The political economy of soil erosion in Cirasea sub basin, upstream Citarum basin

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Abstract. The current problems of the Upstream Citarum basin, particularly in the Cirasea Sub-Basin, are near related to economic factors and the low political position of the community. One of the reasons is the biophysical aspect, which influenced the erfpacht rights for Dutch and British plantation companies in the Agrarische Wet policy at the end of the 17th century. When Indonesia became independent, the Government had worked on environmental rehabilitation as well as dealing with land conflicts, but rehabilitation activities often failed to meet the primary needs of the community. Therefore, rehabilitation efforts in various programs often fail. The objective of this this study is to figure out the preferences of interests and motives from the government and other access authorities which ultimately affect the lives of other communities through the formulation of an environmental rehabilitation program. The approach is Bernstein Political Economy Analysis. The results show that political economy is be able to reveals the problem of erosion, which is always imposed on groups with a low political position compared to other groups who are more vital in reaching access. Even though the community has limitations in implementing environmentally-friendly agricultural practices. Moreover, the political economy can reveal the government's interests behind the land rehabilitation program which often sided with big investors and even tended to repeat the pattern of conflicts in the colonial era. Therefore, erosion can be an important element in describing the conditions of poverty that occur in rural areas.

Keywords: colonial, cultivation, erosion, military, political-economic

1. Introduction
River basin is one of the units of analysis of natural resource management which has a role not only in ensuring quality and distribution of water, but also in maintaining the preservation of ecosystem life, providing a source of food and energy availability, etc. But the river basin condition is getting worse from year to year, including the upstream area of the Citarum Basin, so that rehabilitation efforts are needed. Protected areas in the upstream river basin, when referring to Regional Spatial Plan (RTRW) Bandung Regency of local regulation number 27/2016, generally involves conservation forest areas, protected forest areas, water infiltration, springs, and river boundaries. Meanwhile, natural disaster areas, adjusting to the conditions of Cirasea Sub Basin, include (a) rehabilitation of land and water; (b) forest and critical land rehabilitation; and (c) controlling erosion.

One of the environmental problems that have been highlighted in the upstream area of the Citarum Basin is the problem of erosion. Technically, erosion is eroding of the topsoil layer by rainwater, which is influenced by rain erosivity, vegetation types and management, soil erodibility, and slope. Erosion causes the depletion of the topsoil layer, which reduces soil fertility and infiltration, land degradation and even produces sedimentation which will reduce reservoir function and threaten energy supply [1].

The Upstream Citarum Basin, which plays an essential role in maintaining the downstream environment sustainability, is still shackled by erosion problems. The upstream Citarum Basin had an average erosion rate of 32,073,995.34 tons/year [1]. The
erosion rate of the Cirasea Sub-Basin and the analysis showed a value of 24,930,983 tons/year with a very terrible erosion index status in 2008 [2]. Of course, this is inseparable from the growing area of critical land. According to data from the NGO of Raksa Wahana Citarum, the damage of the Mount Wayang area in Tarumajaya Village reached 412.05 ha from total land area of 645.00 ha that spread over the area of Petak 73 (Situ Cisanti Area) covering an area of 69.0 ha, Petak 71 covering an area of 55.0 ha, Petak 69 as large as 58.0 ha, Petak 18 covering an area of 125.0 ha, and Petak 19 reaching 105.5 ha. Data from the West Java Forestry Service stated the erosion that occurred in the Upper Citarum Basin impacted on the increase of sedimentation phenomenon in the Saguling Dam, which reached 8,467,926 tons. In accumulation, from 1987 to 2007, the total sediment was 84,644,878 m$^3$.

Not only physical aspects, but also social aspects can be used to explain the problem of soil erosion. Erosion often occurs due to inequality in gaining access between the majority of rural communities affected by erosion and other groups who are more vital in gaining access. Besides, soil erosion indicates a symptom of underdevelopment due to the economic limitations of marginalized groups in applying the agricultural sector by conservation principles. This social aspect makes the phenomenon of massive erosion occur in developing countries, particularly in Citarum Basin.

