

# The challenge of government Policy in the management of water resources based on sustainability in Indonesia

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(Received 9 January, 2021; Accepted 31 August, 2021)

## ABSTRACT

Water is an essential component of life. Professional and sustainable management of water resources is useful to maintain the quality and quantity of water as well as to ensure that water is optimally utilized for living things in the world. The data for this qualitative study consisted of two types of data, namely primary data collected from interviews and observations, and secondary data obtained from the legislations related to water management. This study was conducted in Indonesia. The results showed that water resources as a gift from God can be obtained from various sources, such as rainwater, surface water, groundwater and seawater. Water is generally used for multiple purposes, such as drinking water, household needs, industry, etc. Yet, abundant water resources that are not managed optimally can cause various disasters, such as floods and landslides. Conversely, the less volume of water can cause droughts. Hence, water resources management policies must be in harmony with the environment, social and economy so as to create sustainability, justice and welfare in the society. Water resources must be utilized as much as possible for public interests in accordance with human rights to water resources.

*Key words* : Water resources, Sustainability-based policy, Sustainability, Justice and welfare

## Introduction

The availability of natural resources, especially water resources, is very important as it influences the survival of a nation. Water is an essential component of life. Professional and sustainable management of water resources is useful to maintain the quality and quantity of water as well as to ensure that water is optimally utilized for living things in the world. The international agreement on human rights to water was ratified at the United Nations Session in 2002 stating "The human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realization of other human rights". In 2002, UNESCO declared that basic human rights to water are 60 liters/person/day for both consump-

tion and sanitation purposes (Jalunggono and Destiningsih, 2018: 575). Further, the National Standardization Agency states water use for domestic needs is calculated from the population in urban and rural areas in which urban areas need 120 liters/day/capita and rural areas need 60 liters/day/capita (Suroso, 2016). In this sense, human rights norms can be used as a basis to create water management policies since it provides an environmental management approach that can minimize injustice (Lewis 2012).

Water is an indispensable resource for life. The World Bank estimates that the water market potential is worth 1 (one) Trillion US dollars so as water resources become a very profitable business field. Hence, water privatization often occurs resulting in

conflicts with the society as occurred in India, Argentina, Chile, Mexico, Malaysia, Nigeria, Spain, England, South Africa, and almost in all countries in the world (Shiva, 2002). As stipulated in Article 1 Paragraph (3) of the 1945 Constitution of the Republic of Indonesia, "The State of Indonesia shall be a state based on the rule of law" (Ridwan 2013: 17). Constitutionally, the right to get a good environment, especially water, is stated in Article 28H Paragraph 1 (one) that "every person must live in physical and spiritual welfare, live and get a good and healthy environment and obtain health services" and Article 33 Paragraph (3) of the 1945 Constitution of the Republic of Indonesia that "the land, the waters and the natural resources within shall be under the powers of the State and shall be used to the greatest benefit of the people". Enforcement of environmental law is one of instruments to create a good and healthy environment.

The preservation of natural resources in Indonesia refers to several legislative regulations, namely; Law Number 32 of 2009 concerning Environment Protection and Management; Article 20 concerning Environmental Quality Standards; Article 21 (4) concerning the standard criteria for damage due to climate changes which is based on parameters, such as; a. temperature rise; b. sea level rise; c. storm; and/or d. drought; and Article 98, 99 and 100 concerning Water Quality Standards. Management of water resources related to wastewater treatment installations must consider the rules stated in Law Number 32 of 2009 concerning Environment Protection and Management since water pollution can cause a decrease in environmental quality and public health (Agustiningsih, Budi Sasongko and Sudarno 2012: 67) and Law Number 37 of 2014 concerning Soil and Water Conservation. Management of water resources currently refers to Law Number 11 of 1974 concerning Irrigation in which its scope covers Definition, Function, Mastery and Authority, Technical Planning, Guidance, Exploitation and Maintenance, Protection, Financing, Criminal Provisions, Transitional Provisions, and Final Provisions.

