

# **THEMATIC CONCEPT PAPER**

## **WATER AS A KEY FOR SUSTAINABLE DEVELOPMENT**

### **I. Introduction**

Water as a basic need is part of human rights. Therefore, everyone has the right to access clean water and sanitation. The availability of freshwater as much as 5.134.022,75 km<sup>3</sup> (USGS, 2018) does not guarantee equal access to clean water, and according to WHO, around 2.2 million people in the world do not have its access yet. Whereas access equality to clean water is an important key to obtaining sustainable development. This equality can be achieved by improving water security. Even though water has a natural renewal cycle (hydrological cycle), with decreasing water reserves due to land use changes, increasing population, environmental pollution as well as climate change, the availability of clean water is decreasing.

Under those conditions, the Indonesian Government along with other countries cooperates to overcome those problems, which are contained in Sustainable Development Goals (SDGs) targets 6, 12.1, 12.2, and 12.4 as well by 2030. Unfortunately, The COVID-19 pandemic has further increased the challenge, and the world must quadruple the rate of progress to ensure water and sanitation for all. Water is inextricably linked to the three pillars of sustainable development, namely economic, social, and environmental. It is cross-cutting and underpins the achievement of many SDGs through close linkages with climate, energy, cities, the environment, food security, poverty, gender equality, and health, amongst others. With climate change profoundly affecting our economies, societies, and environment, water is indeed the biggest deal breaker to achieving the internationally agreed water-related goals and targets, including those contained in the 2030 Agenda for Sustainable Development.

As part of the organizational arrangements mandated in A/RES/75/212, paragraph 9 (d), the Secretary-General of the UN 2023 Water Conference will prepare concept papers on the themes of the interactive dialogues, finalized during the one-day preparatory meeting for the Conference convened by the President of the United Nations General Assembly on 25 October 2022. This concept paper is on the theme: Water for Sustainable Development.

### **II. Overview of the challenge, current status, and interlinkages**

Based on the UN information in November 2022, the world population will have reached 8 billion. This population growth was followed by increased development and human activity. The increasingly massive level of development will result in land use changes, especially changes in green open space into built-up land which can increase runoff and reduce infiltration areas. In addition, increasing human activity can also be a challenge

as it may increase greenhouse gas production as one of the causes of climate change. Climate change disrupts weather patterns leading to extreme weather, unpredictable water availability, exacerbating water scarcity, and contaminating water supplies. These impacts can drastically affect the quantity and quality of water. Whereas, as mentioned before, water is an essential element for sustainable development that linked to its three pillars.

Related to the economy, water is an essential resource for economic production (irrigation, food and electricity, as well as for many manufactured products) as well as an 'enabler' of trade for most types of goods and services. Indonesia has the fifth largest water resources in the world with its potential reaches approximately 3,900 billion m<sup>3</sup>/year spread throughout the country, in 5,886 rivers and 521 lakes. However, only 11% of Irrigation areas are supported by dam water storage, and the rest are vulnerable to changes in both weather conditions and rain catchment areas, as well as vulnerable to the threat of floods and droughts.

In terms of social, the government allocated funds for water infrastructure development (such as rainwater harvesting buildings) in either dry climate areas or areas with small groundwater potential, such as swamp/peatland areas, small islands, in order to achieve equal access to clean water. While for the environmental, several steps have been taken in water conservation, such as reforestation, making infiltration wells and biopores, saving water by reduce water consumption, collecting rainwater, and managing water quality as well. Awareness of the importance of protecting the environment has also begun to increase in Indonesia with the existence of a several communities concerned with water, for instance.

Nevertheless, Indonesia still has relatively low water security. Therefore, good arrangement in terms of water resistance is needed. The real action that has been taken by the Indonesian Government in managing water resources was to stipulate Law No. 17 of 2019 concerning water resources. Even so, there are still many challenges in carrying out integrated water resources management in Indonesia which involves various ministries, institutions, academics, and the community.

