STAKEHOLDERS' PERCEPTION ON MANAGEMENT OF UPSTREAM CILIWUNG WATERSHED: IMPLICATIONS FOR FOREST LANDSCAPE PLANNING

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STAKEHOLDERS' PERCEPTION ON MANAGEMENT OF UPSTREAM CILIWUNG WATERSHED: IMPLICATIONS FOR FOREST LANDSCAPE PLANNING. Forests play a vital role for the livelihoods of rural and urban communities. Addressing perception of forest users regarding forest practices is one of the most important aspects of forest management. This paper aims to elaborate stakeholders' perception on the biophysical, socio-economic and institutional aspects of forest landscape management in upstream Ciliwung watershed. Data were collected through survey, by highlighting preferences, perceptions, and expectations of actors who are interested in the impacts of watershed management. This study indicates that communities at upstream Ciliwung watershed area perceived that the socio-economic aspect is the most important factor in managing upstream Ciliwung watershed. The governments (central and local), however, pay more attention to the biophysical and institutional aspects. The result of the overall perception analysis shows that institutional aspects need to be addressed first, followed by socio-economic aspects and biophysical aspects to improve the management of upstream Ciliwung watershed. Addressing institutional aspects is needed to enhance awareness and coordination among stakeholders, to enforce law and to develop a monitoring system to support the preservation of the forest at the upstream watershed areas. In terms of socio-economic aspects, improving community livelihoods is needed through payments for environmental services. Regarding biophysical aspects, afforestation and conservation of soil and water need to be prioritised. Thus, there should be programs that could provide solutions based on the three main aspects to improve the management of the forest resources in the upstream watershed area.

Keywords: Watershed management, stakeholder perception, community, institutions

PERSEPSI PARA PEMANGKU KEPENTINGAN TERKAIT PENGELOLAAN DAS CILIWUNG HULU: IMPLIKASI TERHADAP PERENCANAAN LANSEKAP HUTAN. Hutan memiliki peranan yang sangat penting baik bagi masyarakat pedesaan maupun perkotaan. Mengakomodir berbagai persepsi para pengguna hutan terhadap praktik-praktik pemanfaatan hutan merupakan salah satu aspek yang paling penting dalam pengelolaan hutan. Tulisan ini bertujuan untuk menguraikan bagaimana persepsi para pemangku kepentingan terhadap aspek biofisik, sosial ekonomi, dan kelembagaan dalam pengelolaan lansekap hutan di DAS Ciliwung hulu. Pengumpulan data dilakukan melalui survey dengan menggali preferensi, persepsi, dan harapan-harapan pihak-pihak yang memiliki kepentingan dan juga yang terkena dampak dalam pengelolaan DAS Ciliwung hulu. Hasil studi menunjukkan bahwa menurut masyarakat DAS Ciliwung hulu aspek sosial ekonomi adalah faktor yang paling penting dalam mengelola hulu DAS Ciliwung. Di sisi lain, pemerintah baik pusat maupun daerah memiliki persepsi bahwa aspek biofisik dan kelembagaan yang lebih utama. Namun demikian, berdasarkan hasil analisis secara keseluruhan menunjukkan bahwa aspek kelembagaan merupakan prioritas utama yang harus dibenahi, diikuti oleh aspek sosial ekonomi dan aspek biofisik dalam memperbaiki pengelolaan DAS Ciliwung hulu. Upaya mengatasi aspek kelembagaan sangat diperlukan untuk meningkatkan kesadaran dan koordinasi antar pemangku kepentingan, menegakkan hukum, dan mengembangkan sistem pemantauan dalam upaya pelestarian hutan di wilayah hulu DAS. Dari aspek sosial ekonomi, upaya peningkatan mata pencaharian masyarakat di daerah hulu DAS Ciliwung sangat diperlukan melalui pembayaran jasa lingkungan. Sementara itu terkait dengan aspek biofisik, kegiatan penghijauan dan konservasi tanah dan air di DAS Ciliwung hulu perlu diprioritaskan. Dengan demikian diperlukan

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program yang dapat memberikan solusi berdasarkan tiga aspek utama untuk meningkatkan pengelolaan sumberdaya hutan di daerah DAS Ciliwung hulu.

Kata kunci: Pengelolaan DAS, persepsi para pemangku kepentingan, masyarakat, kelembagaan

I. INTRODUCTION

The potential losses of forests and water resources are serious issues worldwide, and it becomes more crucial with limited understanding of the processes that lead to improvements in or deterioration of natural resources (Ostrom, 2009). The implementation of natural resource utilisation will affect land uses (Asdak, 2010). Therefore, land use planning is very important as a key instrument on sustainable development (Bourgoin, 2012). Asdak (2010) stated that the impacts of interaction between human and natural resources are beyond political boundaries. For example, flooding caused by activities of humans at the upstream watershed area, that are not managed according to conservation principles, would inundate the downstream region disregarding political or administrative boundaries. It means that a good resource management conducted by a party cannot be always considered as a good practice by others (Iqbal, 2007; Race & Millar, 2008). This is because the disruption of a component of the natural system will influence other components. Therefore, a good natural resource management needs to consider ecological, social and economic factors (Asdak, 2010). Ecological, social and economic factors have been influencing public perception on forest management in the upstream watershed in a different way (Stojanovska, Blazevska, Stojanovski, & Nedanovska, 2012).