Therefore, soil erosion can be an essential element in measuring poverty in rural areas. Besides, the role of political, social, and economic science can be used to prevent the communities are affected by erosion from migrating to new areas to leave the agricultural sector. Of course, the problem is not only analysing "what is there" explicitly but also "who ordered what" in a phenomenon [3].

The management of the Citarum River Basin often faces failure to solve environmental damage even though it has involved many donor agencies with many programs. The government programs in rehabilitation efforts are often not in line with the community's interests as natural resource users. Also, marginalized communities are often imposed greater responsibility for damage the natural resources than those with excellent access. Therefore, the objective of this this study is to figure out the preferences of interests and motives from the government and other access authorities which ultimately affect the lives of other communities through the formulation of an environmental rehabilitation program. Furthermore, this study also essentially to understand the social symptoms of marginalized communities who tend to ignore environmental sustainability.

2. Methodology

The research has conducted in Cirasea Sub-basin, Upper Citarum Basin. Geographically, the Cirasea Sub-Basin in between 107° 37’ 49,1747” E – 107° 48’ 30,8923” E dan 6° 59’ 32,9636” S – 7° 14’ 35,2305” S. However, the research focuses on administrative areas that have major role in land rehabilitation, particularly forest areas, namely Kertasari, Pacet, Ibun, and Paseh Sub-districts with the following boundaries:

- North: Ciparay Sub-district and Majalaya Sub-district
- East: Leles Sub-district, Garut Regency
- South: Gunung Wayang dan Gunung Papandayan
- West: Pangalengan Sub-district

The orientation map of research location is presented in Figure 1. The study was conducted from July to August 2020. The study revealed the practice of erosion land rehabilitation based on a political economy perspective and presented through a descriptive approach. The data used in this study include secondary data collected through several data collection methods, namely interviews with several informants, literature study, and spatial data from several agencies and NGOs. The research uses Bernstein Political Economy Analysis [4] which includes four key questions that concern the social
relations of production and reproduction: (1) who owns what; (2) who does what; (3) who
gets what; and (4) what do they do with it?

Figure 1

(a) Citarum Basin; (b) Upstream Citarum Basin; and
(c) Cirasea Sub Basin

3. Results

3.1. The landscape of Bandung Basin formation process

The formation of the landscape Citarum flow, especially the Bandung highlands, is
inseparable from a geological change process that occurs dynamically and lasts a very long
time. This process can simultaneously explain the disaster-related phenomena currently
occurring in the Bandung basin, especially in the Cirasea Sub-Basin area.

In the Tertiary era, approximately 25-30 million years ago, the north coast of Ancient
Java was located roughly around Pangalengan, the north of Pangalengan was inundated by
the sea. In the pre-quaternary era, around 2-14 million years ago, the northern coast of
Ancient Java was increasingly shifting towards the north so that mountains began to
appear above sea level and volcanoes began to be active [5]. Mount Jayagiri (pre-Mount
Sunda) is the first giant volcano in the Bandung area which erupted 560,000-500,000
years ago and on one of its sides appeared Mount Sunda. Furthermore, the massive
eruption of Mount Sunda between 210,000-105,000 years ago formed Mount
Tangkubanparahu and Ancient Bandung Lake.

Mount Tangkubanparahu experienced two categories of eruptions and the material
widened to the south. When the Ancient Lake Bandung was inundated, as shown in Figure
2, the lake water began to come into contact with a series of elongated hills. The area
affected by the eruption of Mount Tangkubanparahu in the form of faults and collapsed
areas supported the erosion, which was relatively high until it finally broke into the West
Ancient Lake Bandung in the Cukangrahong area. After the West Ancient Lake Bandung
began to shrink, the water of the Ancient Lake Bandung began to erode the rocks in
Pematang Tengah. Finally, the East Ancient Lake Bandung receded with an outlet point in
the area at Curug Jompong, Nanjung, and West Bandung Regency 16,000 years ago. The
receding of the ancient lake resulted in a basin that became the forerunner to the location
of Bandung, as shown in Figure 3.
The Bandung Basin, which is surrounded by mountains, condenses easily at the top of the mountain, thereby increasing rainfall. However, the lower vegetation density in the upstream area, as shown in Figure 4, causes the falling rainwater not to be infiltrated by the soil. The material in the basin area is dominated by volcanic material whose soil is relatively loose. So, the flowing water quickly erodes the upstream basin, and the material is trapped in the downstream basin, as shown in Figure 5.

