Analysis of the spatial planning institution for Cisadane watershed in Bogor

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Abstract. The problem of damage to protected areas in the Cisadane watershed in Bogor Regency indicates that the problem of spatial planning and utilization has not been effective in the field. Therefore a review of the Cisadane watershed spatial planning institution is needed. This study used the Ostrom Institution Analysis and Development Framework to analyze the implementation of the protected area spatial planing policy plan. The analysis was carried out to describe the conditions of exogenous factors and the arena of actions that caused the implementation of policies on spatial plans for protected areas to be inappropriate. Conceptually, the Regional Spatial Plan policy is a policy direction in the use of space so that the sustainability of environmental resources is maintained. This research found a problem that became a disincentive to biophysical conditions, such as property rights issues, different knowledge and preferences for protected areas, coordination and some weaknesses in the rules used. In addition, the structural approach, sectoral roles and project activities are mostly used by the central government and regional governments. Problems of coordination, communication and, development of mutual trust are still limited. Based on this research, the central and regional governments need to change the way of thinking together with the need for coordination, communication and building cooperation in the implementation of spatial utilization policies.

Key Words: spatial planning, protected area, institution, coordination.

Introduction. Characteristics of watershed natural resources are beneficially shared resources (Common Pool Resources / CPRs) which point to two characteristics, namely the nature of the resources and the collective nature of management that have non-excludable and substracted properties (Schlager & Ostrom 1992; Kasper & Streit 1998; Ostrom 2008). The characteristics of shared resources were at risk of being damaged because no one was responsible and their collective actions did not provide incentives in realizing sustainability for the management of these resources (Baerlein et al 2015). On the contrary, Uphoff (1992), Wade (1987) and Ostrom (1990) stated that shared resources can be maintained properly if there are collective actions and institutions that effectively regulate community interactions in the use of resources. Sustainability of development and management of natural resources is determined by balanced ecological, economic and social aspects (Munasinghe 1992).

Spatial planning as a form of positive intervention has the dimension of space to overcome market failures, interventions are carried out by public institutions namely community institutions (local), government and global institutions (Kurnianti et al 2015). Space management is very important, especially in common goods. Characteristics of common goods or common pool resources (CPRs) have competitive non-excludable properties such as watersheds and protected areas (Kartodihardjo et al 2004). The upstream watershed as a protected function is a CPRs wherein space utilization should refer to the Regional Spatial Plan (RTRW). The RTRW as an institution should be able to direct the behavior of individuals and communities to be in line with predetermined public

goals (Kartodihardjo et al 2004). The RTRW was deemed to have failed to represent the interests of various parties, especially in the distribution of opportunities to utilize natural/forest/land resources, so that in the end it caused conflict in management and control of natural/forest/land resources (Kartodihardjo 2008). The governance of CPRs will experience challenges in its sustainability, one of which is caused by rapid changes by exogenous variables in the form of technology and population (Ostrom 2011).

The Cisadane watershed is one of the 108 watersheds in Indonesia. The increase in the number of DAS I Priority shows that watershed management has not been right on target. The damage to the Cisadane watershed is characterized by increasingly massive land-use change and an increase in the area of critical land is an indicator of the failure of watershed management (Mahera 2015). Watershed Cisadane has forest area of less than 20% which is an area of 28,098.79 hectares (18.34%) (Salampessy et al 2016). The cover of Halimun Salak Mountain National Park (HSMNP) from 2003-2011 experienced mild degradation of 6,197.13 and a heavy degradation of 1,200.15 hectares (Carolyn et al 2013). The biggest reduction in land cover occurred in the forest of -2 846.86 ha (-27.51%) with the rate of land cover change -237.24 ha (-2.29%) per year (Setioputro 2016). The data above shows that the forest area which could have been increased to 30% in accordance with the provisions of Law 26 of 2007 concerning Spatial Planning turned out to be narrower from year to year. The result of changes in land cover has an impact on peak discharge in the upper Cisadane watershed in 2003 at 81.22 m^3 / second to 81.73 m^3 / sec in 2010 (Nilda et al 2015). Damage to the Cisadane watershed function is indicated by the occurrence of landslides, floods and droughts that occur (Rosyidie 2013; Lastiantoro & Cahyono 2015).

Damage to the watershed's natural resources is caused by the dominance of sectoral thinking so that it is not suitable to be applied to natural resource management systems, because it does not allow flexibility to adjust the nature of natural resources that have complex characteristics and functions, beyond management unit boundaries and administrative areas (Kartodihardjo & Djamtani 2006). Work programs are arranged partially based on the interests of each actor and not often overlaps so that watershed management is not effective (Asdak 2010). The problem of watershed spatial planning institutions is the problem of how watershed spatial planning institutions are able to pay attention to the quality of the watershed. Institutional problems related to market reform and regulations that are unable to control behavior that tends to prioritize their own interests are the cause of damage to the Cisadane watershed area.

Institutions are set to direct the behavior of individuals and communities to be in line with predetermined public goals (Kartodihardjo et al 2004). The spatial planning in the Cisadane watershed needs to be studied to obtain information regarding institutional issues. Institutional problems are the basis for formulating a more effective strategy for developing institutional use in the recovery of the Cisadane watershed function. One method in analyzing watershed management institutions is using the framework of institutional analysis and development (IAD). The IAD framework is a method for analyzing and testing hypotheses about behavior from diverse situations at various levels of analysis about how rules, physical conditions, and community attributes affect the arenas of action, interaction patterns and outcomes (Ostrom 2010).