Unintegrated forest-driven water into regional and national decision making on land use and water management will constrain humanity's ability to protect our life-sustaining functions (Ellison et al., 2017). Furthermore, Ellison et al. (2017) stated that forests and trees must be recognized as prime regulator within the water cycles. It indicates that forest management at the upstream watershed is an important part for regulating water flow throughout the watershed area and the reduction of forest cover will affect the process of rainfall infiltration and subsequent groundwater recharge (Krupnik & Jenkins, 2006). Furthermore, Krupik and Jenkins (2006) stated that the decrease of forest cover causes the increase of surface flow (runoff) during the rainy season. Despite an increase in annual runoff, the lack of ground water recharge can result in significantly reduced dry season flows (Gene, Lickens, Boorman, Johnson, & Pierce, 1970). Thus, it shows that forest management in the upstream areas has an important role in supporting the life of people at downstream areas, where they highly depend on the sufficiency of clean water from the upstream area. To manage the forests effectively without ignoring the rules of environmental protection, it is very important to know the involvement of local forest users and other stakeholders and to consider their perceptions on forest management (Stojanovska et al., 2012). So that, the manager will be aware of the most influential stakeholders and set the strategy for stakeholder's management in the future (Aragones-Beltran, Garcia-Melon, & Montesinoe-Valera, 2017). However, changes for the better cannot occur without significant changes in human behaviour and perceptions (Voinov et al., 2016).

According to Allen et al. (2009) besides behaviour, values and beliefs are critical component of the human dimension of natural resources management and they must be considered in the planning processes. Meanwhile, perception is one of three basic dimensions that help explain stakeholders' behaviour (Herman & Thissen, 2009). Robbin and Stephen (2003) stated that stakeholders'

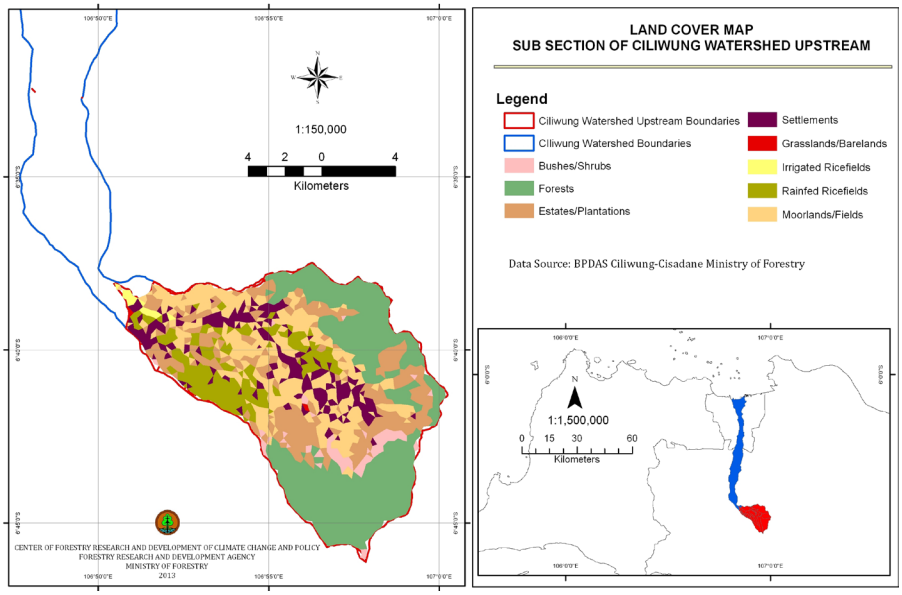

Figure 1. Land cover of upstream Ciliwung Watershed

perception of a resource utilisation is a basic problem in forest management. This is because stakeholders' perceptions or responses have an important role in creating policies and plans to achieve sustainable forest management. The management of forest resources has always been important to many aspects of human life (Stojanovska et al., 2012). Meo et al. (2011) stated that management of natural resources often creates conflict of interests among various parties because they use the same resources for different purposes. It also raises new challenges because of the diverse characteristics, interests and goals of the different stakeholders involved (Kazadi, Lievens, & Mahr, 2016). Stojanovska et al. (2012) also suggested that the diversity of ecological, social and economical factors may lead to the varieties of stakeholders' perceptions throughout the world.

Thus, it is very important to know different perspectives of resource management - especially in the upstream Ciliwung watershed - based on the perceptions of the actors. The upstream area of Ciliwung watershed has been chosen as the case study because it constitutes one of the critical watersheds in Indonesia and is prioritised by the Ministry of Forestry, currently named Ministry of Environment and Forestry, to be managed sustainably. The watershed plays an important role for the daily life of millions of people, especially the communities in the downstream area of Jakarta. As the country's capital city, Jakarta is the centre of national economy where the physical development tends to degrade the carrying capacity of the landscape. In addition, understanding the perceptions of stakeholders could help policy makers and forest planners in developing a better policy for natural resources at the national level (Meo et al., 2011).

This study aims to analyse and illustrate perceptions of community and government agency stakeholders related to the existing biophysical, socio-economic, and institutional conditions of forest management in the middle and upstream Ciliwung watershed. This research is expected to provide information related to how the stakeholders actually perceive and improve the forest management of upstream Ciliwung Watershed.