The process of forming a landscape basin explains that erosion events are commonplace, even having a significant role in reducing the Ancient Lake Bandung. There is an argument that conservation issues, particularly erosion, will only be discussed if erosion seriously disrupts the accumulation interest of the most powerful industrial capitalists. That argues following the conditions of the upstream Citarum, which are currently being held responsible for erosion materials deposited in the downstream area. The consequence of erosion is the silting at the three large dams in Citarum, which will threaten the electricity availability for Java and Bali.

3.2. Land use conditions in land rehabilitation efforts
The ratification of the Agrarische Wet 1870 triggered the Dutch to grant Erfpacht Rights condition for the opening of large private plantations in Sumatra and Java, including in the Cirasea Sub-basin area. This is the initial momentum for the entry of capital in the region. In 1915, the Cirasea Area, by adjusting the research location, entered the Residentie Preanger Regentschappen, Afdeling Bandoeng, District Tjiparaij, Patjet, and Paseh. Based on data from Department van Binnenlandsch Bestuur (1915), for the Cirasea Sub-basin area that obtained Erfpacht rights, only found in the Tjiparaj District with examples of plantation companies that obtained permits are presented in Table 1 [6].
Table 1 Example of Erfpacht Right in District Tjiparaj

| Plot        | Erfpachtsrecht Date | Company                                               | Commodity         |
|-------------|---------------------|-------------------------------------------------------|-------------------|
| Tjikembang 1 | June 20 1882        | Rotterdamsche Kinamaatschappij Tjikembang           | Quinine           |
| Santosa 1   | June 19 1904        | N. V. Maatschij. Santosa                             | Quinine and tea   |
| Kertasarie III | June 5 1911       | N. V. The Kertasarie Tea company Ltd                 | Quinine           |
| Lodaja I    | 1882                | Cultuurmaatsch. Lodaja                               | Quinine           |
| Toetoep Noord | June 21 1904      | Cultuurmaatschappij Sedep                            | Tea               |
| Kertasari V  | January 5 1911      | Kertasari Tea Company Ltd                            | Tea               |
| Taloen      | July 4 1902         | N. V. Assamthee onderneming                          | Tea and Quinine   |
| -           | -                   | Gunung wayang                                        | Coffee and Rubber |

Through the *erfpacht* policy, the liberals hoped that the existence of economic freedom would result from the transformation of the village into a modern economy. Farmers can imitate the administrative management of large plantations in a modern way. However, things that happened was the opposite because many farmers became laborers and it increased inequality [7]. During the Old Order era, foreign plantations experienced nationalization. Almost all *Afdeling* belong to PT Perkebunan Nusantara VIII, except for the Kertasari plantation, which was once owned by the British, whose Commercial Use Rights/Hak Guna Usaha (HGU) was taken by a private company, namely PT PP London Sumatra.

The central government has determined the status of the Mount Wayang area as a Production Forest. Starting from 1960 until 2003, forest products were managed by Perum Perhutani as a state-owned company/Badan Usaha Milik Negara (BUMN). Perhutani’s activities include timber production and logging with the concept of selective logging. To maintain the existence of the forest, Perhutani involves the community in conducting intercropping activities. People who participate in this program are allowed to plant vegetables every three years to wait for the Perhutani tree to harvest.

Perhutani’s collaboration with the community began in 1982. This activity was initially quite useful in Mount Wayang at 18, 19, 20, 69, and 71 plots because the community could still be invited to cooperate. In 1989, the locations that had been planted with timber by Perhutani began to be disturbed because the community prioritized planting vegetables that were considered more profitable. Besides, the sanctions that were supposed to be imposed by Perhutani did not work, so that the community began to feel the state land ownership.

