

# Penta Helix Perspective: The Pollution Control of the River Watershed (DAS) Citarum Indonesia

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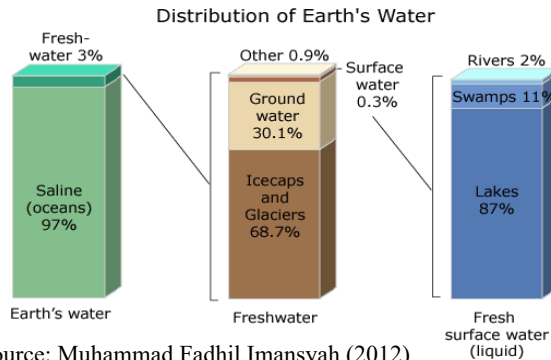
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**Abstract.** Citarum River is one of the largest potential water sources in West Java. Several regencies/cities are traversed by this river. Many problems arise along the watershed. as a result. The government has tried to find a solution but has not succeeded, so it needs proper handling by involving many parties. In connection with this, the government issued a regulation regarding the acceleration of pollution control and damage to the Citarum Watershed (DAS). The problem of this research is that the handling has not been sustainable in an integrated and collaborative manner. The purpose of this study was to analyze the public policy actors involved in controlling pollution and damage to the Citarum Watershed (DAS) studied using the penta helix concept. This research method uses a qualitative approach. Data collection techniques: observation, interviews and documentation studies. The results showed that of the five elements based on the penta helix concept, all of them contributed to controlling pollution and damage to the Citarum Watershed (DAS).

**Keywords:** Penta Helix, Pollution Control, Citarum Watershed

## 1. Introduction

Ecology is the science that studies the interrelationships between living things and their environment[1]. Ecology is also a branch of science that underlies the growing sciences and is always related to everyday life, especially to the environment[2] Ecology is always related to other sciences, such as economics, technology, politics, public administration, socio-culture, and other sciences.[3] In this article, how is the role of public administration through its ecological policies? One of the abiotic components that can affect the distribution of organisms is water. Almost 71% of the earth's surface is covered by water in the liquid form found in seas and oceans. The proportion of water in various forms can be seen in Figure 1 below.



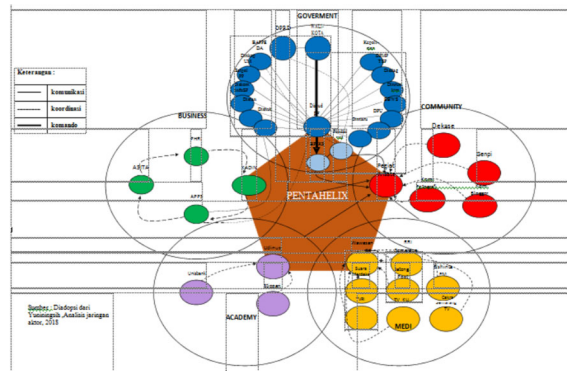
Source: Muhammad Fadhil Imansyah (2012)

**Figure 1. Proportion of Amount of Water on Earth**

From the picture[4], it is clear that water that can be used directly by humans (freshwater) is only 3% of the total amount of water on earth. However, in reality, the rapid development of humans on earth is not balanced with environmental sustainability. One form of water on land is liquid, where its availability flows through a naturally formed channel or commonly called a river. The river consists of the upstream, the middle, and the downstream.