II. CHARACTERISTICS OF UPSTREAM CILIWUNG WATERSHED

Based on the data from the Ministry of Forestry (2013), total land area of Ciliwung Watershed was about 38,610 ha. It is reported

Table 1. The proportion of grant and activities program

No.	Local Government (District/City)	Grant (%)	Activities Program
1.	Bogor	9.88	Bioretention, biopori, controlling villas, absorption wells, dams
2.	Bogor (City)	12.34	Absorption wells, infrastructure
3.	Depok	15.99	'situ' repair, absorption wells
4.	Tangerang	9.26	Dock construction
5.	Tangerang (City)	12.61	Drainage improvements, construction of roads and bridges
6.	Tangerang Selatan (City)	12.04	Drainage improvements, roads, absorption wells
7.	Bekasi	11.59	Repair of roads and bridges
8.	Bekasi (City)	8.20	Road repair and building levee
9.	Cianjur	8.09	Reforestation, dams, absorption wells

Table 1 shows that almost 100% of the funds are distributed to the districts/cities for the physical rehabilitation and only small portions were allocated for planting at the upstream (Cianjur District).

that 50.35% of that area (19,441 ha) has been allocated for settlement and 45% (17,325 ha) are covered by vegetation. From the total of the vegetated areas, only 9.5% are considered as forest, while the rest is dominated by farming crops.

At the upstream watershed, the forest cover can now only be found in protection forests and it tends to degrade further because the forests have been converted into settlements and plantations. The land use changes at the upstream Ciliwung Watershed have happened since 1981 either in legal or illegal ways (Suwarno et al., 2011). Responding to this situation, several attempts have been conducted such as issuing of the Presidential Decree No. 114 of 1999, followed up by Presidential Regulation No. 54 of 2008 on the management of land use of Jakarta, Bogor, Depok, Tangerang, Bekasi, Puncak and Cianjur. Furthermore, upstream Ciliwung Watershed has been included as a national strategic area. However, those efforts have not significantly improved the watershed conditions due to internal problem of the government, poor coordination, and strong vested interests (Suwarno et al., 2011). Figure 1 shows that the upstream watershed has been dominated by settlements, plantations and agriculture land.

Suwarno, et al. (2011) stated that the problems in the Ciliwung Watershed, which caused flooding in Jakarta every year, are resulted from the accumulation of socio-economic and institutional problems. In socio-economic aspects, human resource competencies, population density and the level of community's welfare are the main problems. The next is institutional problems. There is a lack of institutional capacity, lack of coordination among stakeholders that makes less integrated programs, lack of control and law enforcement functions, and spatial planning implementation is not appropriate. Furthermore, the Watershed Management Office (BPDAS) stated that the biophysical problems that occur in upper Ciliwung Watershed management are the impact of socio-economic and institution that have not been resolved.

Related to the improvement of Ciliwung Watershed management, in addition to the action plan, there are also already a cooperation between the government of Jakarta Province with the nine districts/cities surrounding Ciliwung Watershed comprising Bogor Regency, Bogor City, Depok City, Tangerang City, Tangerang Regency, South Tangerang Regency, Bekasi City, Bekasi Regency, and Cianjur Regency. This cooperation has been running since 2012 with a grant from Jakarta Provincial Government. The grant mechanism

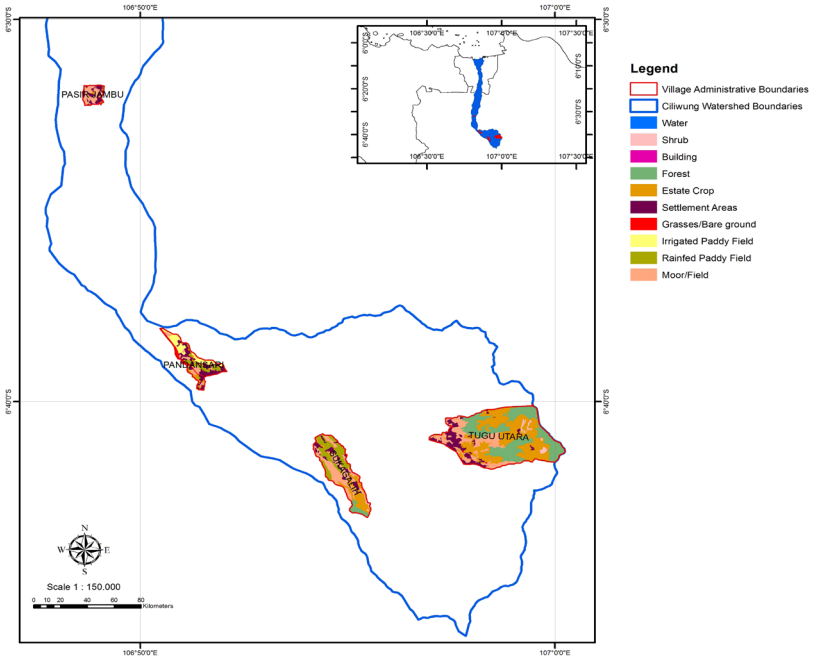

Figure 2. Map showing the study sites

is legalised through the Jakarta Governor Decree No. 127/2011 and No 62/2012 about Procedures for Grant, Social Assistance and Financial Aid from the Local Budget. In 2013, Jakarta Provincial Government has expended a grant of IDR 45 billion, allocated to repair the Ciliwung Watershed through some program activities as shown in Table 1.