In 1992, the Department of Agriculture play along with the Japan International Cooperation Agency (JICA) built the UPT Potato Seed Development Center/Balai Pengembangan Benih Kentang (BPBK), which aims to improve the community's economy. Besides, through the program of JICA-JABAR (SJJB) Potato Seed, the government and JICA have provided training on potato seed production to ten farmers four times in the Kertasari sub-district [8].

In 1996, the planting of vegetables on forest land became more massive, so that the intercropping program was not sufficient. Finally, the New Order government closed all activities on the Mount Wayang land which impacted on people's livelihoods. After the HGU obtained by PT Perkebunan Nusantara (PTPN) VIII expired on December 31, 1997, and the extension process experienced a bottleneck. The community used this momentum
to take up plantation land on a large scale on Mount Wayang. Even the practice of planting vegetables is carried out on steep land.

The provincial government started to be firm against the community by issuing a Governor's Decree Number: 522 / BINPROD / 2003 concerning the Prohibition of Intercropping Vegetables in the Mount Wayang Area. However, efforts to control community behavior only lasted three years due to the economic demands of the community increase. In 2009, the government, through the Minister of Forestry, issued a decision related to changes the status of the Gunung Wayang area, which was previously a Production Forest, become a Protection Forest.

The change in the forest area’s status has triggered a change in the authority of the institution, which was previously held by Perhutani, now being taken over by the Basin and Protected Forest Management Agency (BPDASHL). One of the Forest and Land Rehabilitation (RHL) programs carried out by BPDASHL is continuing the Perhutani program through Agroforestry activities that began in 2015. One of the major activities includes ‘ngajejer disisi’ planting (planting trees along the edge of the potato cultivation). Also, unwritten rules apply to prohibit the use of the roundup and gromoxone herbicides as they will exacerbate erosion rates. Other Use Area (APL) are under the authority of the West Java Provincial Government and these areas are the main focus of the Citarum Harum Program.

The land conflicts that occurred in Kertasari District are certainly not without cause. The domination of HGU and the intercropping program of Perhutani with low enforcement of sanctions started many problems because conservation action could not guarantee the economic needs for the community. Also, the Human Development Index (HDI) in Kertasari District in 2012 was in the 30th position out of 31 Districts in Bandung Regency. Even Kertasari had to be complacent about accepting an investment of only 1.4 billion. Armed with farming, the regional revenue (PAD) of Kertasari District is in the lowest position of the 31 Districts in Bandung Regency, which is only IDR 62 million.

The condition of Kertasari sub-district different from other subdistricts. Each sub-district does have a forest area and agricultural activities are still found, but spatially, Pacet, Ibun, and Paseh sub-districts are adjacent to Majalaya District which is known as a sizeable regional source of PAD for Bandung Regency so that people have various alternatives profession. On the other hand, the Kertasari Sub-district location, which is relatively far from the industrial center, makes it difficult for the community to access other jobs, considering that the community is only skilled in farming.

Protected forest areas that are not found in the Social Forestry Program area and the dominance of HGU make it more difficult for the Kertasari community to utilize the area. According to Safitri et al. [9], Other Use Areas outside of HGU which only 3,111.26 ha, from the total sub-district area of 15,121.36 ha, are contested by 77,157 residents. The rest is controlled by large plantation companies and protected forest areas. Figure 6 presents the distribution of land tenure that can be accessed by the community in a white area, even though this does not include the Perhutani’s HGU area.