The Citarum River has the largest water potential in West Java as well as the longest and largest river which is currently facing problems in the form of pollution and damage in the watershed. The reduction in land conservation areas, dense population settlements, river pollution by domestic and industrial waste, as well as others that cause floods, droughts, and landslides often occur in the Citarum River[5]. The problem that is no less important is the role of government policies in dealing with the Citarum river problem. As Engkus, E. et al., [6] explained the damage and pollution control task force and the Bandung Regency environmental service collaborate with elements of the surrounding community, in building awareness and responsibility in the success of the Citarum Harum Program. Therefore, a study was prepared which is expected to explain the multi-actor that plays a role in controlling pollution in the Citarum River [7]. The purpose of this study was to analyze the actors involved in controlling pollution and damage to the Citarum watershed using the penta helix concept. It is undeniable that the keyword in the issue of environmental preservation is "human awareness" itself, both as individuals, members of the community, as well as government agents who administer the system[8]. Therefore, there must be concrete actions to increase or foster this attitude of caring for the environment[9]. In this case, the role of the state to the elements of society is very large. The state has a development program that is systematically compiled and implemented, in this case, an environmentally sound development is needed. The state has a very strong influence as an institution of economic and political power[10]. The benefits of this research are to find out what the real problems are in the Citarum river and to find out the extent of the influence of the role of the government and government policies in dealing with the Citarum river problem[11]. The basic concept of the penta helix is promoted because of the collaboration between actors who are related to each other. Penta Helix itself is derived from the term 'penta' is five and 'helix' is the braid. The Penta-Helix model is based on five types of stakeholders, namely academia, business, community, government, and media. This model is useful for managing actor-based problematic complexity. The existence of the penta helix concept is a development of the previous concept, namely the triple helix and quadruple helix. The penta helix according to Lindmark et al [12] states that penta helix is an extension of the classical form of synergy (government, private sector, academia). In this model, the role of the private sector is more at the producer locus, while the government acts as the holder of contractual regulations that guarantee the stability of cooperation. The role of academics as a source of knowledge and technology.

Then the triple helix developed into a quadruple helix which involved the community in the collaboration process. The addition of the fourth participant, namely the community, reflects the importance of the bottom-up concept that humans who have creativity and with open insight can have a good impact on the community itself, with such a large and potential contribution to bringing out innovations.



Source: Analysis of research results

**Figure 2. The Penta Helix Concept**

The main characteristic in organizing the use of the penta helix concept is an approach that is more collaborating with the five stakeholder roles to be able to provide synergistic innovations. The concept of the penta helix according to [11] which is usually abbreviated as ABGCM (Academician, Business, Government, Community, and Media) can be explained the role of each stakeholder as follows: 1. Academicians; Academia or academics who act as drafters as well as identifying potential and developing today's technology. Academics in this case are a source of knowledge with relevant new concepts and theories. 2. Business; The role of business or private actors who can also act as enablers, as entities that carry out business processes in creating added value and maintaining sustainable growth. 3. Government; The government acts as a regulator that also carries out planning, implementation, licensing, policies on public innovation, and support for connecting the public and private. 4. Community; Community in the penta helix concept as an accelerator. In this case, the community plays a role in gathering people with the same interests that are also relevant to the potential development. Contribute to be a liaison between stakeholders. 5. Media; According to Satari and Asad in Yunas[13], both social and conventional media play a significant role, even though in reality it stands as an independent element or is not affected by other elements in carrying out its part or function. The role of the media is also as an expander in carrying out publications.

As stated in the Presidential Regulation of the Republic of Indonesia Number 15 of 2018 concerning the Acceleration of Pollution Control and Damage to the Citarum Watershed (DAS), in which there are various organizations involved, both from the central and regional governments that both contribute to the context of handling the problems that arise. located in the Citarum river basin[14].

So the penta helix concept is used to analyze the policy in order to find out the involvement of partners in tackling the Citarum watershed.

## 2. Research Method

This study uses a qualitative approach with data collection techniques: observation, interviews and documentation/library studies. Creswell (Rozikin) [15], qualitative research is a process of exploring and understanding the meaning of individual or group behaviour and describing problems. Analysis of government agency documents, as well as policy analysis used to reveal and analyze public policy actors who play a role in the process of controlling pollution and damage to the Citarum watershed which was analyzed using primary and secondary data to describe it, as well as data on stakeholder analysis, as well as action plans for controlling pollution and damage to the Citarum Watershed (DAS), in obtaining data, researchers also used instruments in the form of in-depth interviews where the research is presented in a systematic, factual, and accurate manner. The data collection technique also uses a literature study, namely by collecting sources both from books, articles, references that are relevant to the research being carried out. Determining the object This research is based on the breadth of reach in handling problems in the Citarum river area so that it involves various parties from the central, provincial to regional governments, the role of the community, private sector, academics and the media.