II. MATERIAL AND METHOD

A. Selection of Research Area

This study has been carried out in four villages along Ciliwung Upstream, i.e. the village of Tugu Utara, Suka Galih, Pandansari and Pasir Jambu that are located in the middle and upstream of Ciliwung Watershed areas (Figure 2). These villages were chosen as the location of the study cases representing topographical variations of major land uses including smallholders' agriculture, plantations and settlements.

The communities of upstream Ciliwung watershed have agriculture practised for generations to support their lives . Respondents consisted of 60% male and 40% female with ages ranging between 20 and 55 years. The educational background of the respondents were 43% primary high school, 26% junior high school, 23% senior high school and 7% colleges. Meanwhile, the sources of livelihood of the communities were: farmers 51%, guards of villas 35%, and the remaining as employees and entrepreneurs. The farming system was supported by the fertile soil and good climatic conditions that made crops, such as vegetables, grow well. In addition, the availability of road and marketing network has encouraged people in the watershed upstream region to do agricultural activities.

B. Methods of Data Collection

Primary and secondary data were collected from April to December 2013. Primary data were gathered through interviews of key persons to provide a deeper analysis related to stakeholders' perception on upstream Ciliwung Watershed management. Open-ended and closed-questions were employed to highlight the preferences, perceptions, awareness, and expectations of stakeholders towards upstream Ciliwung Watershed management and general impacts of ongoing management of the watershed area. The open-ended questions were

Table 2. The governmental institutions

Governmental Institutions	Category of Agency
Watershed Management Office of Citarum-Ciliwung (Balai Pengelolaan Daerah Aliran Sungai/BPDAS Citarum-Ciliwung)	Central
River Management Authority of Ciliwung-Cisadane (Balai Besar Wilayah Sungai/ BBWS Ciliwung-Cisadane)	Central
Water Resources Managemant Office (Balai Pengelolaan Sumberdaya Air)	Local
Agriculture and Forestry Service of Bogor District (Dinas Pertanian dan Kehutanan Kabupaten Bogor	Local
Regional Development Planning Agency of Bogor District (Bappeda Kabupaten Bogor)	Local
Environmental Management Agency of Bogor District (Balai Lingkungan Hidup Daerah Kabupaten Bogor	Local
Environmental Management Agency of Bogor City (Balai Lingkungan Hidup Daerah Kota Bogor	Local
Bureau of Government Administration of Jakarta Province (Biro Tata Pemerintah DKI Jakarta	Regional
Regional Development Planning Agency of Jakarta (Bappeda Jakarta)	Regional
Buiding Management Office of Bogor Dictrict (Dinas Tata Bangunan Kabupaten Bogor)	Local
Sub-District Governments of Cisarua (Kecamatan Cisarua)	Local
Sub-District Governments of Megamendung (Kecamatan Megamendung)	Local
Sub-District Governments of Ciawi (Kecamatan Ciawi)	Local
Sub-District Governments of Pasir Jambu (Kecamatan Pasir Jambu)	Local
Tugu Utara Village (Desa Tugu Utara)	Local
Sukagalih Village (Desa Sukagalih)	Local
Pandansari Village (Desa Pandansari)	Local
Pasir Jambu Village (Desa Pasir Jambu)	Local

designed to allow respondents to expand their responses about current management practices in the upper Ciliwung Watershed. In addition, the closed questions were designed to explore the stakeholders' perceptions on the benefits of the watershed. Questions were designed to guide respondents in providing assessment for the existing watershed management based on three aspects namely: biophysical, socio-economic, and institutional. An overview of the current watershed conditions was obtained from the results of the field observations and opinions of the respondents who stated their perception using the previous open-ended questionnaires.

Stakeholder analysis was used in this study to determine stakeholders' involvement in the management of upstream Ciliwung Watershed. Stakeholder can be defined as individual, groups and organizations who are affected by or can affect those parts of policies, programs, and development activities (Bryson, 2003, 2004; Reed et al., 2009). Meanwhile, stakeholder analysis, according to Reed et al. (2009), is a process that defines social and natural phenomenon aspects affected by a decision or action; identifies individuals, groups and organisations who are affected by or can affect those parts of the phenomenon; and prioritises these individuals and groups for involvement in the decision-making process.

Identifying stakeholders is the first step in stakeholder analysis. Identifying stakeholders is an important part in this process to understand their interests and relationships. In this study the main stakeholders are: (1) government; and

Table 3. Criteria of biophysical, socio-economic, and institutional aspects in the management of upstream Ciliwung Watershed