Based on these challenges, water for sustainable development must be seen as either a non-renewable water resource or renewable yet cannot be renewed in a short time. Water sustainability can be pursued through good integrated water resources management.

### **III. Overview of opportunities for progress and transformative solutions**

#### **1. Financing**

In Indonesia, the strategic policy directions for water resources are focused on food security, flood control, and raw water supply, especially in drought areas. An allocation of Rp. 41.9 trillion has been planned to build dams, irrigation networks, and flood control. The

distribution of the 2023 budget plan comes from domestic and international funding. In striving for sustainable additional funding, considering a conservation investment, such as the idea of equitable payments for joint watershed and groundwater services encourage not only economic growth but efficient water ecosystem management.

## **2. Data and information**

In order to support good data and information, the Indonesian government is currently working on data integration through a one map policy (data standardization). In supporting this, the Ministry of Public Works and Housing through the Data and Information Center (PUSDATIN) has created a platform related to water resources. Trusted and reliable open data of surface water and groundwater, imply optimal management of water resources. This will then have implications for policy making. Nationally, the progress of achieving all SDG targets in Indonesia is contained in the SDG's Dashboard which is managed by Ministry of National Development Planning/ National Development Planning Agency (Bappenas).

## **3. Capacity development**

The success of achieving water security is inseparable from the need for knowledge about water resources. Therefore, human resources development is needed. The efforts that have been made by The Ministry of Public Works and Housing stipulate a master's degree program, with the name "super specialist". This program has the objective to produce expert human resources according to their expertise and competence.

Furthermore, the Ministry of PUPR is also developing its human resources capacity through the human resource development agency (BPSDM). The agency coordinates with universities and other ministries/agencies in capacity building through offline and online training/seminars and others.

## **4. Innovation**

One of the technological innovations to support sustainable water resources is by making rainwater harvesting called "Penampung Air Hujan (PAH)". However, for areas with low rainfall, retention basins can be built which are used to regulate and accommodate rainwater supply.

The Ministry of Public Works and Housing recently started developing a technology-based Smart Water Management System (SMWS) with the aim of being able to support the integrated management of water resources.

## **5. Governance**

The watershed, catchment area of a river, and groundwater basin are not determined by social background and administration boundaries. Those boundaries are determined by

scientific knowledge. River and groundwater often flow through a couple of regions and countries such as in Africa, America, Asia, and Europe. Therefore, the water resources operation and management should be carried out at the cross-sectoral and transboundary level to ensure equal rights to water and avoid water conflicts. The cooperation between Penta helix parties is encouraged based on each responsibility with the concept of synergy and inclusiveness.

Water resources management should be integrated defined as a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable matter without compromising the sustainability of vital ecosystems (GWP 2000) which takes three basic elements, namely: ecosystem sustainability, social equity and economic efficiency. Water related ecosystem services covers: 1. Provisioning services (food, clean water supply, and energy); 2. Regulating services (water management regulation, flood, and water purification); 3. Supporting services (biodiversity or gerplasm protection); and 4. Cultural services (aesthetics, recreation and ecotourism).

#### **IV. Recommendations**

Achieving water security for equitable access to clean water requires the involvement of various parties, such as the government, the private sector, practitioners, academics, and the community. In addition, improving finance by additional funding in valuing water ecosystem services may also give an efficient level of conservation; Accelerating one map policy toward optimal water management; Developing human resources capacity through education; Innovative development of clean water provision by conjunctive water use or SWMS, and joint cooperation for sustainable transboundary basins management.