Article 1 paragraph (2) of Law Number 37 of 2014 concerning Soil and Water Conservation defines Soil and Water Conservation as "an effort to protect, restore, improve, and maintain the land function in accordance with its capabilities and uses to support sustainable development and life". In the same vein, Article 1 paragraph (18) of Law Number 32 of 2009 concerning Environmental Protection and Manage-

ment defines natural resource conservation as "the management of natural resources to ensure its utilization and availability by maintaining and improving its quality and diversity". Government Regulation Number 37 of 2012 and Regional Regulations of West Java Province Number 20 of 2014 concerning Watersheds Management regulate the management of water resources.

The existing regulations reflect a contribution achieved based on encouragement and support from the society who care about their environment (Barkan 2009). The protection and conservation efforts are not an equal priority. Therefore, there is an impression that the legislation policies relating to the management of conservation areas are only complementary rules and have not played their mission to realize certainty, benefit and justice (Alius 2011). In managing natural resources, especially water, the State must not override indigenous peoples' rights over land and its natural resources (Fauzi Rachman 2016).

## **Materials and Methods**

This qualitative study applied an empirical juridical research method with descriptive-analytical design. The data used in this study consisted of two types of data, namely primary data comprising of the data released by the related institutions and secondary data comprising of the legislation and legal theories. The 1945 Constitution of the Republic of Indonesia. Law Number 32 of 2009 concerning Environment Protection and Management, Law Number 37 of 2014 concerning Soil and Water Conservation, Government Regulation Number 37 of 2012 and Regional Regulations of West Java Province Number 20 of 2014 concerning Watersheds Management

## **Results and Discussion**

### **Water resources as grace in Indonesia**

All living things in this world need water, from microorganisms to the noblest creatures, namely humans. There will be no life on earth without water since water is the main component of life (Susana 2003: 17). Water is the most abundant chemical compound on earth. Yet, in line with the increasing standard of living, the water needs are also increasing so as lately water has become an "expensive" thing. In big cities, it is not easy to get clean water since a lot

of water is used for industrial purposes requiring a certain amount of water to support their production. On the other hand, the land as a water resource has been closed for various purposes, such as housing and industry, ignoring the land function as water storage. The amount of water on earth is relatively constant even though water experiences current movements, circulates due to the influence of the weather, and also experiences physical changes. The water circulation and physical change include surface water turning into steam (evaporation), water following circulation in plants (transpiration), and water following circulation in human body and animals (respiration) (Susana 2003). Evaporating water will form clouds and then fall as rainwater. The rainwater will then either become surface water or groundwater. Here, the shallow groundwater will be used by plants, while deep groundwater will come out as a spring. This circulation and physical change will continue until the end of time (Ross, 1970).

Water as a universal solvent can dissolve elements and other chemical compounds besides hydrogen and oxygen as its main elements. Therefore, there is no pure water on earth. With the dissolved elements and chemical compounds in it, water is an ecological component that plays an important role in life. The quality of water needed in various aspects of human life depends on the criteria for water use. In general, water is used for multiple purposes, such as drinking water, household needs, industry, irrigation, agriculture, etc. Yet, setting standards for clean water is not easy since it will depend on many certain factors concerning water use and water sources. Nevertheless, there is an agreement that clean water is not determined by its purity but is based on normal conditions. If there is a deviation from the normal condition, it means that the water has been contaminated. In 1988, the Governor of the Special Capital Region of Jakarta issued a regulation concerning the criteria of water quality standards for various purposes. In the same vein, the Ministry of Population and Environment and the Minister of Health of the Republic of Indonesia issued the same regulation regarding water use. According to Wardhana, the indicators indicating environmental water has been contaminated is characterized by changes or signs that can be observed, such as the changes in water temperature, the changes in pH or hydrogen ion concentration, the changes in color, smell and taste of water, the appearance of deposits,

colloidal, and dissolved materials, the presence of microorganisms, and the increasing radioactivity of environmental water (Wardhana, 1999).