Aspects	Criteria
Biophysical	1. Changes in land uses that do not comply with conservation principles
	2. Poor condition of the upstream causes flooding in the downstream
	3. Farming practices at the upstream areas do not comply with the principles of land conservation
	4. Garbage or wastes are not managed properly
	5. Poor condition of the upstream causes high sedimentation along the rivers
	6. Lack of development of dams and canals at the downstream areas; those are not well implemented
	7. Poor drainage system from upstream to downstream
	8. Soil and water conservation needs to be improved
	9. Tree planting activities need to be improved
Socio-Economic	1. Lack of involvement of local communities in the management of forest at the upstream area
	2. Population growth resulting in a pressure on forests
	3. Communities education level are still low
	4. Rehabilitation activities haven't considered the economic interest of the community
	5. Agricultural activities are significant in improving community's economy
	6. Need to empower communities through household economic development programs
	7. Local people's economic condition is low
	8. Incentive mechanism from downstream to upstream is needed
Institutional	1. All activities in the upper watershed management have been efficiently and effectively implemented
	2. The development of downstream area does not consider the environmental sustainability
	3. Poor coordination among stakeholders in the upstream watershed management
	4. Forest management program in the upstream Ciliwung is not focused
	5. The implementation of spatial planning is still poor
	6. The participation level of stakeholders in the management of upper Ciliwung is still low
	7. Controlling system and law enforcement of land use management is still weak
	8. The competency of human resources in managing upper watershed needs to be improved
	9. Training to improve local communities' capacities are needed
	10. Awareness raising activities to the community needs to be enhanced

(2) communities who live in the surrounding of Ciliwung upstream watershed. Other stakeholders are not considered as the main stakeholders since the focus of this study is on the impacts of policies on the communities. The government is a policy maker in the management of upstream Ciliwung watershed, while the communities are the stakeholders that are directly affected by and providing feedbacks on the policies associated with the management of the upstream watershed.

The respondents were selected through purposive sampling. In total, 54 key persons were selected covering 27 respondents from 19 governmental institutions and 27 community respondents -due to resource constraints- from 4 villages surrounding the watershed. The people as community respondents of the four villages were chosen due to their involvement in forest management in the upstream area of Ciliwung watershed. Meanwhile, the governmental institutions were chosen because they constitute

Table 4. Perception of local communities' on biophysical aspects

Criteria	Value (%)
Tree planting activities need to be improved	89
Soil and water conservation needs to be improved	85
Poor drainage system from upstream to downstream	78
Lack of dams and channels development at the downstream areas; those are not well implemented	71
Poor condition of the upstream causes high sedimentation along the rivers	70
Garbage or wastes are not properly managed	70
Farming practices at the upstream areas do not comply with the principles of land conservation	69
Poor condition of the upstream causes flooding in the downstream	66
Changes in land uses that do not comply with conservation principles	51

the relevant agencies who involved in the development of upstream Ciliwung watershed. The level of organization of stakeholders is very important to be identified because it helps explain which mechanisms are more dominant (Zavyalova, Pfarrer, Reger, & Hubbard, 2016). The governmental institutions are listed in Table 2.

The level of stakeholders' perceptions is measured by criteria related to biophysical, socio-economic, and institutional aspects using a Likert Scale (Table 3). The criteria were derived from (Stojanovska et al., 2012) who state that environmental, institutional, and social economic factors have been influencing public in a different way resulting with a permanent change on the public perception through the time. Furthermore, Stojanovska et al. (2012) say that the criteria are very important to be aware and take it into account to manage forests in accordance with the society needs and to have efficient forest policy and legislation. Meanwhile, the scale is one of the research instruments to measure opinion, perception, or attitude related to an object (Boone & Boone, 2012; Martono, 2015). Rating for each question within each aspect was asked. The rating used was: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The value of respondent perception was obtained using the following formula: Index (%) = Total score/Y x 100, where: Total score is the sum of all respondents scores and Y is the highest score times number of respondents (Kiswari, Fathoni, & Minarsih, 2016). The value of index shows the prioritised criterion perceived by stakeholders. The higher the value the more prioritised is the criterion to be addressed.

In analysing the data, the perception of communities and government are separated. Tabulation and weighting are conducted for each criterion to produce a set of priority in managing upper Ciliwung Watershed. The results of weighting are then described using bar charts. To produce a total perception among respondents, the perception values of communities and government s are averaged. Lastly, a model of decision-making process was developed to aid government in determining steps for managing upstream Ciliwung Watershed.

III. RESULT AND DISCUSSION

A. Local Communities' Perception on Biophysical, Economic and Institutional Aspects

Data from open-ended interviews show that communities in the upper Ciliwung Watershed perceived that the biophysical conditions are poor due to land use changes such as the emergence of the construction of villas on the site and unsustainable farming, poor drainage, and improper management of wastes. It was

Table 5. Perception of local communities of socio-economic aspects

Criteria	Value (%)
Incentive mechanism from downstream to upstream is needed	89
Local people's economic condition is low	87
Need to empower communities through economic development programs of households	82
Agricultural activities are more significant in improving communities's economy	80
Rehabilitation activities haven't considered the economic interests of the communities	77
Communities education level are still low	76
Population growth resulting in a pressure on forests	75
Lack of involvement of local communities in the management of forest at the upstream area	69

Table 6. Perception of local communities of institutional aspects

Criteria	Value (%)
Awareness raising activities to the communities needs to be enhanced	85
Training to improve local communities' capacities are needed	85
The competency of human resources in managing upper watershed needs to be improved	84
Controlling system and law enforcement of land use management is still weak	82
The participation level of stakeholders in the management of upper Ciliwung is still low	80
The implementation of spatial planning is still poor	80
Forest management program in the upstream Ciliwung is not focused	78
Poor coordination among stakeholders in the upstream watershed management	78
The development of downstream area does not consider the environmental sustainability	76
All activities in the upper watershed management have been efficiently and effectively implemented	61

caused partly by the prevailing conditions where about 80% of communities' land has been sold to people from outside the villages. With only 20% of land ownership communities have no free choice to manage the land, because it's only enough to be used for their residence even sometimes without a yard.