3.3. Practices of deploying military personnel

One way to project the interests behind the land rehabilitation program in the basin area is through the DAS rehabilitation program which is currently ongoing. For the Citarum case, the Commander of Kodam III / Siliwangi, Doni Monardo, initiated basin restoration through the Citarum Harum Program and President Jokowi responded quickly to the Presidential Decree 15/2018. In the program, the Coordinating Ministry for Maritime Affairs, Luhut Binsar Panjaitan, became the Chief Steering Officer in implementing the Task Force led by the Governor of West Java. In carrying out technical duties, the governor is assisted by the Indonesian National Armed Forces (TNI). A total of 1,700 TNI personnel divided into 22 sectors, which were determined based on the availability of 22 colonels who
did not work so that they were ready to assist the basin rehabilitation task, were deployed to fix the Citarum problem. The government has budgeted IDR 605 billion for the Citarum Harum Program and IDR 300 billion to finance the TNI. The government has received funding from the World Bank of IDR 1.4 trillion to deal with the garbage problem.

Governments in the third world countries [10] that were once colonized have mostly used guerrilla warfare strategies with a territorial command system (Koter). Therefore, after the country became independent and began to do a non-military role, the state often adopted a territorial function due to the comprehensive definition of Koter which did not yet have specific functions. For example, as happened in the mid-1980s, The Indonesian Military (ABRI) functioned as one of the tools of power in the Soeharto government by establishing ABRI's position in various government bureaucracies until the regional governments. To support the task, ABRI built a shadow government by forming territorial institutions consisting of the Kodam (Province), Korem (Regency / City), Kodim (Distric), Koramil (Sub-district) to the Babinsa (Village) level. The formation of 22 sectors of Citarum Harum is also adopted this method.

Military performance has succeeded in creating political and security stability and accelerating the modernization process during the New Order Era. However, the paradigm of implementing guerrilla warfare, which still dominates in non-military tasks, often runs inefficiently because it involves many personnel. Also, military's deployment in large numbers supports the re-strengthening of political positions within the civilian sphere. Therefore, many parties consider that the involvement of the TNI in the civilian development process, in non-military missions, can obstruct the democratization process [10].

Besides, the entrenched guerrilla warfare tactics made the Indonesian military very open to enemy attacks. This condition at risk when this culture is carried over when the TNI performs non-military duties because the TNI's work orientation will refer to the definition of 'enemy.' For example, in the case of land rehabilitation in the Cirasea Sub-
basin area, especially in the Kertasari District area, the main problem highlighted is the wrong planting practice in the upstream area. So, the definition of ‘main enemy’ refers to the peasants. As a result, farmers will be considered incompetent in managing nature and many cultivated lands will be confiscated because the cultivated land belongs to the state. That accusations generally without considering the economic conditions of the community, including those the farmer’s access and economic capacity in implementing environmentally friendly cultivation practices.

After the reformation, the focus of the TNI changed from the Praetorian Military, namely a military involvement in politics/government, to a professional military. TNI is faced with the challenge of submitting to civilian supremacy [11]. However, the process of changing the corps of the military from a conquering group to a professional group is certainly not an easy thing. Military professionalism has faced significant challenges in the Jokowi era.

Presidents with civilian backgrounds generally do not have much bargaining power to sustain their power. The visible indication is that many of Jokowi’s policies have greatly benefited the interests of the TNI. The most prominent thing is related to the problem of the excess number of personnel. President responded with the realization of the Citarum Harum Program which was dominated by the military.

Also, the practice of planting coffee by TNI does not really follow conservation principles. For example, in planting coffee, TNI does not use shade plants and the planting principle uses a monoculture system. Coffee [12] is a plant that requires less light, so the suitable planting method is carried out with an agroforestry system. The legume tree is used as a shade for coffee trees.

