

SUSTAINABLE GROUNDWATER RESOURCE MANAGEMENT

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ABSTRACT

Water is a basic human need for daily life, so it is necessary to provide protection to water. The absence of clear regulatory concerning water resources, especially groundwater, will result in the declining quality and quantity of water due to the commercialization of water use. Article 33 paragraph (3) of the 1945 Constitution of Indonesia has provided a clear direction for the use of water in Indonesia: "the earth and water and the natural resources contained therein are controlled by the State and used for the welfare of the people". However, in reality it has not done well. Although there are some rules such as the Government Regulation No. 82 of 2001 on the Management of Water Quality and Water Pollution Control, but it is only related to the water that exists on the surface, and it does not cover underground water. Good and appropriate pattern of ground water management planning will affect the balance between the conservation of groundwater resources and the utilization of groundwater resources in use. Therefore, it is necessary to have clear regulations concerning the management of ground water with the sense of justice so that it can be used for the welfare of the people, not individuals.

Keywords: groundwater resources, sustainable

A. Introduction

Water crisis has become a common sight in the dry season in both urban and rural areas. The government's failure to ensure the provision of water for people also aggravate the water crisis in the community worsened by greenhouse effect, global warming, forest fires, and the damage to the ozone layer. They increase the severity of water crisis for people's life.

Juridically, the government has set up on the issue of water in some regulations, but it could not overcome the problems of water resource as the major need of human's life. One of them is the problem of water pollution in River Balangan in the province of South Kalimantan. The river pollution was the impact of the coal mining activities of PT ADARO Indonesia that occurred shortly after the Ministry of Environment awarded PT. ADARO Indonesia in the Program of Corporate Performance Rating in Environmental Management in 2009 with the rating of GREEN.¹

Today human perspective toward water will experience a change of perspective from getting water easily without the cost into the difficulty of getting water that incur huge costs. Actually, the 1945 Constitution in Article 33 (3) has provided a clear direction for the use of water in Indonesia; "the earth and water and the natural resources contained therein are controlled by the State and used for the welfare of the people".

This means that water must be used for the welfare of society, but in reality people have to pay to get water. The government's failure in the management of water resources is the government's lack of consistency in regulating the use of water resources that have been mandated in the Constitution. The failure is due to, the first, the government's failure to choose the model of development that prioritize economic growth with all the negative consequences for the environment. Secondly, the government fails to play the role as the guardian of common interest including the common interests of good environment. The third, the government fails to build a good governance which causes the deviations of various formal provisions in the environmental field.²

Water crisis could be a disadvantage for most people and can be an advantage for the other party. For the most party, water scarcity can be a source of disastrous life, but for a small number of people, water scarcity could be economic commodity and traded goods that can be utilized as much as possible.

In this water issue, especially for groundwater, the government under Act No. 2 of 2015 on the Stipulation of the Government Regulation in Lieu of Act No. 2 of 2014 on the Amendment of the Act No. 23 of 2014 on Regional Government into Law, the government has the authority in the management of the available ground water resources in the region and is responsible for the preservation of groundwater resources in the region. This implies that the implementation of the authority in groundwater management must be based on the management principle of sustainable groundwater resources and can ensure the sustainable groundwater development.

¹www.walhi.or.id/in/kampanye/tambang/144-siaran-pers/362-protas-keras-terkait-tercemarnya-sungai-balangan-akibat-aktivitas-pt-adaro-indonesia

² A. Sonny Keraf. 2002. *Etika Lingkungan (Environmental Ethics)*. Jakarta. Kompas. p 191.

Groundwater, especially in urban areas, is a natural resource that plays vital role for the survival of people's lives, and even in some areas such roles can be classified as a strategic factor. On the other hand, there are some people who exploit ground water excessively so that it causes the problems with the negative impact on the surrounding environment. One of them is the reduction in height of surface soil, reduced quantity of groundwater, the degradation of groundwater quality, subsidence, and seawater intrusion into aquifer layer of ground water.

Government interest in addressing the groundwater issue is considered have less support the partisanship to the public. Many companies that use groundwater for commercial purposes will ultimately harm the public at large. Even the groundwater context will be placed in the economic commodity with bargaining power in public. Water scarcity in the world can be used by large corporations and international institutions as an economic commodity that is highly profitable. Increased water-based commodities and the privatization of water management in various countries will have the impact on the commercialization of water use.