To meet the basic human needs, water can be obtained from various sources, such as rainwater, surface water, groundwater, and seawater. Yet, this water cannot be directly used because it is mixed with certain impurities coming from various pollutant sources (industry, household, agriculture, etc.). First is rain water. The utilization of rainwater is usually done in areas that do not get groundwater or the available water cannot be used. Rainwater that will be utilized is usually accommodated in barrels, tubs, or ponds. Yet, this type of water contains many air-derived materials, such as gases (oxygen, nitrogen, carbon dioxide), strong acids derived from certain industrial exhaust gases, and radioactive particles (Schroeder 1977). Besides, from the roof of the shelter itself, the water can be polluted by dust particles, bird droppings, and various other impurities. Although the water source originating from rainwater is not pure, it is included in the category of soft water so that the water needs to be boiled or disinfected first before being used for drinking water. Second is surface water. All surface water above the surface of the earth, such as trenches, sewers, rivers and lakes water, is surface water. In general, this water contains pollutant in the form of floating objects originating from the surrounding environment, suspended solid objects, bacteria, waste materials, chemicals, etc. These pollutants cause a variety of odors and flavors so that it is necessary to gradually complete the cleaning treatment before being used for fulfilling humans needs; the cleaning treatment itself depends on the type and amount of dirt contained (Schroeder, 1977). Conversely, surface water found in mountainous areas is relatively clean compared to river water so that the water can be used after a long storage and chlorination. Third is groundwater. Groundwater is water found in the soil, precisely below the surface of the groundwater. In general, groundwater contains soluble mineral materials, consisting of cations (Ca, Mg, Mn, and Fe) and anions ( $SO_4$ ,  $CO_3$ ,  $HCO_3$  and  $Cl$ ). The level of these ions varies depending on the nature and condition of the soil. Here, the deeper the groundwater is, the higher the ions' level (Bolt, 1967). This groundwater is widely used for various purposes since it is not much contaminated by the surrounding environment compared to other water sources. The contamination that may occur caused by poor retrieval

techniques, pipeline system leaks, and soil cracks. The cleaning treatment of groundwater which is sometimes needed is a softening process to remove water hardness and aeration to eliminate unwanted odors and tastes. Last is seawater. The amount of water on earth is quite a lot in which its percentage reaches 71% of the earth's surface area. It means that the surface of the earth is mostly covered by seawater which is about two-thirds (70%) of the earth's surface. The total area of the sea covering the earth is  $3.61 \times 10^8 \text{ km}^2$  with an average depth of 3800m. Hence, 97% of the amount of water existing on earth comes from seawater and the largest part is in the Southern Hemisphere (Ross, 1970). In general, seawater is relatively pure so that it can function as a solvent for chemicals both in the form of solid, liquid and gas. The seawater will be used as a source of fresh water when the fresh water sources, such as rainwater, surface water and groundwater, are no longer available. Therefore, a desalination process can be carried out in several ways, such as distillation, electro dialysis, osmosis/hyper-filtration, etc. In accordance with its function as a solvent, 96.5% of pure water contained in seawater can dissolve 3.5% of chemicals. Chemically, there are about 80 chemical elements in seawater with acidity values (pH) between 7.5 - 8.5. In this sense, ROSS (1970) divides the chemical composition of seawater into four groups, namely dissolved inorganic compounds, dissolved organic compounds, dissolved gases, and particulate compounds (Ross, 1970).

### Water resources as disasters

Law Number 41 of 1999 concerning Forestry explains that forests have 3 (three) functions, namely: (1) protecting life support systems to regulate water systems, prevent flooding, control erosion, and maintain soil fertility; (2) preserving the diversity of plants and animals as well as their ecosystems; and (3) producing forest products. With the existence of forests, rainwater will not directly hit the ground since it will fall on the trees and flow through twigs, branches, stems, and finally to the soil (stem flow). After the rainwater reaches the ground, the water will be held in the topsoil and loose topsoil. The loose soil has high porosity so that the pores will be filled with rainwater. Based on the gravity law, rainwater will drop down as infiltrated water so that it reaches the host rock and continues to flow to lower areas. In certain places, it will then come out as a spring. Water from this spring will flow to the lower

areas and reach the tributary. Water from the tributaries then flows to the larger river and finally to the sea. If the soil pores are saturated with water, then the water will flow at the surface of the soil. Yet, with the existence of dense forests, the trunks and roots of trees binding the soil will hold back the rate of surface water so that it can reduce the occurrence of soil erosion (Senoaji, 2011.).