From the closed-questionnaires it can be found that the local people want to plant trees or grow crops, but the new owners of that land prefer to build a villa. Although they tend to ignore the existing environmental conditions, which are no longer in accordance with its function, because of their limited access to the land and economic pressures, they realise that land rehabilitation through replanting program is needed to conserve soil and water resources. Table 4 describes the perceptions of local communities on the current situation of the biophysical aspects. In general, the perception reflects communities' awareness and willingness to sustainably manage the watershed area.

The perception of local communities on the biophysical aspects of the watershed is echoed by their perception on the socio-economic conditions as illustrated by Table 5. In Table 5, communities perceived that their welfare need to be improved, indicated by more than 75% of communities' perception encourage the increase of communities' welfare. From the survey, about 63% of communities only have 0 – 250 m^2 of land area. That piece of land is usually used for housing and farming. A household may consist of four to eight members with an average monthly income of Rp1,100,000. In addition, based on the educational level, most

communities (43%) only attended primary school, 26% graduated from junior high school, 23% graduated from senior high school, and only 7% attended university (BPS, 2012). Thus, empowering communities through household economic development programs is needed. Furthermore, applying incentive mechanism from downstream to upstream, as a form of compensation for forest conservation would also help the programs. There are two main sources of income for respondents in that region: (1) farming; and (2) taking care of holiday villas. Farming crops and taking care of villas can provide an average income from Rp 400,000 to Rp 1,000,000 per month. Thus, the land use change in the upstream is not their concern as long as they earn enough money from the two substituting activities. For them, the reduction of income from farming could be compensated by income from maintaining villas.

On the institutional aspects, the communities strongly agree with the statement that the institutional arrangement of watershed management is still poor, indicated by a score that is more than 75%. Table 6 shows a strong agreement of the communities on the poor institutional arrangements of watershed management. Local communities felt that it is important to improve the capacity of local communities through training to develop their competency. It is inline with Evans et al. (2010) who said that the local communities need to develop skills to achieve their goals. They also felt that coordination and cooperation among stakeholders in the management of upper Ciliwung Watershed is still poor and the law enforcement is still low. Meanwhile the coordination and cooperation is very important to solve the problems that can bring changes to the management in the future (Aurenhammer, 2016).

B. Perceptions of Governments on Biophysical, Economic and Institutional Aspects

According to Stojanovska et al. (2012), in the long run the sustainability of forests can determine the viability of watershed, society, and economy. To achieve the sustainability, it is necessary to build an integrated collaboration among government agencies. Perception of various government agencies is one of the fundamental factors to be able to develop a better management plan and it is important to understand the formal and informal interests of stakeholders to evaluate the implementation of regulations (Nurrochmat, Dharmawan, Obidzinski, Dermawan, & Erbaugh, 2016). The perceptions of government on the current situation of biophysical aspects of Ciliwung Watershed are illustrated in Table 7.

According to the government's perception on Table 7, tree planting and conservation of

Table 7. Perception of Government officials on biophysical aspects

Criteria	Value (%)
Tree planting activities need to be improved	91
Soil and water conservation needs to be improved	89
Poor drainage system from upstream to downstream	75
Poor condition of the upstream causes high sedimentation along the rivers	74
Garbage or wastes are not properly managed	74
Changes in land uses that do not comply with conservation principles	72
Poor condition of the upstream causes flooding in the downstream	69
Farming practices at the upstream areas do not comply with the principles of land conservation	68
Lack of dams and channels development at the downstream areas; those are not well implemented	65

Table 8. Perception of Government officials on socio-economic aspects

Criteria	Value (%)
Need to empower communities through economic development programs of the households	82
Incentive mechanism from downstream to upstream is needed	78
Population growth resulting in a pressure on forests	74
Local people's economic condition is low	74
Agricultural activities are more significant in improving the economy of the communities	74
Communities education level are still low	72
Rehabilitation activities haven't considered the economic interests of the communities	68
Lack of involvement of local communities in the management of forest at the upstream area	62

soil and water were two major programs that should be prioritised in the management of upstream Ciliwung Watershed. The programs have been, actually, tried to be accommodated by the Ministry of Forestry through Watershed Management Agency (BPDAS) of Citarum-Ciliwung and the Ministry of Public Work through Balai Besar Wilayah Sungai (BBWS) Ciliwung-Cisadane. The BPDAS has developed a Management Action Plan of Ciliwung Watershed program covering an area of 370.8 km^2 from upstream to downstream. This action plan also covers some activities such as addressing the key issues that are very influential in the Ciliwung Watershed management, formulating action strategies that are rational, effective, efficient and implementable, and determining priorities and strategic actions of management activities based on time, location, cost and the role of parties.