#### **V. Guiding Questions**

The principal question we need to answer is how can the world's population still get equal access to clean water with the weigh on water stresses in terms of quantity and quality? Both developing and developed countries ought to cooperate concurrently. The projected growth of the world's population, climate change which will affect the quantity of clean water sources, and contamination which will have an impact on the quality of drinking water, make us academics, decision makers, and consumers themselves have to work together to increase our sense of cooperation in actualizing water for sustainability.

with government support and the provision of research funds for the water resources sector will encourage academics/practitioners/researchers to create innovations/technology that can help increase the supply of clean water. This is also inseparable from the role of the

community as water consumers. Considering that Indonesia is still a developing country with unequal education levels, an effective persuasive method in increasing public awareness of the environment, keeping water sources from polluting, as well as saving water consumption would also be a problem need to be addressed. On the other hand, we also need to clarify the role of each ministry/institution so that integrated water resources management can be run well.

# THEMATIC CONCEPT PAPERS

## Water for Climate, Resilience and Environment in Indonesia

### I. Introduction

As part of the organizational arrangements mandated in A/RES/75/212, paragraph 9 (d), the Secretary-General of the UN 2023 Water Conference will prepare concept papers on the themes of the interactive dialogues, finalized during the one-day preparatory meeting for the Conference convened by the President of the United Nations General Assembly on 25 October 2022. This concept paper is on the theme: Water for Climate, Resilience and Environment.

The world is not on track to achieve SDG 6 and related goals and targets by 2030. The COVID-19 pandemic has further increased the challenge, and the world must quadruple the rate of progress to ensure water and sanitation for all by 2030. Water is inextricably linked to the three pillars of sustainable development, and it integrates social, cultural, economic and political values. It is cross-cutting and underpins the achievement of many SDGs through close linkages with climate, energy, cities, the environment, food security, poverty, gender equality, and health, amongst others. With climate change and population growth profoundly affecting our economies, societies and environment, effective solutions are needed to prevent even worse situation and water is indeed the biggest deal breaker to achieve the internationally agreed water-related goals and targets, including those contained in the 2030 Agenda for Sustainable Development.

In accordance with the Kumamoto Declaration in results of the 4<sup>th</sup> Asia-Pacific Water Summit: Water for Sustainable Development in Japan, a collective understanding was reached that recovery from pandemic or other disastrous condition requires transformation into quality-oriented societies that are resilient, sustainable and inclusive. This transformation should proceed through multi-stakeholder partnership with open, transparent, participatory and collaborative processes. Resilience as involving effort to reduce water-related disaster risk on a cross-sectoral, whole-of-river basin and aquifer basis. Sustainability involves placing water at the center of the political agenda, promoting climate change mitigation measures while utilizing low-emission energy resources, promote green infrastructure that can provide mitigation and adaptation benefits for achieving carbon-neutral societies in harmony with nature and biodiversity conservation. Inclusiveness involves improvement towards achieving SDGs such as access to safe and affordable drinking water and sanitation facilities for all, involving every party to closely cooperate in activities to address water-related issues towards quality-oriented society. Improving governance, close the financial gap, and appeal to the science and technology community to provide innovations for resolving water problems to accelerate the efforts of reaching the quality-oriented society. All stakeholders should join together to create sustainable water management in order to achieved shared prosperity. Water resource management is a challenging aspect in Indonesia which has 2.78 trillion cubic meters

of potential surface water to manage that will be shared for more than 270 million of its people.

Water for climate, resilience and environment connected with SDG target 6.5, 6.6, 7, 11.5, 13, 14, 15. These targets focus on water management, protect and restore water ecosystems, develop resilience cities, and mitigate the impacts of climate changes that will be achieved in sustainable manner. The climate change add uncertainty in all water related analysis, which need to be addressed in all stage from planning, designing, mitigating and recovering; and all level from operators, builders and decision makers.

## **II. Overview of the challenge, current status and interlinkages**

Indonesia is an archipelago in the equator populated by more than 270 million people mostly lived in Java Island. The biggest challenge in water resource is to accommodate water and sanitation for the densely populated urban areas. While the water for agriculture and energy gives their own challenges due to the reduced base flow in the dry season. Furthermore, Indonesia considered to have severe risk from the climate change, such as extreme rain intensity, raising frequency of drought and sea level rise that threaten most of population in coastal areas especially in North Java Coastal which harbor several Indonesia's important cities. The high population growth and climate change will give Indonesia more complex problem in managing water resource, adding to already complex cultural, social, and economic problems, further increasing the uncertainties in socio-economic growth.