Theoretical framework. In this paper, we use a definition of an institution as a widely understood rule, norm, or strategy that creates incentives for behavior in repetitive situations. Institutions may be formally described in the form of a law, policy, or procedure, or they may emerge informally as norms, standard operating practices, or habits (Ostrom 2005). Individuals interacting within rule-structured situations face choices regarding the actions and strategies they take, leading to consequences for themselves and for others (Ostrom 2005). The IAD framework helps analysts comprehend complex social situations and break them down into manageable sets of practical activities.

The Institutional Analysis and Development (IAD) framework is built on a variety of theories, including classical political economy theory, neoclassical microeconomic theory, institutional economics, public choice theory, transaction cost economics, and non-cooperative game theory (Ostrom et al 2006) to provide means by which complex

decisions are made by certain institutions can be broken down into components for analysis. The IAD framework is very effective for ecosystem-based management systems because it does not only discuss institutional rules, but also biophysical and cultural influences. Therefore, this is an appropriate framework for analyzing watershed spatial planning institutions. The IAD framework examines the impact of human behavior on institutions and vice versa, which is very important when dealing with programs designed to influence human behavior (Imperial 1999) such as regulating space use in watershed protected areas.

Biophysical / material conditions. Biophysical attributes greatly influence the choices available to participants. Two attributes are often used to distinguish between four groups of goods and services, namely: exclusion and subtractability in the use of goods and services. Exclusion is related to the difficulty of limiting people to benefit from the supply of goods or services. Subtractability relates to the extent to which the use of goods or services by individuals reduces the availability of goods or services to be consumed by other parties. The state of the two attributes ranges from low to high. Ostrom (1990) states that Common Pool Resources (CPRs) are characterized by their substractable and non-excludable nature. Rivalness means that one's use will reduce the ability of others to use these resources. Examples of resources with rivalness characteristics are watersheds, forests, and natural resources.

Attributes of the community. Community attributes that are important in influencing the arena of action include (1) behavioral values that apply within the community, (2) a common understanding that community members share (or not share) about certain parts of the structure of the arena of action, (3) the level of homogeneity of community members' preferences, (4) the size and composition of the community, and (5) the extent of the inequality in the mastery of basic assets between them. Mental owned by participants can be influenced by culture in a situation (Ostrom 2005).

Rules in use. Rules in use are a set of rules that become participants' references if they are asked to explain and justify their actions. Rules in use are a set of rules that become participants' references if they are asked to explain and justify their actions. Conscious individuals can also decide to adopt different rules and change their behavior to adjust to such decisions (Ostrom 2005). Judging from the type, according to Sabatier & Weible (2007) rules in use can be either formal or informal rules, written or unwritten rules, and can even be social habits. These rules can be classified based on their impact on seven elements of the action situation, namely position rules, boundary rules, authority rules, aggregation rules, information rules, scope rules, and payoff rules (Ostrom 2005).

This study focuses on the influence of exogenous factors (biophysical conditions, community attributes, and regulations) on the arena of action on watershed spatial management, which in turn will influence the patterns of interaction between participants and the resulting effects. Impacts are limited to strengthening or weakening the principles of watershed space governance in the watershed management community. Members of this community are also implementers of the participants in the arena of action to determine the regional spatial plan.

Material and Method

Description of the study material. The study was conducted from October 2017 to March 2018. Qualitative research techniques were employed to collect the data. Based on IAD-Framework, the variables which were analyzed include influence of exogenous factors (biophysical conditions of Cisadane watershed in Bogor, community attributes, and rules in use), conditions of action arena (action situation and participant characteristics), and pattern of interactions.

To gain an understanding of the institution work, the content analysis was carried out on a number of laws and regulations related to the spatial layout of the Cisadane watershed in Bogor. The interpretation and implementation of these regulations were analyzed through semi-structured interviews based on participants' opinions and behavior (Bunguin 2010). A total of 30 participants were interviewed which consist of

representatives from Ministry of Forestry, Ministry of Ministry of Agrarian Affairs and Spatial Planning, Central River Region (BBWS), Bogor Regency Regional Government (Bappeda, Dinas Perijinan, Dinas Tata Ruang), National Land Office (BPN), academics, institutional donor, companies, and community leaders. In addition, relevant secondary data were collected from hardcopy documents and the Internet. Considering the Cisadane watershed participants location, this research was conducted in Jakarta and Bogor. Data collection method and source of data were synchronized with research objectives, as shown in Table 1.

The main data used in this research is the primary data obtained from structured interviews of expert respondents, representing the various stakeholders. In addition to in-depth interviews, primary data were also obtained through limited, non-formal discussions. While secondary data comes from various reports and documents related institutions, as a supplementary and support information obtained from expert respondents.

The qualitative approach uses the Institutional Analysis and Development (IAD) framework. This IAD work approach can be used to analyze the performance and structure of institutional arrangements on spatial policy issues. The IAD was developed based on a rational institutional choice perspective that provides a useful platform for assessing the ins and outs of watershed-level collaboration (Ostrom 2005). In the framework of IAD (Figure 1) consists of three variables, namely 1) institutional variables, 2) resource variables, and 3) variables from the community, all three influence the decision structure. Analysis of biophysical factors and community attributes that influence spatial performance is an attempt to understand social issues and the meaning behind the facts of spatial planning activities that are analyzed descriptively. Qualitative research explains that qualitative research seeks to understand social problems based on the creation of a holistic picture of Creswell (1994).