There are two major programs that will be implemented by BPDAS in order to improve the biophysical conditions of Ciliwung Watershed namely: (1) vegetative action (i.e.: tree planting activities in the upstream of the watershed); and (2) civil engineering (i.e.: development of bio-retention, gully plug, dam, and water infiltration). These activities were targeted to be implemented from 2012 to 2016 at an estimated cost of about Rp 352 billion. Likewise, BBWS Ciliwung-Cisadane has also devised strategies and action plan that are documented in the Ciliwung- Cisadane Water Resources Management Pattern. This program has been implemented in the period 2012 to 2017. The programs of biophysical activities are river normalisation, dam and 'setu' revitalisation, construction of infiltration wells, and one of the great plans that will be executed from 2014 to 2017 is the construction of Ciawi Reservoir in Gadog Village, Bogor with a budget of Rp3.9 trillion. This study finds that the implementation of the program is usually slow due to bureaucratic and administrative compliances. This makes that program is not optimally implemented.

The government officers' perception on the socio-economic conditions as shown in Table 8 illustrates that the local government is still concerned with the socio-economic conditions of the communities, indicated by the highest score of 82%. One of the socio-economic programs has been led by the Agriculture and Forestry Office Bogor Regency through providing livestock such as cows or goats to selected farmer groups at several sub-districts using a rolling system. The government also considers the need for an economic stimulus for the upstream communities. The stimulus will be an incentive for the people who conserve the forests. The government perceived that the population density and limited employment opportunities in the upper Ciliwung Watershed are still unresolved issues and must be addressed

Table 9. Perception of Government officials on institutional aspects

Criteria	Value (%)
Awareness raising activities to the community needs to be enhanced	82
Poor coordination among stakeholders in the upstream watershed management	80
Training to improve capacities of local communities is needed	78
Controlling system and law enforcement of land use management is still weak	78
The competency of human resources in managing upper watershed needs to be improved	77
The development of downstream area does not consider the environmental sustainability	74
The implementation of spatial planning is still poor	74
The participation level of stakeholders in the management of upper Ciliwung is still low	72
All activities in the upper watershed management have been efficiently and effectively implemented	69
Forest management program in the upstream Ciliwung is not focused	68

in the management of Ciliwung Watershed.

Hence, it means the government officials agreed that participation of the local communities is very important to protect and regenerate forests by rehabilitating the forests through replanting activities. They also agreed that forest protection is possible only when the socio-economic conditions of the villages are improved. From the institutional side as shown in Table 9 the relationships among stakeholders is still a fundamental problem in the management of Ciliwung Watershed. This is illustrated by government official's strong agreement (80%) on the statement. Thus, a good coordination between agencies in Ciliwung Watershed management has not been established yet, besides the lack of raising awareness of the communities (82%). Most of respondents think that it is very important to improve mutual relations and understanding among stakeholders. Some respondents also felt that the relations of the official government with the people have improved but it is still not satisfactory.

The perceptions of communities and government officials on the management of watershed are compared according to biophysical, socio-economic and institutional aspects as shown in Figure 3. According to communities, the socio-economic issues are the most influential factors that cause the degradation of upstream Ciliwung Watershed. The second issue is the institutional problems because they felt less involved in the rehabilitation activities carried out by the government. However, related to the biophysical issues, the communities are not concerned. This is in contrast with the perception of the government agencies, who perceived biophysical and institutional aspects as the main issues and the most important factors to be addressed and the socio-economic aspects as the last issue to be concerned. The differences reflect different in orientation, interests, and priorities for daily life. Their financial limitations lead communities to prioritise the fulfilment of their basic needs compared to addressing biophysical and institutional problems. On the other side, government officers usually have a better life and are responsible for the improvement of the watershed.

Thus, the communities want to improve the standard of living as a priority in the management of upstream Ciliwung watershed. On the other hand, the government considers that the biophysical and institutional conditions are the top priorities in the upstream watershed management that will lead to the improvement of socio-economic conditions. This is due to the differences of interests between communities

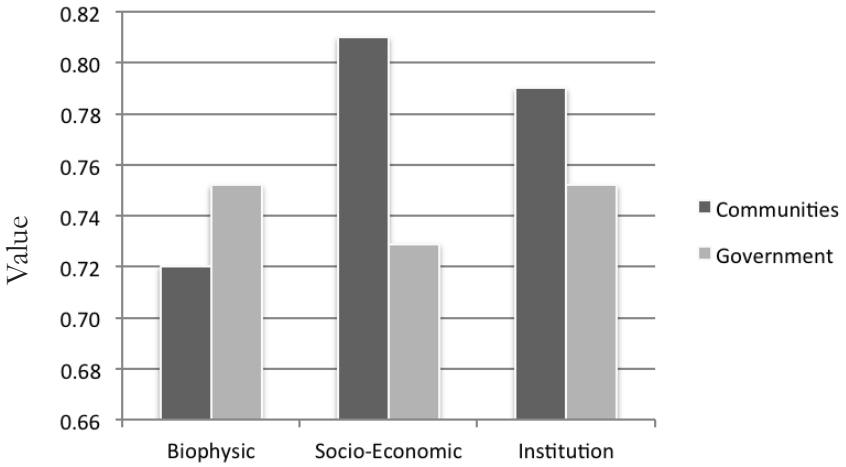

Figure 3. Stakeholders' perception on the biophysical, socio-economic, and institutional aspects of Ciliwung Watershed management

and government agencies in terms of priority of the factors that need to be addressed in the Ciliwung watershed management. The authorities of Ciliwung watershed need to compromise their differences, as the best solution, to set up the top priority. One alternative to compromise over the different priorities of each party is by doing reconciliation. It can be done by averaging the scores of the same criteria of the two parties (communities and government). Figure 3 shows how priorities can be established to compromise the differences between communities and governments' perceptions on the management of Ciliwung watershed.