There are 5 (five) main environmental problems identified in Indonesia, namely (Sudiana and Soewandita, 2007):

1. Land damage due to deforestation, illegal logging, land use conversion for plantations and industrial plants, oil mining, industry and settlements;
2. River banks abrasion due to the traffic of large and fast ships;
3. River siltation due to high erosion, abrasion and sedimentation;
4. Disturbance of surface water flow patterns due to land use conversion, the existence of ports, docks, and log ponds;
5. Decreased water quality due to industrial liquid waste, domestic discharge of ship ballast water, and domestic solid waste disposal.

Flood caused by land saturation and drainage capacity occur in various regions, such as Brebes District, Cirebon District, Bandung District, Kuningan District, and Wonogiri District (BNPB 2018). Floods and landslides also occur in Sumatra, such as Pariaman City, Pasaman District, Balingka City, Central Lampung District, Mandailing Natal District, etc. In 2018, there were 506 floods (five hundred and six) occurred throughout Indonesia (BNPB, 2018). Based on the National Agency for Disaster Management (BNPB) data, drought occurs in 11 (eleven) provinces locating in 111 (one hundred eleven) districts/cities, 888 (eight hundred eighty-eight) sub-districts, and 4.053 (four thousand fifty-three) villages. The drought causing 4.87 million people to be affected hit several places in Indonesia, especially in Java and Nusa Tenggara during the dry season of 2018. Dry season causes water supply to decrease so that people experience shortages of water, crop failure, and some people are forced to buy clean water to fulfill their needs (BNPB 2018).

In addition to bringing blessings to life, water can also be a hydrological disaster in the form of floods and droughts. Floods occurring in several cities over the past 12 (twelve) years has caused losses in terms of material and non-material things. Flash flood oc-

curing in Jakarta on February 2007 resulted in 79 deaths, 1 missing, and 2,349 refugees in the Special Capital Region of Jakarta, 106,406 refugees in West Java Province, and 52 refugees in Banten Province. The damage and losses to flood-affected assets, both government-owned assets, business assets and community assets, was estimated to reach IDR5.16 trillion (Nugroho 2008). Moreover, the National Agency for Disaster Management (BNPB) noted losses and damage caused by floods in Jakarta in 2013 reached IDR7.5 trillion (Tirto, 2019). Meanwhile, the flash flood in Garut, West Java, on September 21, 2016 caused losses up to IDR288 billion. As for 2016, losses and damage caused by floods in Jakarta reached IDR5 trillion. Further, losses and damage caused by floods and landslides in 16 cities/regencies in Central Java reached IDR2.1 trillion, IDR1.4 trillion in North Sulawesi, and IDR6 trillion in North Coast. On March 2019, losses and damage caused by flash floods in Sentani, Papua Province, reached IDR454 billion, consisting of damage to settlements which was estimated to reach IDR252 billion and losses in infrastructure sector that reached IDR174 billion. Besides, this flash flood also caused damage in worship house sector which reached IDR4 billion, IDR1 billion in cross-sector as well as 112 people reportedly died, 82 people have not yet to be found, 917 people reportedly injured, 8,008 people were evacuated, and 33,161 households were affected by disasters (Okezone, 2019). Disasters also occur in various countries in the world, including Vietnam, Japan, Myanmar, India, North Korea, Arkansas, Oklahoma, Saudi Arabia, Jordan, Brazil, Australia, France, Mozambique, Malawi and South Africa (Reuter 2018; BBC, 2018; CNN, 2019).

Floods and droughts are caused by land use conversion into various buildings so that rainwater cannot be absorbed by the soil. The process of groundwater infiltration occurs in 2 (two) sequential processes (Wibowo, 2006), namely infiltration (water movement from above to the surface of the ground) and percolation (water movement from unsaturated zone into saturated zone). Infiltration power is the maximum infiltration rate determined by ground conditions. Some factors influencing water infiltration power include (Wibowo, 2006):

1. The depth of the puddle on the ground: the higher the puddle, the greater the water pressure to seep into the soil;
2. The level of water in the soil: the drier the soil, the greater the infiltration;

3. The compression of the soil that will reduce porosity: compression can occur due to rain drops, blockage of pores by fine grains, humans and animals footprints, etc.;
4. Plants: the broader the soil covered by plants, the greater the infiltration;
5. Soil structure: the presence of fracture will enlarge the infiltration power;
6. Land slope and water temperature (affecting thickness).