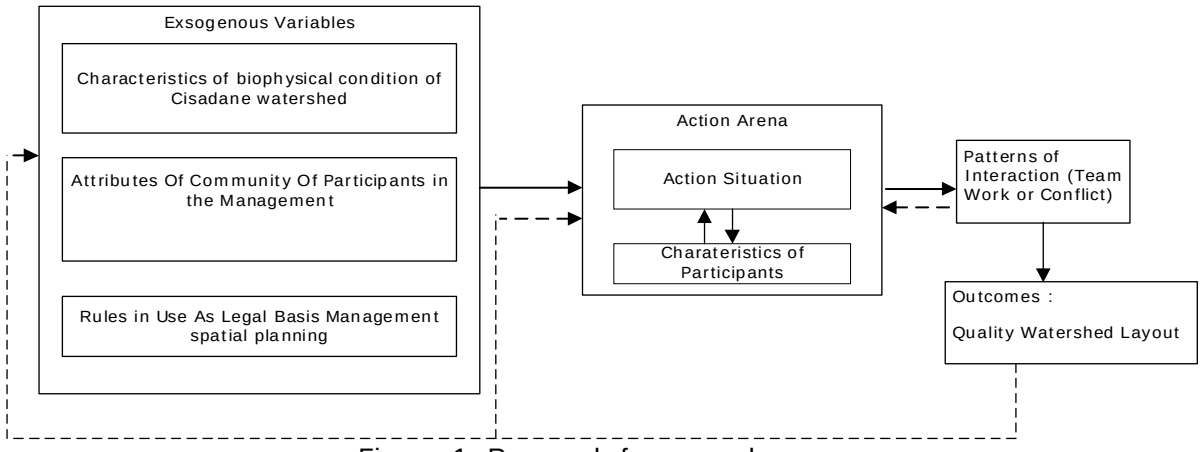

Figure 1. Research framework.

The interview are explained based on the results of information from sources (sub-district / village officials and residents) at the research location, the causes of factors affecting land use change. Qualitative research findings were not obtained through statistical procedures but obtained from collected data interview, observation, etc. (Corbin & Strauss 2008).

The descriptive analysis also illustrates how efforts can be made to maintain protected areas through an institutional approach. The institution is defined as a collection of rules and organizations that play an important role in regulating the use /allocation of resources efficiently, evenly and sustainably (Kartodihardjo et al 2004). Institutions are set to direct the behavior of individuals and communities to be in line with established public goals (Kartodihardjo et al 2004). The main components of institutional analysis are property rights (rights or obligations of community members to regulate resource management), jurisdiction limits (determine what and who is included in the institution) and the rules of representation (determine who has the right to make decisions for resource management).

Table 1

Data collection and analysis, and data source

Objective	*Analyzed variables*	*Data collection and analysis*	*Data source*
	Influence of exogenous factors		
A. Biophysical conditions of Cisadane watershed	Item institutional properties; Property rights of Cisadane watershed, availability of protected area.	Collecting from documents, interview (descriptive)	Document of Cisadane watershed informer: Bappeda, BPDAS, BBWS, Dinas ATR (5 persons).
B. Community attributes	Conformity of policy values spatial planning and utilization procedures; The level of mutual understanding for the policy; Homogeneity of preferences on policy strategies.	Interview (descriptive)	Informer from Bogor District: Forestry Service (5 persons), Regional Parliament (1 person), Academia (3 persons), NGO (3 person), Companies (2 persons), Community leaders (2 persons); National informer: Ministry of Forestry (2 persons).
C. Rules in use	Position rules; Boundary rules; Authority rules; Aggregation rules; Information rules; Scope rules; Payoff rules.	Collecting regulation, interview (content analysis)	Website of the Ministry of Environment and Forestry; Watershed management center; Informer from Bogor District: Spatial Planning Service (3 people), Bappeda (3 people).
	Conditions of action arena		
A. Action situation	Participant; Position and role; Task and authority; Control; Information; Cost-benefit; Potential outcomes.	Collecting regulation, interview (descriptive)	Website of the Ministry of Environment and Forestry; Informer: the same with informer from community attributes
B. Participant characteristics	Posession of resources; Contribution; Ability to process information; Preferences; Selection criteria.	Interview (descriptive)	Informer: the same with informer from community attributes.
C. Pattern of interaction	Associative or non-associative.	Interview (descriptive)	District: Forestry Service (5 persons), Regional Parliament (1 person), Academia (3 persons), NGO (3 person), Companies (2 persons), Community leaders (2 persons); National informer: Ministry of Forestry (2 persons).

Results and Discussion. In this section, we follow the second approach institutional-oriented policy analysis (Polski & Ostrom 1999). We begin by describing the influence of exogenous factors and proceed through a detailed analysis of the action arena, patterns

of interaction, and outcomes. Based on the analysis, it could eventually make conclusions.

Biophysical conditions. Watersheds and protected areas are included in the CPRs, based on the nature of competition and the nature of their exclusivity (Ostrom 1990). Watershads has various forms of control or rights and access to forests /land. The Cisadane watershed in Bogor Regency is included in the upstream section. The upstream watershed has an important meaning especially for the protection of the function of the water system (Asdak 2010). The Cisadane watershed protected area has a surface of 63,889.52 ha (59.3%). Protected areas consist of protected forest areas and non-forest protected areas. Forest protected areas cover 29,195.64 ha of forest area (45.69%), consisting of conservation forest 23,820.81 ha and protected forest 1,501.07 ha, production forest 2,964.3 ha, limited production forest 909.46 ha and not forest area 34,398,39 ha. Limited production forest and production forest areas are included in water catchment protected areas and landslide-prone areas.

Protected areas with forest cover tend to decline. Based on Landsat imagery in 2003, protected areas with forest cover vegetation were 25,255.53 ha (39.5%). Based on Landsat imagery in 2016, protected areas with forest vegetation are only 22,861.89 ha. The forest area of 8,306.26 ha has been turned into a settlement, plantation, rice field, moor, open land, shrubs. This shows that protected areas that are the support of environmental support have not received significant management. The upstream of Cisadane watershed protected area as a water catchment area has only 35.78% of forest vegetation cover, of which 32.6% is in state forest areas. In 2025, it is estimated that Bogor Regency will lose 72.41% of the forest area from the space specified in the RTRW (Fajarini et al 2015).