Located in pacific ring of fire, Indonesia has many volcanoes and unstable tectonic plate which make it prone to disasters which need to be mitigated to ensure the cities and settlement resilience. Several areas in Indonesia also severely suffer from land subsidence mostly in urban area caused by the population growth. Risk of disaster in Indonesia has been increasing in these years due to the increased frequency and magnitudes of disaster that results in economic damage. Environment degradation has been slowly occurred in Indonesian forests, due to land use changes and urbanizations.

Many has been done by the government of Indonesia in water for climate, resilience and environment. One of the important achievements is by implementing integrated water management through establishing river basin organization based on one river, one plan one management. Indonesia also has built more than 250 reservoirs to cope with flood and drought, currently we are building more reservoirs with a target of 68.11 cubic meter per capita of storage by the year of 2024. Furthermore, with enough reservoir the impact on climate change can be minimalized. Upstream and wetland conservation has been commenced to protect ecosystem and environment from degradation to reduce water related disaster.

In response to water related disaster, The Government of Indonesia has built river dike to mitigate flooding, erosion protection, sediment control, and sea wall to prevent flooding from the sea which has been a problem in the North Java coastal cities such as Jakarta, Semarang, and Surabaya. The flooding in coastal area has been worsening due to the land subsidence in those cities owing to the over extraction of ground water. Beside the structural approach, non-structural measurers have been deployed, such as strengthening participation, capacity building and disaster response system. Disaster response system has also been built to shorten response time in the occurrence of a disaster. The disaster mitigation is a key toward

resilience cities and settlement.

In order to increase cities and settlement resilience, Indonesia has improved the water access, which 89,27% of household has a proper access to drinking water in 2019 in which 95.63% ensured in urban area and 81.15% in rural area. While in sanitation sector 77.44% household has a proper access. These achievements are important toward the SDG's especially SDG 6.

To mitigate the climate change impacts, Indonesia has issued policy documents for climate resilience development. The main goal is to strengthen disaster resilience system, response to climate change through low-carbon development and increasing community resilience to climate change. The commitment is proven by the reduction of green house gas emission of 20% in 2019. Furthermore, the campaign of green infrastructure has already started, the main driver is the development of the new capital in Borneo Island which developed with resilience and sustainable urban development in mind.

### **III. Overview of opportunities for progress and transformative solutions**

The existing and future water-related challenges we face require the rapid development and deployment of innovative and transformative solutions that go beyond business-as-usual. The international community must strive for concrete recommendations that can foster progress and transformative solutions. The SDG 6 Global Acceleration Framework aims to deliver fast results at an increased scale. The themes of the interactive dialogues will be addressed through the lens of five cross-cutting and interdependent accelerators namely: Financing, Data and information, Capacity development, Innovation, and Governance.

#### **1. Financing**

Innovative water financing is needed to ease the burden of national budget in developing water infrastructures and ensure sustainable water security hence increasing the settlement resilience. The national budget is mostly spent on urgent public infrastructures that prioritize on public services, hence, the infrastructures with high economical values can be financed by other sources. However, the alternative financing needs an open mind of the decision makers to accept financing alternatives in dealing with water, especially in climate, resilience and environment in which often seen as a low priority. Nowadays water financing on climate change impacts is supported by many international investors and lenders, which can be an advantage in developing disaster risk reduction infrastructure in Indonesia. Alternative financing on water related disasters mitigation also need to be looked into because this sector is still do not have enough attentions in Indonesia.