This study refers to the work of Jonathan Levy and Yongxin Xu entitled *Review: Groundwater management and groundwater/surface-water interaction in the context of South African water policy*. In their study, Jonathan Levy and Yongxin Xu found that water resources management in South Africa is regulated by National Water Act Number 36 of 1998 concerning National Water. One of the main principles regulated is fair access which involves the principles of efficiency, decentralization and sustainability. The National Water Act sets the concept of water as a public item and not a personal item. Here, water used for basic human needs is subsidized by the government with amount of 25 liters/day/person (Levy and Xu 2012, 2005). Another research done by Cecilia Tortajada and Yugal Kishore Joshi entitled *Water quality management in Singapore: The roles of institutions, laws and regulations* found that Singapore Ministry of Environment which was renamed to Ministry of the Environment and Water Resources focuses on more comprehensive environmental and water administration. Here, the implementation of a policy is determined by two councils, namely Public Utilities Board which is in charge of managing water resources and National Environment Agency which is in charge of managing the environment. For that reason, Singapore was awarded the "Water Agency of the Year Award" in 2006 at the Global Water Awards, Dubai from the Global Water Intelligence (Tortajada and Joshi, 2014).

Eiman Karar in his book entitled *Freshwater Governance for the 21st Century* declares that countries which are successful in managing water resources are supported by 4 (four) main pillars, namely (Karar, 2017):

1. In more successful areas, water management is informed by high-level science, technology, and innovation as well as very informed decision making in which water is a critical basic consideration in any development plan;

2. Good and well-maintained infrastructure;
3. The development and availability of skilled talents to plan, develop, operate and maintain water management systems at all levels;
4. Water use behavior across spectrum from large industries and agriculture to individuals at household level.

This study is expected to be a solution to water resources management, especially conservation of water resources so that the sustainable development goals can be realized. Land use conversion for settlements is one of the causes of hydrological disasters in the form of floods and droughts resulting in economic or social losses. Floods can cause physical and even non-physical damage. Some potential losses caused by floods are (2014 Arrangement, 559):

1. Damaged or destroyed buildings;
2. Victims;
3. Traffic congestion;
4. Disruption of teaching and learning activities in education sector;
5. Economic collapse;
6. Emergence of various diseases (i.e. diarrhea, vomiting, itching, etc.);
7. Household appliances are damaged;
8. Trash scattered everywhere;
9. Crop failure in agricultural sector.

The motto of National Agency for Disaster Management (BNPB) is "We take care of nature; Nature take care of us." This phrase reminds us of the disaster management paradigm emphasizing mitigation as part of disaster risk reduction. This phrase implies that all parties must be actively involved in taking care of nature or their surrounding environment since, in the end, nature will take care of us. Disasters, such as floods and landslides, reflect that natural balance is disrupted due to human activities. Degradation of watersheds, land use conversion of riverbanks as settlements, and improper land use have triggered various disasters in the country. During 2018, 2,572 disasters occurred and resulted in more than 4,000 deaths (BNPB 2019).

Therefore, this study intends to measure, find out and analyze government policies concerning environmental protection and management as an effort to preserve the environment, especially the conservation of water resources related to water preservation, namely the use of rainwater as the main source of groundwater recharge. The result of this study is expected to be used as a basis and reference for related parties in creating or developing policies re-

lated to water resources conservation, water resources management, and environmental protection and management in Indonesia. The improvement of policies will then reduce the occurrence of hydrological disasters in the form of floods and droughts. Forest is a place in which abundant water resources are available. When massive logging occurs, it will greatly affect the water conditions in terms of its quality and quantity (Boekhout van Solinge 2014:). These environmental problems can be viewed from various aspects, starting from medical, technological, environmental, economic, and legal aspects. As stated by Siti Sundari Rangkuti, the legal aspect of environmental management and conservation of natural resources in Indonesia needs to be intensively reviewed since environmental management is not possible to be realized without legal regulation (Khotijah, 2010). This does not mean that legal experts can handle environmental problems by themselves regardless of other scientific disciplines related to the field of environment (Khotijah, 2010:). Natural resource is a sensitive problem that can cause conflict between citizens or with the state (Tignino, 2011). In addition to paying attention to legality, natural resource management shall also consider the environmental aspects so that the impact for other living things can be well measured (Silalahi, 2002). Management of water resources conservation requires a comprehensive policy so that the quantity and quality of water supply can fulfill human basic needs.