B. Discussion

Water is a natural resource that is absolutely necessary for life and human life. Therefore, water is a key element in any environmental system.³ It is understandable because water is very important, so international and national attention to the preservation of water resources is indispensable for the sustainability of human life.

Water is a highly needed natural resource which is in the fighting ± 7 billion inhabitants of the earth, so it is not surprisingly to be able to pose conflicts of interest in water, the incidence of violence, and the war for water resources at various levels, such as inter-state, inter-region and inter community or group. Concerning water issues which are so important for human life, the problem of water scarcity encouraged the United Nations to organize the World's Water Conference I in Mar del Plata, Argentina in 1977, which confirmed the recognition of clean water access for anyone which must be met by each country.

Indonesia with its arge population is required to also anticipate the occurrence of the problems to the needs of water. The protection to water resources is implied in Article 3 of Act No. 32 of 2009 on the Environmental Protection and Management, i.e.:

- a. protecting the territory of the Republic of Indonesia from pollution and/ or environmental damage;
- b. Assuring the safety, health, and human life;
- c. Assuring the sustainability of living creatures and the preservation of ecosystems;
- d. Preserving environmental functions;
- e. Achieving harmony, synchronization, and balance of the environment;
- f. Assuring the justice for present and future generations;
- g. Ensuring the compliance and protection to the right to environment as part of human rights;
- h. Controlling the use of natural resources wisely;
- i. Realizing sustainable development; and
- j. Anticipating global environmental issues.

Although the Law does not explain the water resources but Article 3 letter h has ordered that the government should control the natural resources including water resources. If the protection of water resources is not performed from the beginning, it is most likely that Indonesian's water resources could be a problem in the future.

Here water resource has significant social function meaning that public interest has more priority than the individual. As the pillar of the environment, water resource is part of the ecosystem as well as the habitat for flora and fauna. In addition, as the economic pillar, water resource can be utilized to support business activities which are organized in harmony.⁴

Basically, the conflicts of water resource are very broad, complex, and could be broader into the conflicts of ethnics, religions, and races. The conflict resolution must be performed in various ways according to the context of the cause of conflict and the condition of the society. Although the characters triggering the conflicts are the same but the ways to resolve can be different when occurred in other places.

Conflict, according to Kovach, is derived from the Latin word of *con* (together) and *figere* (to strike). Kovach defines the conflict as a struggle for human mental and spiritual due to the differences concerning opposing principles, statements and arguments. Meanwhile, according to P. Hadi Sudharto, conflict can occur within an individual in relation to other individuals or an individual with institutions or the groups of public institutions, inter-institutions, and can also occur among family members. In other words, conflict is part of our lives.⁵

³ Soerjani, M, Ahmad, dan Munir, R. 1987. *Lingkungan Sumber Daya Alam dan Kependudukan dalam Pembangunan (Natural Resource Environment and Population in Development)*. Jakarta. UI Press. P. 34.

⁴ Kodoatie, .J. dan Basuki, M. 2004. *Kajian Undang-Undang Sumber Daya Air (A Study of Water Resource Law)*. Yogyakarta. ANDI Offset. P. 27.

⁵ Sudharto P. Hadi. 2010. *Resolusi Konflik Lingkungan (Environmental Conflict Resolution)*. Semarang. Badan Penerbit Universitas Diponegoro. P. 2.

Edith Brown Weiss, as quoted by Adji Samekto,⁶ identifies three mistakes in the use of natural resources, such as: (1) over-consumption of quality natural resources which makes future generations have to pay dearly to consume the same resources; (2) the use of natural resources with unknown current best benefits in excess. It is very harmful to the interests of future generations because they have to pay the in-efficiency in the use of natural resources by the past and present generations; (3) the excessive use of natural resources by past and present generations so that the future generations do not have the high diversity of natural resources.

Excessive exploitation of groundwater will cause the decrease of groundwater appearance and affect the water quality standard both the quality and quantity of the local environment such as the discharge of water and the pollutants in the well pump. The change of the groundwater quality standards for the groundwater exploitation does not consider the characteristics of groundwater. Therefore, it affects the amount of groundwater flow, and it will easily invite the initial water with poor quality to flow into the water layer with better quality. To overcome it, it requires a sustainable groundwater management.