## 3. Results and Discussion

Law Number 15 of 2018 concerning the acceleration of controlling the Citarum river flow, has explicitly explained that there is a Citarum Watershed Team consisting of a director and a task force as written in Articles 5 and 8. West as Commander of the task force (President of the Republic of Indonesia, 2018). The Citarum Integrated Water Resources Management Program (ICWRMIP) involves various parties, both directly and indirectly related to this program.

The role of academics who should also act as drafters, which allows them to be able to provide innovations for pollution control programs and damage to the Citarum watershed. However, based on the findings of researchers that the role of academics here is more of an evaluator, for example the research conducted by Laili et al [16] regarding the identification of the carrying capacity of pollution loads in the Citarum river which based on the results of the study shows the polluted status from mild to severe in the Citarum Hilir area of Karawang. Application of environmental technology as an effort to restore the Citarum river recommended by ITB [7]. Held an External Monitoring Agency (EMA) in the Resettlement Plan in the West Tarum Channel by Parahyangan University [17]. Other research from the Institute of Technology, University of Indonesia and various other universities involved through community service programs, as well as research results that can be used as a basis for designing several policy improvements [18]. This group of business actors also has a big role in providing support for community empowerment and environmental conservation in the Citarum river basin. The private sector is the driving locomotive in this case as a company's CSR (Aditya) [19]. According to The World Business Council on Sustainable Development in Sari [20], which states that CSR is a commitment from companies to implement behavioral ethics and contribute to sustainable economic development. Programs that are run mainly for Citarum are usually in the form of Corporate Social Responsibility (CSR) programs from private companies and BUMN in order to improve environmental conditions. Until 2014, various CSR forums have been formed and managed by the government and the private sector. The CSR is managed by the government under the auspices of the West Java BAPPEDA while CSR from the private sector is managed by the CFCD (Corporate Forum for Community Development). The Indonesia Power company that carries out CSR activities in the Citarum Harum program which in 2018 the company made a policy that focuses on the floating net cage publishing program and community economic empowerment programs for former illegal sand miners through the duck over profession program. However, in addition to empowering, of course, the company also wants a profit motive as an effort to maintain company assets and achieve electricity production targets (Resnawaty et al) [21]

The government's role in handling the Citarum river is a milestone in the various activities carried out. Collaboration between elements in government ranging from the central government, local governments, to institutions that participate in efforts to improve the Citarum river and the surrounding environment. Therefore, there are several parties that are directly or indirectly related. Some of the ministries involved include:

1. National Planning and Development Agency; as the executor of the activity is in the Directorate of Water and Irrigation, Deputy for Facilities & Infrastructure. In addition, BAPPENAS has a bigger role in water resource management as the Chair of the NSCWR (National Steering Committee of Water Resources).
2. Ministry of Public Works; The Directorate General of Water Resources is the executor of the activities of the Ministry of Public Works. Specifically, there are 2 parts involved in the implementation of Citarum River management, namely the Directorate of Water Resources Management (PSDA) and the Citarum River Basin Center (BBWSC).
3. Ministry of Forestry; involved in the management of Citarum River improvement through land improvement and rehabilitation activities as well as protected area conservation activities. As the executor of the activity, he is in the Directorate General of Forest Protection and Nature Conservation.
4. Ministry of Agriculture; is one of the stakeholders for the implementation of land improvement activities and water management through SRI (System Rice Intensification). The authority to implement this activity rests with the Directorate General of Land and Water Management.
5. Ministry of Health; involved in the improvement of the Citarum River through the Support for Community and CSO Driven Initiatives for Improved Water Supply and Sanitation activities. The implementation of these activities is in the Directorate of Environmental Health.
6. Ministry of Environment; who in this program are involved in Citarum River improvement activities whose contribution can be seen in the Development of Strategies and Action Plans to Improve Citarum River Water Quality.