The results of the overlay of 2016 land cover map with the spatial pattern of the RTRW 2005-2025 are inconsistencies in the use of space 18,439.55 ha (28.8%) of the total protected area of the Cisadane watershed in Bogor Regency. The function of the 22% conservation area and protected forest more than 77.4% is not in accordance with the allocation of spatial patterns. This shows that most protected areas are used for non-protected functions. Deviations in spatial use indicate a low sense of ownership of the community towards the RTRW, where one reason is the lack of participation in the formulation of spatial policies. Spatial inconsistency is a form of discrepancy between spatial use and spatial designation (Dani 2016). The nature of competition for land use for protected areas is fulfilled because the availability of land for protected areas is increasingly limited, any conversion of land in protected areas will reduce the joint ability to provide protected functions. The nature of the exclusivity of protected areas in the watershed is characterized by a public perspective that is very difficult to prevent the conversion of protected function lands.

As a consequence of these biophysical characteristics, management of protected spatial planning and monitoring of land use and control of land use and others are becoming more difficult. In this context, BPDAS officials revealed: ... watershed problems are very complex from various sectors and their land ownership status varies, there are state land, HGU land, private land, and arable land, the issue of watershed space is not just a watershed management center. Every time there is a flood, our drought landslides are always in the spotlight.

Areas that have protected functions in the Cisadane watershed have state-owned protected areas in the form of conservation forests, limited production forests, and some production forests. The Cisadane watershed protected area has several land use permits for mining, settlement, tourism, agrotourism, asphalt and concrete processing industries, hotels and resorts at present. In the forest area, there are 9 legal mining companies that are still in operation and 5 companies that are already inactive.

The effect of community attributes. The Cisadane watershed in Bogor Regency has a population of 3.49 million people with a population density of 23 million people ha^{-1}, with the highest population distribution in the Central Cisadane watersed of 39.8% and Cisadane Hulu sub-watershed 30% (BPS 2011). Some sub-districts experienced > 30%

increase in population from 2005 to 2010, namely Ciomas, Dramaga, Caringin, Parung, and Rumpin. Subdistricts with a population density of more than 2,000 people km^{-2} are Ciomas, Tamansari, Cibungbulang, Dramaga, Ciawi, Ciampea, Cijeruk, Ciseeng, Megamendung, Leuwisadeng, Ranca Bungur, Tenjolaya and Cigombong (BPS 2011). The population growth in the sub-district is very high and exceeds the national population growth rate of only 1.49%. The need for land is getting higher, this will encourage the high function of land/business land for settlements. The education of the Cisadane watershed community in the upstream part is relatively low, dominated by elementary and junior high school level 73.50% (BPS 2011).

Community attributes are exogenous factors that influence the action situation and decision makers when they make collective choices about institutional arrangements (Table 2). Differences that exist in community attributes will cause institutional arrangements to be ineffective (Kiser & Ostrom 1987). These community members are all participants involved in the Cisadane watershed utilization in Bogor Regency. There are three community attributes were selected, namely 1) conformity between policy values and the bureaucratic culture of space utilization; 2) level of understanding of policies; and 3) preference homogeneity towards policy strategies (Ostrom 2005). The damage experienced by the Cisadane watershed is caused by spatial planning that is wrong or not adhered to, the land allocation is incorrect. The fundamental problem with the watershed is that there is no good coordination. RTRW as an institution has not been able to control community behavior in land use.

Table 2

Community attributes

Conformity between the values of spatial policy and utilization of watershed space	*Level of understanding*	*Homogeneity (preference)*
- Government commitment to efforts to protect and optimize environmental benefits is carried out on the basis of watersheds (DAS); - Economic activities in increasing local revenue are regional priorities; - Rent seeking; - Business license (vulnerable to corruption); - Transfer of land functions (vulnerable to corruption)	- Different levels of community understanding regarding protected areas and watersheds because: - knowledge difference, - participation, - information; - Level of understanding of local governments with other sectors involved in watershed protected areas. the importance of the role of communication and building mutual trust and cooperation (Ostrom 2005)	- Different policy in determining protected area between the RTRW and forest function based policies has resulted in overlaping areas with different function; - The determination of protected area based on function area is authorized by the Ministry of Enviroment and Forestry (KLHK), while for the protected area based on RTRW is determined by local government in coordination with KLHK; - There needs to be a protected area in the watershed for watershed sustainability (same preference)

The conformity of policy values. Conceptually, as mentioned in the introduction, the Regional Spatial Planning policy is a direction in the use of land that is divided into protected spaces and cultivation spaces. Decision-making in institutional choice is very dependent on the mental model used by various actors (Schlüter 2007). The implementation of watershed management in the field up to now still tends to prioritize their respective sectoral interests. Government Regulation No. 26 of 2007 which divided government affairs between the Central Government and the Provincial Governments and district / city Governments made the watershed management activities increasingly chaotic and increasingly showed the interests of their respective regions. It could be seen from the tendency of district/city governments to exploit watershed natural resources to

increase locally-generated revenue that they are not following conservation and rehabilitation knowledge and activities. Thus it will aggravate the watershed condition plus there is no initiative from the district/city government to carry out watershed conservation and rehabilitation activities. In addition, there is no respect for environmental services produced by a watershed. Environmental services were still not accounted for by most actors that involved in spatial use. Therefore there was a need for an understanding of the watershed's environmental services by the parties involved in watershed management.