Water quality standards, according to Article 1 paragraph 9 of the Government Regulation No. 82 of 2001 on the Management of Water Quality and Water Pollution Control are "threshold limits or the levels of living creatures, the existing substance, energy, or component that must exist or should exist and/ or the polluting elements which are tolerable in water". In other hand, the provisions of Article 8 of the Government Regulation No. 82 of 2001 on the Management of Water Quality and Water Pollution Control state that the water qualities are divided into four classes, namely:

1. Class one is the water that can be used for drinking water and other uses that require the same water quality as the purpose.
2. Class two is the water used for infrastructures/ facilities of water recreation, fresh water fish cultivation, livestock, and water for crops, or other uses that require the same water quality for the use.
3. Class three is the water that can be used for the cultivation of freshwater fish, livestock, and water for crops, or other designations that require the same water quality as these purposes.
4. Class four is the water that can be used for planting, or other designations that require the same water as these purposes.

Groundwater environment in everyday life is one of the important sources of clean water to fulfil increasingly human needs along with population growth and development progress, particularly in urban areas with many industries. There are several factors that cause the threats to groundwater sources, i.e.:

1. The pollution of the earth's atmosphere resulting in the earth's surface warming.
2. Deforestation, especially in protected forest areas, which resulted in the absence of water catchment areas.

On the other hand, the distribution coverage of groundwater through the aquifer media which is quite wide and not contaminated by surface pollutants making the source of ground water be the important and strategic water source. However, the exploitation of ground that is not in accordance with the principles of good environmental balance could be disastrous for humans in the future. This is due to the utilization and use of water freely by using pumps by the society and economic actors with no efficient and effective action will pose serious negative impacts on the sustainability and quality of groundwater resources. The negative impacts of the utilization of ground water (excessively) can be divided into the qualitative (groundwater quality) and quantitative (groundwater supply) impacts.

The changes that occur in the environmental components will affect the quantity and quality of groundwater. Meanwhile, the utilization of ground water will surely influence the resource condition directly as well as the surrounding environment. Therefore, the conservation and utilization of ground water require the understanding of the geological conditions of a site.

Although groundwater is a renewable natural resource, but the process of formation (genesis) can take very long. The formation can take tens to thousands of years depending on the distance between the augmentation and discharge areas, and depending on the physical properties of the rocks (igneous, sedimentary or metamorphic). Likewise, the recovery process, both quantity and quality, requires a very long time.⁷

Groundwater management plan is the result of a comprehensive and integrated planning that is necessary to manage groundwater. In other words, a plan is an activity process to determine the actions / steps that will be performed in a coordinated and focused way in order to achieve the goal of groundwater management⁸. Meanwhile, according to Takdir Rahmadi⁹, the definition of water resource management is "an effort to plan, implement, monitor and evaluate the implementation of the water resource conservation and control of water damaging power".

The pattern of groundwater resource management is based on the principle of balance between conservation and utilization of groundwater resources. The planning of ground water resource management consist of inventory of activities, preparation

⁶ Adji Samekto. 2005. *Kapitalisme, Modernisasi dan Kerusakan Lingkungan (Capitalism, Modernization, and Environmental Damage)*. Yogyakarta. Pustaka Pelajar. P. 73-74

⁷ Asdak, C. 2004. *Hidrologi dan Pengelolaan Daerah Aliran Sungai (Hydrology and River Flow Area Management)*. Yogyakarta. Gadjah Mada University Press. P. 51.

⁸ Suripin, 2002. *Pelestarian Sumbidaya Tanah dan Air (Ground and Water Resource Management)*. Yogyakarta. ANDI Offset. P. 142.

⁹ Takdir Rahmadi. Op cit. P. 205.

and adoption of water resource management plan. Groundwater resource now no longer solely has ecological and social values but it has already included the economic values which can be used for the commercialization of certain interests. According to Koesnadi Hardjosoemantri,¹⁰ the demand for water use increases which is needed for commercialization, such as irrigation, industry, drinking water, recreation, and others.

The strong economic influence of the world market today has the impact on water management as well. The economic aspects of water are getting stronger, so the privatization or commercialization of groundwater resources can no longer be prevented because of the need or use of water which is increasingly numerous and widespread. There are also pressures from the World Bank, IMF, and Water Resources Adjustment Loan (WATSAL) that suggests the privatization of water that can be used for the benefit of multinational companies for the unlimited use of water resources. Then, the multinationals will later be able to take control of water resources, including groundwater for commercialization, and the public interest over water resources will be threatened by the market law.