Sustainable development can mean working to increase human productive power without damaging environment or society. In other words, the improvement of progressive socio-economic conditions shall not grow beyond the ecological carrying capacity which means that achieving public welfare shall be done without exceeding the Earth's capacity to regenerate natural resources and absorb waste. The conceptual model of sustainable development must describe a balanced relationship between economic, ecological, and social issues that are of concern in decision making (Flint, 2004). Here, the society are collectively constructed by the 1945 Constitution of the Republic of Indonesia giving a mandate to the State to create policies (*beleid*) and to arrange (*bestuursdaad*), regulate (*regelendaad*), manage (*beheersdaad*) and supervise (*toezichthoudendaad*) for the greatest purpose of public welfare (Redi 2014: 9).

### Sustainability-based policy of water resources management

Public policy is a series of actions/activities proposed by a person, group or government in a particular environment in which there are obstacles (difficulties) and possibilities (opportunities) for the policy to be useful in overcoming various problems in order to achieve the intended goals (Agustino, 2008). Meanwhile, according to William N. Dunn, public policy is a complex pattern of dependence on interdependent collective choices, including decisions to act or not, created by government agencies or offices (Dunn, 2003). In the same vein, Andreson (1979) states public policy is a policy developed or created by government agencies and officials. Thus, public policy includes everything that the government has stated and done or vice versa.

Further, W.I. Jenkins views policy as “a set of interrelated decision concerning the selection of goals and the means of achieving them within a specified situation” (Andreson, 1979). Meanwhile, *Friend, et al.*, define policy as “essentially a stance which, once articulated, contributes to the context within which a succession of future decision will be made” (Andreson, 1979).

Drainage system is one of important infrastructures that must be built in urban areas since a high intensity and a long duration of rain in the rainy season can cause flood. Factors causing the drainage system unable to hold water resulting in flood overflows are (Sedyowati, 2004):

1. The inappropriate drainage system: the structure or the size of the drainage channel is not suitable so that the water flow is greater than the channel capacity;
2. The drainage system is not well maintained: the damaged drainage channel can cause a non-functional drainage channel so that the water cannot flow smoothly towards the final discharge;
3. The public's unconsciousness: the society rarely cares about the function of the drainage channel. It can be seen from the blockage of the drainage channel by the garbage disposed of by the society causing the water flow to not run smoothly.

Water resource is an essential component of life for all living things in the world. Thus, the management of water resources is fundamentally divided into 3 (three), namely (Wahidin, 2016):

1. Conservation of water resources – water resources such as springs, rivers and lakes always become the target of conservation. Since water resources are affected by environmental degradation, the conservation target is to restore environmental conditions in protected areas to maintain the stability of water availability so that human interests to water resources are protected and fulfilled;
2. Utilization of water resources – the existing water resources are utilized for various purposes, including agricultural irrigation, drinking water, drainage flushing, manufacturing industry, tourism and water crossing, etc. The utilization of water resources is intended to fulfill human needs in order to achieve public welfare;
3. Control of the destructive force of water – in addition to providing benefits for human life, water resources also have physical and chemical destructive force so that water resources need to be controlled and managed continuously by considering the following 3 (three) aspects, namely: aspects of utilization, aspects of conservation and aspects of control.

The concept of sustainable and environmentally sound development as an objective in environmental management shows that the concept is a part of environmental management concept (Main 2007). Basically, there are 6 (six) environmental administrative law instruments that can be used in realizing environmental management based on sustainable development (Husien, 2009), namely:

- a. Environmental quality standards;
- b. Environmental management licensing mechanism;
- c. Environmental impact analysis;
- d. Environmental audit in environmental management;
- e. Enforcement of administrative sanctions in environmental management.

Sustainable development requires ecological balance. As stated by Johan Galtung that sustainable development is a process of meeting basic human needs while maintaining ecological balance (Mukhlis and Lutfi, 2010). Overall, natural resources conservation is a wise management of natural resources to ensure the continuity of its supply while maintaining and improving its quality and diversity. In Indonesia, conservation should be carried out collaboratively by the government and the society, including private sectors, non-governmental organi-

zations, universities, etc. The concept of sustainable development is developed based on the interests of each party (Elliot, 2013). Yet, basically, there are 3 (three) pillars in sustainable development concept that are agreed upon by interested parties, namely the importance of environmental conservation, the economic growth and the governance of socio-political life (Sachs, 2015). Thus, today's generation must inherit good conditions for future generations, both in terms of material conditions, such as natural resources and technology as well as institutional conditions, such as legal systems, education systems, and political and economic mechanisms (Dasgupta, 2007).