#### **2. Data and information**

Awareness of the importance of data and information on climate, resilience and environment needs to be improved, whether on the operator or decision-making level. Lack of the awareness can lead to the ignorance of data accuracy, storing, and save keeping. Data and information accessibility and transparency can be improved to have increased information and reports synergy between stake holders, furthermore data correction can be done in early stage.

Collecting method for accurate data and information about SDG indicators should be

standardize to have the same data quality. Data and information presented in tailored way so each of the user can have just what they need no need and avoid miss-leading decision due to wrong interpretation.

As climate change and supply chain (especially food) is an issue that need global attention, it is necessary to think about strengthening the international and regional collaboration in technology to increase the ability to predict uncertainty caused by the climate change in the course of natural disasters, water scarcity, water productivity, financing opportunity and an improved and sustainable environment.

The developing of data and information shall also consider to add a good the uncertainty analysis due to the many uncertain factors and errors. The uncertainty analysis is more important in the prediction-based analysis where many additional scenarios should be included in consideration. The information users including decision makers should aware that every information has its uncertainty hence, a better decision and policy could be made.

### **3. Capacity development**

Capacity development on decision support system with embedded uncertainty analysis in response to water related disaster can be improved, hence the decision makers are able to make decision quicker, accurate, and considers all factors that are involved. Capacity building on how to create and utilize innovative technology in facing the climate change, improve the resilience, and sustainable environment is still rare and need to be improved in Indonesia. Disaster risk reduction expert also still low in quantity, which need an urgent development. Furthermore, bio diversity and water ecosystem capacity building have not gained enough attention.

### **4. Innovation**

Innovative approach such as using latest technologies to reduce the risk of disaster that applicable in Indonesian area can improve the efficiency in dealing with water related disaster that still a huge problem in Indonesia. Decision support system that can easily guide the decision makers to react correctly and timely in dealing with disaster. Early warning system will give the citizen enough time to react when disaster come. Knowledge improvement of resilience cities and human settlement can guide the Indonesian in developing strong cities in dealing with disaster and can recover quickly.

Green infrastructure development will help building sustainable settlements and reducing the disaster frequency. Prevention, mitigation, and restoration technologies can reduce disaster risk and increase the resilience.

### **5. Governance**

Integrated water management application throughout all river basin and continuous monitoring and supervision by international communities will ensure sustainable approach in dealing with climate and water related disaster. Next step is to develop adaptive water management that have high resilience and able to cope with everchanging problems in water management. Leaders' awareness on all level, of SDG targets on climate, resilience and environment can help the collaboration between stakeholder in achieving the targets.

Increasing the amounts of climate, resilience and environment agendas can help to promote and increase the understanding of the needs of resilience settlements in dealing with water related disasters.

There are several goals that Indonesian government have targeted to achieve and one of which is the climate action goal with activities like empowerment grow green by Jejak Rimba Raya that is carried out in the form of campaign to walk a trail together to make the earth, nature, people and the environment healthier and more conserved through simple patterns and lifestyles. Building disaster risk reduction for city and community resilience where this program implements three strategies which involve stakeholders and the national and subnational levels. The program employs the conceptual framework of Climate Smart Disaster Risk Management of child participation and principles of digital development. Directly increased awareness and preparedness for 46.363 people which 12% of it are children and youth. Another program is utilization of Biogas for household energy supply to aim the reduction of GHG emissions from livestock waster by producing renewable energy. The last program is improving the food and economic security of vulnerable communities through sustainable agriculture.

#### **IV. Recommendations**

Therefore, it is recommended to imply in the cross-sectors improvement of resilience in facing changes, uncertainty and ever-increasing complexity, especially after the Covid-19 pandemic. Adaptive steps to implement such as the development of green and grey infrastructures, coordination enhancement between sectors, based on respect and share, international cooperation in data processing and management that responsive to every changes. Ensure water securities in the vulnerable area through good governance and cooperation between stakeholders with shared prosperity as the top priority.