It is found that fresh water is scarce water resources for approximately 97.2% is sea water that cannot be drunk directly and 2.15% is frozen water that cannot be consumed directly. The rest is water of less than 0.65% that can be consumed directly by humans in rivers, lakes or ponds, and groundwater. It is necessary to keep in realize that the water in the percentage of 0.65% has also been on the wane because the sources of fresh water are getting decreased and contaminated. Therefore, it is predicted that \pm 7 billion people in this world will have a shortage of clean water for life and may be in danger of not getting clean water.

Indonesia in the 1945 Constitution has underlined that water resource is for the prosperity of society and cannot be sold and traded or privately owned. The aim is that water resources can be used for future generations and be able to run continuously from present to future generations. Considering that natural carrying capacity is crucial for human survival, natural carrying capacity must be protected from damage and does not have bad impact on humans.¹¹

In Act No. 32 of 2009 on the Protection and Management of the Environment, the government has set up the sanctions that can be imposed against the misuse of water resources set forth in Articles 98 and 99. Article 98 of Act No. 32 of 2009 on Environmental Protection and Management states:

- (1) Any person who intentionally commits acts that go over the ambient air quality standard, water quality, sea water quality standard, or the standard criteria of environmental damage shall be sentenced with imprisonment of minimum 3 (three) years and a maximum of 10 (ten) years and a fine of at least IDR 3,000,000,000.00 (three billion rupiah) and at most IDR 10,000,000,000.00 (ten billion rupiah).
- (2) If the acts referred to in paragraph (1) result in injury and/ or hazards to human health, it shall be sentenced with imprisonment for a minimum of 4 (four) years and a maximum of twelve (12) years and a fine of at least IDR 4,000,000,000.00 (four billion rupiah) and at most IDR 12,000,000,000.00 (twelve billion rupiah).
- (3) If the acts referred to in paragraph (1) result in serious injury or death, it shall be sentenced with imprisonment of at least five (5) years and a maximum of 15 (fifteen) years and a fine of at least IDR 5,000,000,000.00 (five billion rupiah) and at most IDR 15,000,000,000.00 (fifteen billion rupiah).

In other hand, Article 99 of Act No. 32 of 2009 on Environmental Protection and Management states:

- (1) Any person whose negligence has surpassed the ambient air quality standard, water quality, sea water quality standard, or standard criteria of environmental damage, shall be sentenced with imprisonment of a minimum of 1 (one) year and a maximum of three (3) years and a fine of at least IDR 1,000,000,000.00 (one billion rupiah) and at most IDR 3,000,000,000.00 (three billion rupiah).
- (2) If the acts referred to in paragraph (1) result in injury and / or hazards to human health, shall be sentenced with imprisonment of at least 2 (two) years and a maximum of 6 (six) years and a fine of at least IDR 2,000,000,000.00 (two billion rupiah) and at most IDR 6,000,000,000.00 (six billion rupiah).
- (3) If the acts referred to in paragraph (1) result in serious injury or death, shall be sentenced with imprisonment of minimum 3 (three) years and a maximum of 9 (nine) years and a fine of at least IDR 3,000,000,000.00 (three billion rupiah) and at most IDR 9,000,000,000.00 (nine billion rupiah).

With the presence of these regulations, it is expected that water resources, particularly groundwater, can be preserved in a sustainable manner for future generations so that water is not misused for individuals or companies for the commercialization of seeking their own benefits.

C. Conclusions

Water resource management is important to preserve so that water is not used arbitrarily for the interests of personal or individual, or a group. Especially for the decreasing groundwater resources and the inappropriate exploitation of groundwater, it results in negative impacts on the surrounding environment. Arbitrary and unwise groundwater exploitation will result in a reduction in the height of ground surface, reduced quantity of groundwater, the degradation of groundwater quality, subsidence, and the intrusion of sea water into groundwater equifer layer.

¹⁰ Koesnadi Hardjosoemantri. 2005. *Hukum Tata Lingkungan (Environmental Order Law)*. Yogyakarta. Gadjah Mada University Press. P. 53.

¹¹ Wisnu Arya Wardhana. 2004. *Dampak Pencemaran Lingkungan (Environmental Pollution Impacts)*. Yogyakarta. ANDI Offset. P. 15.

Groundwater management plan is urgently needed to address the reduced groundwater. The good and appropriate pattern of groundwater management will affect the balance between the conservation of groundwater resources and the utilization of groundwater resources. It is also necessary to immediately make the laws on water resources as the consequence of Article 33 of the 1945 Constitution of the Republic of Indonesia.

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