Concerning the land use in the field related to land conversion, there were still many discrepancies with spatial plans. It was due to economic interests, besides that there were indications of space that used permits and tenants were also vulnerable to corrupt practices. On the one hand, the local government was required to utilize space optimally to increase regional income. Even so, related to land conversion, there were still many found in the fields that were not guided by the RTRW, the conversion of land for economic interests, permits for spatial use and renters were also vulnerable to corrupt practices. It related to corruption culture (Nuryanto 2016). The results of interviews in the field indicated that the level of understanding of the community and other stakeholders knew much about the RTRW but there were those who were not aware of the provision that the RTRW might be used in the preparation of development program proposals, the substance of the RTRW was too general and did not provide clear direction. The heterogeneous level of homogeneity could be seen in the management of the Cisadane watershed upstream area, where the local government was more dominant in its role to establish policies on the utilization of protected area. Meanwhile, the private sector tended to prioritize the exploitation of economic benefits from natural resources within the Cisadane watershed, including the potential for sand deposits and other mines in potable sand, Rumpin, Ciampea and tourism/resort potential. Bogor District Government issues HGU (Cultivation Rights) and HGB (Building rights) permitted to utilize the area as resorts, settlements and agrotourism, and issue several SIPD (Regional Mining Permits). The change in HGU land occurred in that location from rubber plantations to golf resorts. It also caused a decrease in the water supply felt by residents.

The issue of land ownership is facilitated by the authority of the village head to issue a statement of no dispute, land history and letter C as a condition for the publication of the SPPT by the United Nations. The head of the village does not understand exactly the protected room according to the RTRW. The role of the village government and head of sub-district in approving the applications for land ownership has an impact on the speed up process of land transfer (Marsusanti 2007). Basuni (2003) stated that the authority of the village head and subdistrict government in approving land ownership applications are used as a rent seeking.

The problem of land degradation, for example, was often understood solely as a technical problem of soil conservation and as an implication the technological approach was almost always relied on to overcome it, even though the root problem lied precisely in the social, economic, policy, and institutional realms (Barbier et al 1997). Land degradation was triggered by various government policies, especially in the fields of tourism, settlement, and mining. Farmers did not understand the technology of soil conservation and the importance of woody plants in protected area. Because most of the land that was cultivated is not theirs and the incentives that drive them were the choice of non-timber cultivation with all the risks, the problem is that the upstream people who manage the land are mostly non-landowners so they do not plant long-living woody plants. Sulastiyo et al (2016) even indicated that the failure of various critical land rehabilitation projects was caused more by a lack of attention to social, economic and institutional issues of land users compared to technological problems.

The one perception will affect her/his berhavior. Someone’s perception on a certain aspect will influence her/his behavior, for example during decision making (Fabra-Crespo et al 2012). The perceptions of the relevant agencies, sub-district heads and village heads about the importance of the existence of protected areas are positive. This positive perception is characterized by the awareness that the existence of protected areas is important because they have various functions including as regulator of the

water system and preventing natural disasters. Related institutions generally support development activities that are maintained in accordance with their designation. One of the agency's constraints in space control is the arrangement on land owned. These obstacles are demands for compensation for prohibitions if the use is not in accordance with the designation. This means that the Regional Government will continue to fail in controlling space if it is always confronted with this problem. The environmental management activities that have been carried out include installing warning boards. Public perceptions about the importance of the existence of protected areas are positive but still have some bad attitudes. Some public attitudes that are not good towards protected areas include making buildings on river banks and coastal borders and dumping garbage into rivers. They also refused if there were stipulations of protected areas on their land except for compensation.

Rules in use. The rules used or work rules were a set of rules that would be used as a reference by participants if they were asked to explain and justify their actions to fellow participants (Ostrom 2005). Ostrom (2005) classified these rules into seven types: position rules, membership rules, authority rules, aggregation rules, information rules, scope rules, and rules of results. In this study, the analysis was carried out in Bogor Regency Perda No. 11/2016 concerning Bogo district RTRW, PP 37.2012 concerning Integrated Watershed Management; Keppres 32/1990 concerning protected area. These rules are currently used as a basis for watershed management. Weaknesses and regulatory mismatches are shown in column 1 of Table 3. Regulatory arrangements affected the situation of actions that faced by participants shown in column 3. This weakness was one of the causes of problems in watershed management.

Table 3

Analysis of protected area and management watershed regulations

Ostrom's rules concepts	*Findings*	*Impacts*
Position rules (rules on number and type of position, number of member in each position, each position's roles, and mechanisms of succession)	The position of the BKPRD as a planner, regulating the use and control of the area within the administrative boundary, the Regent as the manager of the Regency watershed, the cross-Province watershed by the Governor and the cross-provincial watershed management is the responsibility of the Ministry of Environment and Forestry.	Local governments that have a significant role in regulating watershed protected areas have little role in formulating and planning watershed management. Emptiness of authority and responsibility in several aspects of protected area management (areas prone to natural disasters, water resapam and management of local protected areas).
Boundary rules (rules on memberships in and out for each position, consist of prerequisites and mechanisms).	Membership is regulated in the RTRW perda and Law No. 37 of 2012 regarding watershed management. But related to the management of protected areas is not regulated.	Considering that the management of user protected spaces and ownership is sectoral, there is still a "difference in understanding and interest" between the central government, other regions and other sectors.
Choice rules (rules on legitimate action/authority for participants in each position).	• ATR Minister, Governor and Regency DPRD: reviews the draft RTRW of the district according to its authority; • BKPRD: compile, determine and socialize the district RTRW; • Society / Corporations: involved in preparing the district RTRW; • Minister of LHK: establishes the function of forest area; • Communities / Corporations: utilize forest areas according to their area functions and utilization permits.	The implementation of sectoral policies is still running, there is no integration between space design compilers and space users.
Aggregation rules (rules on mechanisms for the transformation of decision making for group/organization decision).	▪ Determination of protected areas in the district RTRW is determined by the regent with the approval of the Regency DPRD, Governor and Minister of ATR; ▪ Determination of forest protected	Although there are aggregation rules about protected areas, disagreements between space users.