#### **V. Guiding Questions**

How climate change and population growth will add to the SDGs especially SDG 6 in 2030 after impacted by the Covid 19 Pandemic?

How to improve resilience (social, economy, infrastructure) in dealing with water-related problems? What is the most urgent action needs to be taken in each country?

# THEMATIC CONCEPT PAPERS

## WATER FOR HEALTH

### I. Introduction

Water is one of the essential resources in the world and an integral part of human life. Water resources is beneficial for drinking water, sanitation, domestic use, industrial processes, irrigation, navigation, fisheries, and hydropower. However, some issues such as water availability, population growth, climate change, privatization, and water pollution, cause water conflict among the water users.

Under those merits and challenges in water resources management, the government and water manager must ensure that the public needs can be fulfilled. Each and every one has an equal right to water whether the lower-income or the high-income household, man or women, even children or senior citizen. Nevertheless, the people in rural or isolated areas often do not have access to water in terms of sufficient quantity and quality for drinking water and sanitation. They must walk for couple km to obtain a bucket of water from spring or fountain. In other cases, such as an isolated small island, the groundwater withdrawal is not viable due to limited quantity, insufficient depth or available in form of brackish water. Water shortages also appear in urban area. The term of “Day Zero” is often heard from countries such as South Africa and Mexico where drought caused the water level in reservoir drops below required operational level in 2019. Developed countries such as the USA also had been hit by severe drought, particularly in dry state such as California which in 2022 recorded a historical driest year over the past 128 years. Thus, collaboration and acceleration efforts by all stakeholders across the globe is indispensable to achieve all SDG and water-related goals and targets, particularly regarding safe drinking water and sanitation or Water for Health.

### II. Overview of the challenge, current status and interlinkages

There are some unavoidable challenges to provide water for health. Population growth is the main challenges in water resources management. By November 2022, the world population have reached 8 billion which equal to about 24 billion liters of water needed just for daily drinking water (under the assumption of 3 liter of water per person per day). The population will keep increasing with a growth rate of 0.9% annually (the World Bank, 2021) and will reach 8.5 billion in 2030. The cases of water conflict will keep developing due to the limited access to water for all population. The population growth forced people to reside in rural and mountainous area and caused land use change from forest to residential. This phenomenon triggers a chain reaction of a decreasing river base flow, limited groundwater recharge, and caused water scarcity in rural and urban areas. Another challenge is climate change which exacerbate the dry season and intensify the wet season, caused a severe drought and massive destruction by flooding across the globe. Recent case of flooding was in Germany in 2021 which recorded a rise of precipitation by 400%.

In global scale, about 90% of population in the world in 2020 had access to basic drinking water. The proportion of population in urban and rural area that had access to basic drinking

water of about 96% and 82%, respectively. However, some remote and arid regions such as Oceania and Sub-Saharan Africa, only 57% and 65% of its population, respectively, had access to basic drinking water. In addition, in rural area of those regions, more than half of the population could not secure a basic drinking water (UNICEF, 2021). In Indonesia, the Ministry of National Development Planning of the Republic of Indonesia (2021) stated that the proportion of household with access to improved and safe drinking water services in 2020 was 42.3%, while the access to basic sanitation services in urban and rural area in 2020 were 83.7% and 74.3%, respectively. The lack of sufficient drinking water, sanitation and hygiene services can cause a malnutrition and stunting, particularly for children, as well as induce water-borne disease such as diarrhea, cholera, and typhoid. Moreover, the Covid-19 pandemic significantly aggravates the water consumption for clean water and sanitation for at least 3-5 times higher than normal condition (IWI, 2022).

Overcoming the aforementioned challenges and alleviate the water scarcity in the urban and rural area can be completed by sheer effort from all parties in pentahelix, including public authorities, academia, community, private and media. Public authorities produce water-related policy that promotes equal rights to water for all while academia conduct research regarding water efficient innovation and technologies. For example, please recall that the irrigation itself is accounted for more than 70% of the global water consumption. The academia need to find a way to increase the efficiency of irrigation and the results should be implemented by the community. The government should produce water policy based on the knowledge and research of the academia. In addition, the government must committed to utilize the surface water because recharging and managing the surface water is much easier than groundwater.

