June 2, 2024, file:///C:/Users/caspe/Downloads/5354-1-8502-1-10-20130501.pdf.
[14] Hermien Hadiati Koeswadji, 75.
[15] Muladi dan Barda Nawawi Arief, Teori-Teori dan Kebijakan Pidana, (Bandung: Alumni, 1984), 92.

tremendous damage to the environment. People arbitrarily use protected forests for personal interests without caring about others. With the existence of environmental laws accompanied by strictness to violators, it will minimize environmental damage. This is because the penalties given by law to violators are very severe.

Because of the many impacts generated by this that cause conflict, it would be better if the central government and local government provide 1 (one) spring to overcome the number of drilling that causes natural damage. 1 (one) spring is flowed to the community's house and also to their agricultural land. Each region should be provided with water flow and provide restrictions on industry to reduce drilling. Finally, there is a need for checks on the community and industry to prevent abuse of authority and to avoid undesirable negative impacts from excessive drilling.

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