In addition to the involvement of the Central Government, the involvement of the Regional Government both at the Provincial and Regency/City levels is very much needed in the handling and management of Water Resources in the Citarum River Basin. Some of the local governments that participated were as follows: Bappeda of West Java Province, Regional Environmental Control Agency of West Java Province, Department of Housing and Settlement in West Java Province, West Java Province PSDA Service, West Java Provincial Forestry Service, Regional Perum Perhutani III West Java Province in Bandung, West Java Province Food Crops Agriculture Service, West Java Province Energy and Mineral Resources Office, West Java Province Livestock Service, West Java Provincial Health Office, West Java Provincial Environmental Agency. Regional Disaster Management Agency of West Java Province

The Citarum River area covers 10 regencies and 3 cities, the relevant district/city governments in the Citarum River area can be explained as follows: Bandung City, Bandung Regency, West Bandung Regency, Cimahi City,

Cianjur Regency, Subang Regency, Sumedang Regency, Purwakarta Regency, Indramayu Regency, Karawang Regency, Bekasi City, Bekasi Regency, and Bogor Regency.

The results of interviews conducted by researchers also showed that there was a contribution from the local government in efforts to handle the Citarum river, namely the Karawang District Health Office which, as described by Eti Herawati as a functional health administration position in the agency, said that the environmental health department in the office Health District of Karawang which plays a role in; a. Develop improvements to drinking water and sanitation infrastructure; b. Creating communal sanitation around the Citarum watershed area; c. Recycling of waste along the Citarum watershed; d. Community empowerment to improve basic sanitation around the Citarum watershed area. For example, the program to plant millions of trees around the Citarum watershed by mobilizing the TNI, and cleaning up garbage around the Citarum watershed. Activities that are usually carried out are in the form of revitalizing the Citarum watershed area and rehabilitating land from upstream, middle and downstream. The activity started at the end of 2017. In this case, the Health Office was involved in community sanitation issues around the Citarum watershed, including family latrines/WC, clean water, garbage, and STBM (Community-Based Total Sanitation).

As for the control of Citarum river pollution, based on 2014 data, there are a number of community communities/NGOs that contribute to community empowerment[22], in which the implementation of their activities is in the form of trial activities for Citarum River improvements which are also facilitated by the Pilot Demonstration Activity or PDA. Some of them who participated in the improvement of the Citarum River are as follows:

**Table 1.** NGOs/NGOs in the Citarum River Program

No	Name	Core of Interest
1	Water Communication Working Group (K3A) Water resources)	Water resources
2	Citizens Care for the Environment (WPL) Water resources	Water resources
3	Environmental Care Community Association	Environment
4	Community Education and Research Institutes Community Empowerment	Community Empowerment
5	P3A Partners Cai Gedebage Agriculture	Agricultur
6	Empowering Research Communication (EMPERICA) Socio-Economy-Politic-Culture	Socio-Economy-Politic-Culture
7	Community of Children Care for the Universe (KAPAS) Health	Health

**Source:** Institutional Strengthening for IWRM (2010)

The role of the media in controlling the Citarum river is by presenting various reports that show the media's point of view by raising various topics such as government policies and problems, not infrequently news also appears that shows the government's weakness in dealing with the problem of river pollution. The findings in the study show a number of reports on Citarum river pollution in the People's Daily Thoughts and Tribun Jabar which show news perspectives in criticizing the shortcomings of government policies. As revealed by Fitri [5] that Citarum environmental news will also determine several things, including government attitudes and policies, information on polluters, increasing public awareness and awareness of the whole community in dealing with problems in the Citarum watershed. Not only that, with the advancement of technology and the emergence of various platforms that further expand the role of the media in reaching all elements of society to be aware of the problems faced today and at the same time controlling and supervising the sustainability of government efforts and the extent to which these policies can be considered effective[23].

#### 4. Conclusion

The conclusion in this study is that controlling pollution and damage to the Citarum Watershed (DAS) is a multi-sectoral responsibility and requires good cooperation in the process of preparing and implementing programs and activities. the use of the penta helix concept in analyzing all the actors who play a role ranging from academia, private sector, government, community, to the media, all of which play an active role with their contribution in the form of direct or indirect action in realizing the improvement of the Citarum watershed area In the context of program sustainability, it should be supported by the availability of budgets and controlled programs in an integrated and collaborative manner.

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