The collaboration between all parties in pentahelix can alleviate the water crisis, ensure the prosperity of the community, improve the efficiency in water-energy-food nexus, stimulate the sustainable development, and strengthen the disaster resilience of the region. Furthermore, this synergy can accelerate the achievement of SDGs 3, 6, 9, 11, and 12.

### **III. Overview of opportunities for progress and transformative solutions**

The current state and future challenges in water resources management forced the stakeholders to accelerate the sustainable development by providing concrete innovative solutions. There are key elements that must be addressed to provide an effective and innovative solutions for water-related problems based on the Committee on Economic, Social and Cultural Rights (2002) and Heller (2018). Those five key elements are: availability, accessibility, affordability, quality and safety, and acceptability.

The transformative solutions is very dependent to collaboration. The community and stakeholders in Indonesia are very familiar with the collaboration work, which is called mutual cooperation or *gotong royong* in Indonesian language. The mutual cooperation or synergy must be disseminated to another countries and regions while maintaining the mutual respect to the right to water for all.

The themes of the interactive dialogues of Water for Health will be addressed through the lens of five cross-cutting and interdependent accelerators namely: Financing, Data and

information, Capacity development, Innovation, and Governance.

### **1. Financing**

Many types of domestic and international funding have been directed to the rural and remote areas, particularly the region with limited access to safe drinking water, sanitation, and hygiene. For example, there are couple of grants from countries in Europe for the community development in remoted area in Indonesia and in Africa. The development includes the water and sanitation services, provision of energy, and community empowerment. This is a good start and should be continued to ensure the achievement of SDG 6. Furthermore, the private sector could participate in the form of public private partnership in water-related project to accelerate the achievement of the internationally agreed water goals and targets. It includes a cooperation between state or local owned company and the business enterprise to provide safe drinking water in the region. The private sector can participate through social entrepreneurship which provide a safe drinking water and sanitation with affordable price while guarantee the sustainability of the enterprise.

### **2. Data and information**

A well-informed decision making regarding the right to safe drinking water and sanitation will have a greater impact to the community. This will be achieved if the decision maker has access to adequate water-related data in spatial and temporal resolution, such as the relationship between water and sanitation services to the human health, safe raw and drinking water compliances in the region or the water quality of the pipelines' networks.

The data can be generated through real-time monitoring with the help of IoT and cloud date storage. Before the data are published, the quality control of the data should be conducted by the capable institutions. The quality-controlled data should be accessible for all parties, particularly for less sensitive data, while the higher resolution and sensitive data can be accessed through controlled method to ensure the safety and respect to national interest. Then, the frequently water report to the stakeholder and community will help the understanding of the water availability and needs in local and global scale.

An example is the use of satellite data to analyze the water availability and water balance in a region. The historical and prediction of the precipitation in the future can be obtained from satellite data. The satellite data is then validated by ground stations (ARR and AWLR) and water level in reservoir. The quality control of the satellite and ground data can be done by the federal government and the selected university. Later, the report of water availability and water balace analysis are disseminated by the government through its official website of social media to ensure the dissemination of the information.

### **3. Capacity development**

Education regarding water-related issues and innovation practices should be provided for all population through formal and informal channels. The formal education can boost the capacities of the high-level decision makers and water managers. The bachelor, master and doctoral degrees in civil engineering, hydrology, water resources planning and management, environmental studies, health, nutritionist, public policy, and community development are essential for the public authorities and leaders in water sector. Meanwhile,

the informal channels such as telecommunication and social media, can escalate the understanding of the current state of water issues for the masses. The channels such as Youtube and Instagram can be useful to disseminate the efficient irrigation, effect of excessive groundwater withdrawal, how to reduce water consumption, recycling water, importance of sanitation, and water balance in a region, to increase the prosperity of the community. Furthermore, massive open online courses in water resources science and engineering can inclusively improve the human capacities, particularly for the public who has interest in water resources.