In addition to causing erosion and deforestation, coffee cultivation [13] using a monoculture system creates new problems in the water footprint aspect. The water footprint blue refers to the volume of groundwater evaporated by plants [14]. The green water footprint refers to the consumption of rainwater. Also, the grey water footprint refers to the volume of water required to assimilate pollutant loads based on ambient water quality standards. In the case of Kertasari, both tea and coffee consume a lot of water. If stakeholders do not consider water consumption by plants, the area will find it increasingly challenging to obtain groundwater. Table 2 provides data to help imagine the water consumption by commodities available in the Cirasea Sub-Basin area. Plating coffee on state-owned land [15] will create new problems because the longer the planting period for a commodity, the more prone to claims of land tenure by the society. Especially when the citarum harum program will has been completed.

| Commodity         | Global Average Water Footprint (m³/ton) |
|-------------------|----------------------------------------|
|                   | Green       | Blue       | Grey       | Total       |
| Tea               | 7,232       | 898        | 726        | 8,856       |
| Green Coffee      | 15,249      | 116        | 532        | 15,897      |
| Roasted Coffee    | 18,153      | 139        | 633        | 18,925      |
| Potato            | 191         | 33         | 63         | 287         |

Ma’arif’s [10] recommendations for realizing ideal military professionals. That is transfer of TNI businesses to the government accompanied by clear compensation for the welfare of soldiers. But, for the case in Cirasea Sub-Basin, the TNI is still indicated to have a business element from the dominance of the TNI in Situ Cisanti. Moreover, TNI has started to build networks by involving the role of non-profit foundations. For example, the foundations that dominate the nursery in the Kertasari area are the Budiasi Foundation,
owned by General Doni Monardo, and Artha Graha Peduli (CSR), where the TNI, through
the Kartika Eka Paksi Foundation, has big role in the establishment of the business since
the New Order Era.

3.4. Land rehabilitation with classical methods strengthens shackles of land conflict
Blaikie [3] describes that the ideological structure of land conservation in the colonial
period not able to define erosion problems comprehensively. However, specifically for the
Citarum Harum Program empirically, the Government continues this paradigm. A
comparison of criteria and empirical conditions is presented in Table 3.

| Criteria of Classical Soil Conservation Model | Empirical Conditions |
|---------------------------------------------|----------------------|
| The problem of soil erosion has been identified as an 'environment one' rather than a complex 'socio-environmental' problem. The ‘coescion’ method was applied by the colonial rulers that ignored the social problems that were the leading causes of soil erosion. | Although the main program of Citarum Harum seeks social engineering, the ‘coescion’ exacerbate the conflict that occurred in Kertasari District. Even violence be a way to facilitate access to land only for military purposes. This criterion happened when the community cultivation land (former PTPN VIII area, called Bongkor area) has grabbed by the military for the nursery. |
| Land users are often accused of being most responsible for erosion problems. Even most land users as marginal groups are identified as lack of education. | The criteria happened in Kertasari Sub-district because the TNI generally underestimates the capabilities of society and only involved the society in cleaning activities. |
| Overpopulation as a cause of soil erosion | The government had planned a transmigration program in the village of Tarumajaya, Kertasari in 2003, but the society returned to Tarumajaya. |
| involve the society, particularly farmer, more strongly in the market economy. | The main program of Citarum Harum, particularly in the upstream area, is increasing coffee productivity in order to meet global market demands |

If the task force in any land rehabilitation program does not understand the social aspects and tends to use force in resolving conflicts, the government only repeat the colonial government's agenda behind the Agrarische Wet 1870 policy. The interests of the government and the military unilaterally have revived the rules of the Domein Verklaring in Agrarisch Besluit, section 1, which states that "all land which is not proven to have absolute property rights (eigendom) is the domein (absolutely owned) of the state."

4. Conclusions
Even though the Citarum Basin rehabilitation practice has been going on for a long time, there are still many task force parties who still have a classic soil conservation paradigm. This paradigm certainly has obstacles because social aspects are still neglected in the effort to solve problems. The program based on the military's need for jobs due to the consequences of applying military professionalism and the government efforts to give back to the military in maintaining political stability. Although the principle of "mental revolution" is used in the Citarum Harum program to ensure basin management sustainability, the program tends to focus only on increasing coffee productivity to increase
economic growth and overcome poverty problem. Ironically, the economic improvement in the profit-sharing mechanism in the Citarum Harum program is still unclear and people access to the natural resources in their regions is getting more limited which resulatin g the basin rehabilitation program. Finally, the program only adds to the conflicts that occur in the society.

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