The concept of sustainable development consists of 5 (five) main principles, namely (Samexto, 2008):

- a. principle of inter-generation equity;
- b. principle of intra-generation equity;
- c. principle of precautionary;
- d. principle of biological diversity conservation;
- e. principle of internalizing environmental costs.

National development planning must be compiled comprehensively involving all related elements and must be explicitly linked to spatial planning (Supriadi, 2010). Sustainable development is then realized in *Millennium Development Goals* declared on September 2000 which consist of 8 targets containing 18 monitoring and 48 indicators of success (Twining, 2009). According to Otto Soemarwotto, the benchmark of sustainable development consists of 6 (six) aspects, namely (BPHN 2013):

- a. Pro-environment;
- b. Pro-the poor;
- c. Pro-gender equality;
- d. Pro-job creation;
- e. Pro with the form of NKRI; and
- f. Must be anti-corruption, collusion and nepotism.

In line with globalization, the concept of sustainable development continues to transform. Here, the original form consisting of 5 (five) main principles transforms to 17 (seventeen) sustainable development goals (Akhmaddhian, Hartiwiningasih and Handayani 2017: 5), namely:

- a) Goal1. End poverty in all its forms everywhere;
- b) Goal2. Zero hunger, achieve better food security and nutrition as well as support sustainable agriculture;
- c) Goal3. Ensure healthy lives and promote well-being for all at all ages;

- d) Goal4. Ensure inclusive and qualified education as well as promote lifelong learning opportunities for all;
- e) Goal5. Achieve gender equality and empower women and girls;
- f) Goal6. Ensure access to water and sanitation for all;
- g) Goal7. Ensure access to affordable, reliable, sustainable and modern energy for all;
- h) Goal8. Promote inclusive and sustainable economic growth, employment and decent work for all;
- i) Goal9. Build resilient infrastructure, promote sustainable industrialization and foster innovation;
- j) Goal10. Reduce inequality within and among countries;
- k) Goal11. Make cities inclusive, safe, resilient and sustainable;
- l) Goal12. Ensure sustainable consumption and production patterns;
- m) Goal13. Take urgent action to combat climate change and its impacts;
- n) Goal14. Conserve and sustainably use the oceans, seas, and marine resources;
- o) Goal15. Sustainably manage forest, combat desertification, halt and reverse land degradation, and halt biodiversity loss;
- p) Goal16. Promote just, peaceful and inclusive societies, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;
- q) Goal17. Revitalize the global partnership for sustainable development.

The sustainable development goal used in this study is the sixth goal, namely ensure access to water and sanitation for all. Thus, this goal is the scope of the discussion regarding sustainable development goals.

Goal 6. Ensure access to water and sanitation for all (International NGO Forum in Indonesia Development 2015), consists of:

- a. 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all.
- b. 6.2 In 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.
- c. 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing

release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

- d. 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.
- e. 6.5 By 2030, implement integrated water resources management at all levels, including through trans boundary cooperation as appropriate.
- f. 6.6 By 2030, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.
- g. 6.A By 2030, expand international cooperation and support capacity building to developing countries in activities and programs related to water and sanitation, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technology.
- h. 6.B Support and strengthen the participation of local communities in improving water and sanitation management.

Water is an essential component to support human life. Societies with knowledge, habits, and culture utilize water resources in their area to fulfill their daily needs. They manage these resources together and live in a harmony with the environment (Hidayati, 2016).

The waning of the society's local wisdom is closely related to the shift of their orientation towards water and natural resources, namely from the social dimension to the economic dimension. Water that was originally used as 'free' without compensation, turned out to have economic value and this value is getting higher over time. Commercialization of water grows and develops in line with the increasing volume of water needed by the society. This condition mainly occurs because water resources are increasingly limited, while the need for water is increasing. Besides, the value will be higher considering the increasing development activities and investments in the water source areas (Hidayati, 2016). Water management also changes from the society to the government with a top-down approach. As a result, various water resources management systems and agricultural water use that have been carried out from generation to generation are threatened by the modernization of irrigation

system development and other development activities (Fox 1991).