	areas through the establishment of forest areas) is carried out by KLHK; ▪ Determination of local protected areas, areas prone to landslides, water catchments and flood-prone areas have been stipulated in the RTRW.	
Information rules (rules on information's types, supplies and access, and also on socialization and communication).	There are rules for information related to protected spatial planning in the Perda and watershed information in PP 37 of 2012.	The limited access to information related to protected areas has negative implications for protected area management, because the rules regarding information have not been widely known and used as control controls.
Scope rules (regulate the conditions of the state variables that must (obligatory), must not (forbidden), and can (allowed) influenced as a outcome for action in action situation).	The three regulations analyzed clearly have clear criteria for classifying protected areas but it has not been explained who has the authority of non-forest protected areas in the watershed area.	Regulations for establishing protected areas must be in line with the implications in the field because it does not explain who is authorized in the management of protected area management. Thus, supervision of protected areas is almost not implemented. The direction of management of protected areas should make the guidelines for the use of space not only for administrative purposes.
Payoff rules (rules on net cost and benefit, including incentives and sanction for each participant).	Bogor Regency RTRW Regulation No. 11 of 2016 regulates costs, incentives and sanctions.	Although the issue of costs, sanctions and incentives has been regulated, implementation has not yet been carried out either in relation to incentives or enforcement of sanctions. Barriers to controlling space in protected areas are related to the regulation of private land use because it relates to incentives provided, as well as sanctions for violations of spatial planning.

Action arena. Action arena consists of two components, action situation, and participants (Kartodihardjo 2008; Ostrom 2011). Action situation and participants comprise of seven and five variables, respectively. Data obtained from rules analysis, identification and observation on the development process are shown in Table 4 and Table 5.

Participants are individuals and or organizations involved in an arena of action. Participants include four variables, namely (1) Participant resources brought to the action situation, (2) Participant assessment /perception of the arena of action, (3) The way participants participate in acquiring, exercising, mastering, and utilizing knowledge and information, and (4) The processor strategy of the participants selects the action criteria (Ostrom 2005).

At the national level, the responsibility of forest protected areas is taken by the Ministry of Environment and Forestry through the preservation of regional functions. The regulations related to structuring this forest area should be in synergy and not overlap because the TGHK and Provincial RTRW were implemented. However, based on studies in the Cisadane watershed, there are overlaps in determining the function of protected areas. The Bogor Regency RTRW stipulates 45% of protected areas with a gradual transfer of protected forest reserves in the form of changing the status of limited production forests and community-owned forests into protected forests. The implementation should involve the Ministry of Environment and Forestry which has the authority to change the function of the forest area and improve the strategy of the Perhutani Corporation in using wood in production forests on a limited basis. This condition can occur due to differences between the scale of the map and the methods used in determining regional functions. The Bogor Regency RTRW should be adhered to and implemented by all actors in land use in the Cisadane watershed.

Table 4

Action situation of management protected area in Cisadane watershed, Bogor

Participants	*Position*	*Type of action*	*Control power*	*Information availability*	*Cost-benefit*	*Potential-outcomes*
National						
Ministry of Forestry	Responsible for forest areas and watershed management	Create regulation	Regent with SKPD (Office of Spatial Planning and Land, Dinas Perijinan has relatively high control power in directing land use in non-forest protected areas. Controlled forest protection areas are carried out by coordinating with National Park and Perhutani Hall. Coordination is still limited to administrative functions. Control Relatively weak when faced with spatial use violations: Supervision by the community and NGOs has relatively low control in addition to information that the RTRW is not socialized as well as surveillance media that do not yet exist.	Information about the RTRW is available on the website of the Bogor Regency Government. Information related to protected areas has not been much information, especially related to water absorption, prone to landslides, prone to disasters. The scope of information is still at a very limited level.	At the national level: the availability and access of the budget (APBN and other financial support) for the rehabilitation of protected areas is adequate even though the rehabilitation fund is small. Short-term benefits to meet Performance Indicators Implications of the policy of spatial utilization, long-term to create sustainable watersheds and prosperous communities. Environmental benefits are clear for districts upstream of the watershed and downstream, while unclear upstream-downstream responsibilities and coordination are mainly related to incentives.	There are three possibilities: Local Governments coordinate with the central government and other sectors in handling watershed management, Local Governments only stipulate spatial planning but the implementation of each sector runs independently, Local governments in implementing half-hearted spatial plans, Protected areas and the cultivation area has been established but the openness of the drafting of the RTRW is still not transparent and participatory. the implementation of the RTRW as a direction in land use in its implementation has not been fully implemented, especially in the commitment to control spatial use.
Perhutani	Responsible for production forest areas	Provide support or rejection				
Ministry of Agrarian Affairs and Spatial Planning	reviewing the design of the district RTRW according to their authority	Assess the suitability of spatial plans				
BBWS	Responsible for the river body	Build river body infrastructure				
Bappenas	Policy supporter	Synchronize development plans with the RTRW				
BPN	Responsible for identifying land tenure	Legalize land tenure				
Academics	Expert	Give input and control				
Other sector ministries	Land use policy makers	Provide support or rejection				
Local Government						
Governor	reviewing the design of the district RTRW according to their authority	Assess the suitability of spatial plans				
Regent	RTRW policy makers	Decision Making				
Parliament Regent Bappeda	reviewing the design of the district RTRW according to their authority	Decision Making				
Head of Provincial Forestry Service	Supervision of forest exploitation, implementation of reforestation and conservation of land and water, monitoring for Utilization of Community Forests and Protection Forests	Supervision of protected forest areas and critical land, Socialization				
Office of Spatial Planning and Land	Policy makers of spatial utilization	Decision making				
Investment Services and one-stop integrated services/DPMTSP	Permit related to space utilization	Provider of land use permit				
Companies	Space utilization	Provide support or rejection				
Community	Helps supervise space utilization	Provide support or rejection				
NGO	Facilitation	Provide support or rejection				

Source: Analysis results.