#### **4. Innovation**

One of the innovative practices in Indonesia regarding water resources and sanitation development is the community-based water resources and sanitation provision, which is called PAMSIMAS. This action greatly accelerates the access to safe drinking water and sanitation for middle- and lower-income households in rural area. Another innovative practice is conducted by local social entrepreneurship in the community in East Nusa Tenggara which have water related issues such as insufficient raw and drinking water, as well as water and ice cube to store the fisheries products. They introduce the innovative combination technologies of reverse osmosis and solar panel to provide affordable drinking water and ice cube from the brackish water that available in that arid coastal region. These innovative actions and technologies should be published and scaled up to improve the water resources and sanitation development at national level or even at international level.

#### **5. Governance**

The watershed and catchment area of a river know nothing about social background and administration boundaries. A river often flows through couple regions and countries such as in Africa, America, Asia, and Europe. For example the Rhine River in Europe or Nile River in Africa. Therefore, the water resources operation and management should be carried out in cross-sectoral and transboundary level to ensure the equal right to water and avoid any water conflicts. The cooperation between pentahelix parties is encouraged based on each responsibility with the concept of synergy and inclusiveness.

The governance of water resources can be strengthened by an appropriate water policy. For example, the Government of Indonesia have guaranteed the fulfillment of water basic needs (60 liter/person/day) for all citizen through the Law no. 17/2019 about Water Resources. The Law also mentioned that the water resources cannot be owned by a person, community or an enterprise. It emphasizes that water privatization is prohibited in Indonesia. This type of regulation is very important to ensure the equal right for water and should be echoed in other countries.

#### **IV. Recommendations**

The main discussion for theme of Water for Health is the equal right to water and sanitation for all, particularly in rural, underdeveloped, and remote areas, to increase the prosperity of the world communities. The affordable and rapid action to achieve is though PAMSIMAS or community-based water and sanitation provision. This act should be internationally published and scaled up to increase the quality and quantity of water

provision while maintain the sustainable development as well as protecting the environment. The main actors for the theme are the public authorities and community and supported by the other three parties in the pentahelix, including the non-governmental organization.

## V. Guiding Questions

The foremost question in the Water for Health theme is related to the key elements of the right to water and sanitation: water availability, accessibility, affordability and water quality. First, about the water availability, the following questions are important. How much water is available across the globe or across a country? Does the water originate from groundwater or surface water? Is it continuously available throughout a year? And is the available water enough for everyone? Second set of questions is regarding the accessibility. How far is the water fountain from the residence area/water consumer? Can the water be accessible with pipeline network? Can the water spring be accessible for the water consumer from different region? Third question is specific about affordability. How much is the cost to bring the water closer to the water consumer? Is the water tariff affordable for all population in the region? Can the cross-subsidies or tiered pricing be applied to make the water more affordable? The last set of question is about water quality. Does the water of the existing condition fulfill the required quality for drinking, sanitation and domestic use? What are the technologies that can be applied to improve the quality of the water?

Another guiding question is related to the population growth. The published studies have shown that the water crisis is closely related to population growth (Grigg, 2004; Salehi, 2022). However, the effect of population growth to water stresses in different regions and countries should be deeply analyzed.

The effect of global warming and climate change to the water availability, water need and water balance in rural, underdeveloped, and remote areas need to be addressed. The data regarding these issues might be scarce due to the limited access and attention to the regions.

Another interesting topic is about the effectiveness of community-based approach for water resources and sanitation provision. The comparison between community-based and governmental-based approach could give a better insight about the most efficient and effective action plan to improve the prosperity and healthiness of the community.

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