The concept of sustainable development for Indonesian society is not a new one. It has been existed since long time ago as Sundanese people have a concept of *lain kumahaengke, tapi engkekumaha* means that people should have known what they will do, they shall not go without plan. Simply, it can be said that this concept considers the present and the future time. Besides, there is a concept of *Tri Hita Karana* from Balinese people and there are also other similar concepts in various indigenous people, such as Baduy Society, *Kampung Naga*, *Kampung Kuta*, *Talang Mamak*, etc (Soemarwoto, 2006). Local wisdom related to human relations with the environment is a guide for humans to interact with nature wisely (Brisman, 2019).

Sustainable development must have a function as a means of maintaining national unity and integrity in order to maintain national stability. Thus, according to Abdoellah (2016), there are some aspects that should be considered in order to run sustainable development in Indonesia, namely:

1. Mainstreaming sustainable development requires political commitment from all stakeholders;
2. Establishment of Sustainable Development Council as an institution whose task is to map, plan, assist, monitor and evaluate the achievements of sustainable development goals in a measurable and structured way;
3. Increasing supervision and control towards the government's policy related to development programs that are on the government's agenda by involving all components of society;
4. Adopting sustainable development model requires synergy between stakeholders to achieve the Sustainable Development Goals;
5. In mainstreaming sustainable development, the Ministry of Environment and Forestry is expected to integrate the importance of environmental aspects in development.

Sustainable development can mean working to increase human productive power without damaging environment or society. In other words, the improvement of progressive socio-economic conditions shall not grow beyond the ecological carrying capacity which means that achieving public welfare shall be done without exceeding the Earth's capacity to regenerate natural resources and absorb waste. The conceptual model of sustainable development

illustrating a balanced relationship between economic, ecological and social problems that are of concern in decision making is shown in Figure 1 (Flint, 2004).

Water resources management policies must be in harmony with the environment, social and economy so as to create sustainability, justice and welfare in

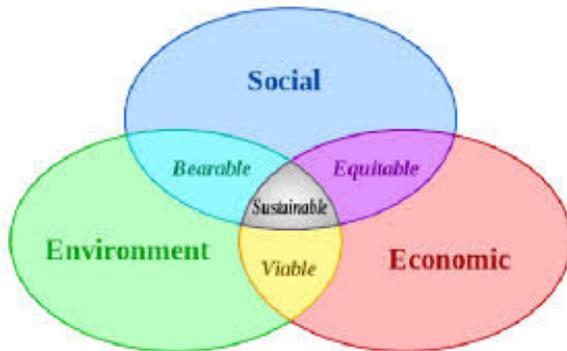


Fig. 1. Sustainability Model (RW. Flint, 2004)

the society. Water resources must be used as much as possible for public interests (Akhmaddhian and Hartiwingsih, 2018). It is in accordance with human rights to water resources as regulated in the United Nations declaration which is a guideline for all applicable law in every country in the world in order to ensure the management of water resources is based on sustainability, justice and welfare of the society as owners of water resources. A balance between environment, social and economy in managing water resources is needed in order to maintain water resources as a gift from God. Otherwise, an imbalanced management of water resources will cause disasters, such as floods and droughts, because management of water resources is not carried out in a balanced and comprehensive way. Thus, the State as the manager of water resources must adhere to universal principles in managing their natural resources.

## Conclusion

Water is an essential component of life. Professional and sustainable management of water resources is useful to maintain the quality and quantity of water as well as to ensure that water is optimally utilized for living things in the world. Water resources as a gift from God can be obtained from various sources, such as rainwater, surface water, groundwater and seawater. Water is generally used for multiple pur-

poses, such as drinking water, household needs, industry, etc. Yet, abundant water resources that are not managed optimally can cause various disasters, such as floods and landslides. Conversely, the lack of volume of water can cause droughts. Hence, water resources management policies must be in harmony with the environment, social and economy so as to create sustainability, justice and welfare in the society. Water resources must be utilized as much as possible for public interests in accordance with human rights to water resources.

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