Table 5

Characteristic of participants

Participants	*Resources/influence*	*Liveliness*	*Knowledge to protected area policy strategy*	*Ability to process information*	*Selection criteria*
National					
BTN TNGP dan TNGHS	+	++	The central government is only a compiler of regulations, supervision, input and guidance related to the use of watershed space.	The availability of information about protected areas is available in the RTRW document, the local government web should be the RTRW as basic information and direction to develop policies, programs, work plans and activities of all actors of space users.	National: rules knowledges work plan
BPDAS Citarum Ciliwung	+	+++			
Perhutani	++	+			
Ministry of Agrarian Affairs and Spatial Planning	+++	+			
BBWS	-	++			
Bappenas	+++	++			
BPN	+++	-			
Academics	+++	++			
Other sector ministries	+	++			
Local Government			Regional Governments as compilers and compilers of regulations (1, 2, 3, 4, 5), planners (2, 5, 6), beneficiaries (8, 9), supervision (6) and controls (6, 7) watershed protected areas.		Local Government: economic politics (Payment environmental services)
Governor	++	++			
Regent	+++	+++			
Parliament Regent	+++	-			
Head of Provincial Forestry Service	++	+++			
Bappeda	+++	++			
Office of Spatial Planning and land	+++	++			
Investment Services and one-stop integrated services/DPMTSP	+++	-			
Companies	++	++			
Community	+	+			
NGO	++	++			

Note: +++ = high; ++ = middle; + = low; - = none (perceptional measurement).

The institutions that determines in formulating and implementing the spatial policy of the Ministry of Environment and Forestry (KLHK), are Perum Perhutani, Bogor Regency Bappeda and the Office of Spatial Planning and Land. Whereas those who play a role in the watershed management program are Watershed Management Centers, District, and Provincial Governments. KLHK is only a compiler of regulations, supervision, input, and guidance related to forest protected areas. Regarding the BPDAS as the representative of the Ministry of Environment and Forestry at the UPT level, it is still in the role of Tupoksi not yet able to coordinate and integrate upstream-downstream watershed into regional spatial plans that are limited by administrative boundaries.

Bappeda has a role in coordinating all SKPDs in the division of roles of each SKPD especially in spatial planning so that there is no overlap between SKPD activities. Non-governmental organizations (NGOs) also play a role in supervising the protection function in the Cisadane Hulu watershed. In addition to acting as a team of experts, academics also play a number of strategic actions in controlling and overseeing the functions of strategic life scoping studies. The selection criteria that are important in the decision-making process are the need for interrelation and interdependence between various parties in planning, formulating and controlling the use of protected area space. This

statement shows that we must equate understanding of knowledge about protected areas so that policies on the institutional layout of protected areas can be mutually agreed upon.

In the implementation of development in the era of regional autonomy, regional government policies are based on Law Number 23 of 2014 concerning regional governance, that each region has the authority to manage natural resources in its area. Based on this, Bogor Regency made arrangements for protected area management in the Bogor Regency Spatial Plan, which was stipulated based on Regional Regulation No. 11 of 2016 concerning the Bogor Regency Spatial Planning. The policy of spatial planning in the regions is very much determined by the decisions of the regional leaders. In the era of regional autonomy, the provincial government should act as a leader to coordinate all institutions in their area to jointly develop a spatial structure in a watershed. Provincial Bappeda has an important role in encouraging the active role of district or city governments in one watershed to develop spatial planning. As a reference, there are two central institutions in the area that can be used as resource persons, namely the Center for Watershed Management (BPDAS) and the Center for Management of Water Resources (BPSDA). The Regency Parliament has not shown its active role. Other participants (academics, NGOs, community leaders) even though they have been involved in the preparation of the RTRW for participation and the role of their control in policy implementation have not been seen. In fact, the supervision and control of protected areas in the regions are very much determined by the decisions of regional leaders. In Bogor Regency, the most important role in space control is the licensing service (DPMTSP), followed by the Office of Spatial Planning and Land.

The central government's preference is focused on one strategy as a regulator of regulation, supervision, input, and guidance related to the use of forest area in the watershed. Meanwhile, the Bogor Regency Government is divided into three groups, namely the Regional Government as the compiler and compiler of regulations, planners (2,5,6), beneficiaries (8,9), supervision (6) and control (6,7) of protected areas Those who want to correct problems related to the assignment of authority. Because the highest decision-making authority in Bogor Regency is with the Bupati, the preference of the first group dominates. The results of the Main tasks and functions analysis indicate a vacuum of authority and responsibility in several aspects of protected area management. The vacuum of authority and responsibility of the UPT of the central government and the Regional Government, namely in the management of non-forest protected areas, prone to natural disasters and management of local protected areas.

Patterns of interaction and outcomes. The incompatibility of land use in protected areas is evidence of violations of the Bogor Regency RTRW and the Decree of the Minister of Forestry shows weak coordination at the level of implementation and supervision of regulations. Programs and activities that are oriented towards achieving common goals in sustainable watershed management have never been done. The government has formed a forum for realizing coordination between actors in watershed management, namely the Cisadane Watershed Forum. Bogor Regency developed a plan (PRJP, RPJM, and RKP) through a coordination forum through Development Plan Deliberation. The implementation of the Bogor Regency Musrenbang is guided by Law Number 25 of 2004 concerning the National Development Planning System.

The implementation of the Musrenbang was carried out by the Head of the Bogor District Bappeda to prepare the RPJPD and RPJMD followed by government elements and community involvement while in the preparation of the RKPD only elements of the government (SKPD and DPRD of Bogor Regency) were followed. Based on the results of interviews with several actors, it was stated that there had never been any involvement in the Development Plan Deliberation in the development of the Bogor Regency development plan. This condition caused the actor's interests not to be accommodated in the Bogor Regency development plan.

The Watershed Management Coordination Forum is a forum for coordination between watershed management agencies. The establishment of the Cisadane Watershed Coordination Management Forum was guided by Government Regulation Number 37 of

2012 concerning Watershed Management and Forestry Ministerial Regulation Number 61 of 2013 concerning Watershed Management Coordination Forum. In Bogor Regency, there is the management of the Cisadane Watershed Care Forum which consists of elements of government and society (farmer groups). However, until now the Cisadane Watershed Care Forum in Bogor Regency does not yet have a work program because it has not yet received a budget even though in Minister of Forestry Regulation Number 61/2013 it is explained that funding of this forum comes from the APBN, APBD or non-binding grants.

The results of interviews and observations on the ground that the approach taken by the central government to local governments is still more likely to be approached with a structural approach strategy (highly dependent on regulatory instruments) and physical (infrastructure approach, forest, and land rehabilitation, and sectoral implementation of activities). In contrast, approaches to developing shared understanding, disseminating knowledge and building mutual trust, coordination and cooperation are rarely done. On the other hand, in addition to the issue of conflict of interest, the Regional Government is not fully aware of all SKPDs understanding the boundaries, criteria, and benefits of protected areas for the management of watershed sustainability.

The RTRW as the basis for the use of space and its control has not explained how local governments can resolve spatial violations. The mismatch of land use against the RTRW that occurred was resolved by bleaching there should be no changes to the spatial plan. Policies, programs, and activities of institutions, both local and central government, should be in line with the RTRW. The commitment to realize the preservation of ecological functions by allocating protected areas 45% of the total area of Bogor Regency should be upheld. Determination of non-forest protected areas that are controlled by individuals or groups should be compensated for establishing protected functions as a public function. Space utilization permits that have already occurred after the spatial designation have not been canceled and have not been compensated by the local government. There are no criteria for watershed ecosystem areas as a basis for controlling the negative impacts shared by all sectors and as a basis for coordinating the administrative boundaries of districts/cities and provinces related to the control of carrying capacity and environmental conservation.

In regard to the space utilization permits as a control instrument for spatial use this is done through coordination of space compliance by the local government through the regional spatial planning coordination team (TKPRD) stipulated by the Bupati not to be further regulated. The TKPRD's duties should not only be limited to regulation, guidance, implementation, and supervision but also as a forum for mediation in the settlement of existing and future spatial utilization conflicts. There is a need to strengthen the TPKRD team by involving elements of civil society, a framework including an inventory of violations of spatial planning, typology, and direction of completion, decision-making mechanisms, providers of information to the public and funding sources. The layout that has been made by the macro-provincial Bappeda has not yet been detailed by making a micro-spatial structure within a particular watershed.

Conclusions. Problems that occur in watershed management are related to the institutional use of the watershed protected area. The problem of institutional use of space has emerged from biophysical conditions, community attributes, and rules used. This situation of action combined with the characteristics of participants creates a pattern of interaction that is not synergistic due to lack of good coordination between actors, overlapping areas, detailed plans for unresolved spatial planning, licenses that are not transparent, inconsistencies in spatial use, bleaching of violations, and incentive systems it becomes a problem for the regional government that must be addressed. Containing coordination such as the watershed forum is not used as a coordination forum. Regional development plans should be integrated with spatial plans and activities in the watershed unit. The involvement of all actors in the DAS Forum and in the Musrenbang was able to create interactions to synergize programs between actors and establish mechanisms for the provision of incentives and disincentives as outlined in the Bogor Regency development plan. Local governments tend to still prioritize spaces for economic activities

even though they have allocated 45% of protected areas. Local governments still consider that the authority to manage protected areas is that the central government, including responsibility for watershed management, is the authority of BPDAS and BBWS. Whereas there is an allocation of non-forest protected areas where there are no institutions that have the authority to manage. The implementation of the allocation of non-forest protected areas has not been considered the policy of how compensation/ incentives are given to landowners.

The central government tends to rely heavily on structural approaches and physical activities to complete watershed management. Conversely, strategic steps such as coordination, dissemination of knowledge, communication and role sharing are rarely carried out. Coordination carried out is still administrative in nature and the output of activities is not yet in outcomes how to jointly manage watershed protected areas for sustainable watershed management. Different preferences in understanding and utilizing protected areas are obstacles in coordinating and cooperating. The regional government in allocating protected areas is still limited to the RTRW policy, this is proven in the field, there are still problems with space utilization violations.

In addition, reluctance to cooperate is also caused by conflicts of interest. Based on this research, the suggestions proposed are: (1) local governments need to change the way of thinking that the involvement of actors in the preparation of the RTRW is not only at the level of formulation and planning but how actors participate in spatial supervision and control, especially in watershed protection areas. The concept of a watershed utilization plan must be internalized throughout the watershed area because it needs coordination and synchronization of spatial use. forestry, and; (2) the central government needs to improve socialization and communication about the protection function of the watershed hydrological function to regional leaders in a watershed. To realize this implementation of the tasks, it is recommended that the Ministry of Environment and Forestry take action to enhance cooperation with the Ministry of Agrarian and Spatial Planning, the River Basin Office, the Ministry of Agriculture and the Ministry of Energy and Mineral Resources, the Corruption Eradication Commission and the local government of Bogor Regency and other Regencies located in the upstream and downstream parts of the Cisadane watershed.

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