Based on the discussions above, a model of decision-making process in the forest management of upper Ciliwung watershed can then be developed . A model can be developed to determine steps for decision making (Heyler, et al., 2016). In this research, the model was developed based on a compromise over differences of two parties. It is acknowledged that the successful management of the upstream watershed is not only influenced by the quality of the planning and implementation by the government, but also by the support of the surrounding communities which are the main stakeholders affected by any decision regarding the management of the watershed. Participation of communities in forest management in the implementation of a policy has increased over the last few decades (Hajjar & Kozak, 2015). Furthermore, Hajjar and Kozak (2015) stated that a trust between policy makers and communities is important to support forest management leading to a need for more trusted relationships prior to or while operationalizing new policies. A flow chart describing the decision-making process of watershed-based forest management is presented in Figure 4.

Figure 4 shows the process of decision making in the forest management of the upper Ciliwung watershed. Firstly, the main problem of the main priority in key success area should be determined. Determining these priorities is very important because it will lead to the direction of development and it is also the key to the success in management actions. Based on this study, the steps to determine the priorities in a watershed-based forest management comprise: (1) identify and categorise stakeholders, (2) develop a list of questions to explore perceptions of the management of each criteria consisting of institutional, socio-economic and biophysical aspects, (3) perform weightings of each of the questions in each criterion, (4) provide a rank for each criterion to determine the priority

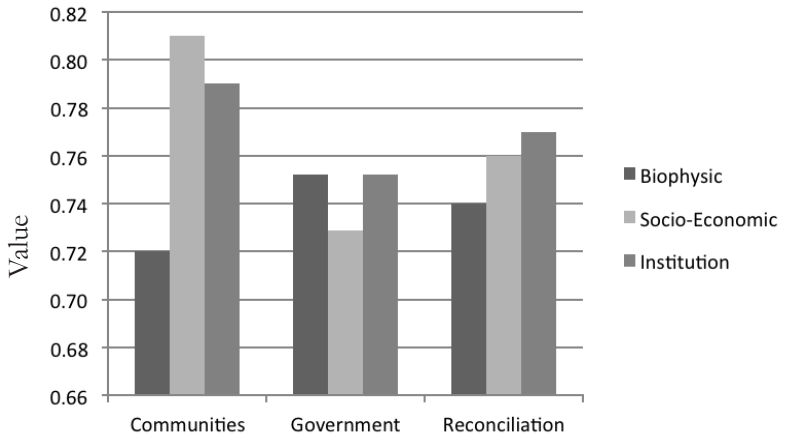

Figure 4. Proposed priorities to manage Ciliwung Watershed based on stakeholders' perceptions

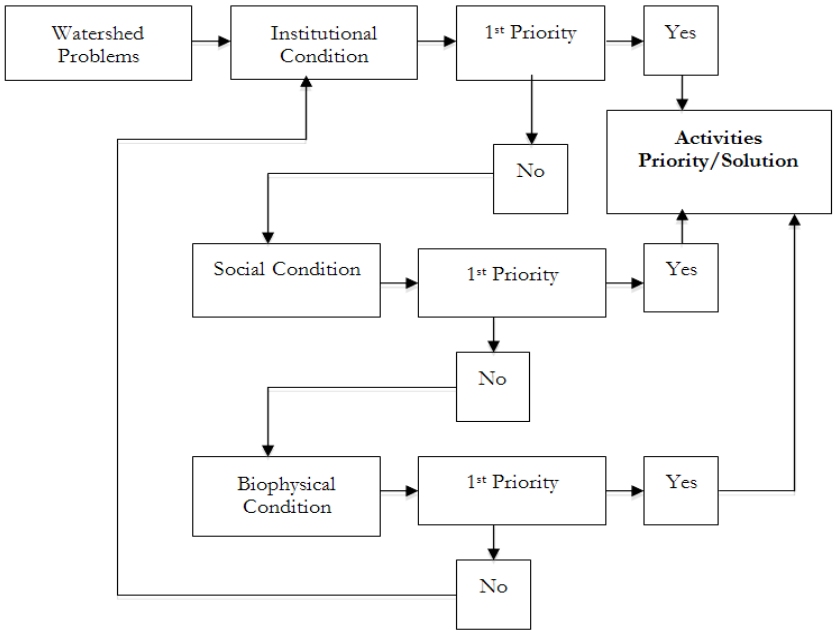

Figure 5. Procedures to make a decision based on the prioritised aspects of Ciliwung Watershed Management

in decision-making process, and (5) perform reconciliation or compromise as a solution to bridge the perception of each group of stakeholders.

IV. CONCLUSION

According to the analysis of stakeholders' perception on the management of upstream Ciliwung Watershed, the institutional aspect of the management is considered the most important aspect to be addressed. The features of institutional aspect that need to be prioritised include strategies for managing the watershed, awareness raising of communities, capacity building, law enforcement and monitoring land convertion activities. The second and third aspects to be addressed are socio-economic and biophysical aspects, respectively. Biophysical aspect becomes the last sequence of improving the management of Ciliwung Watershed because, in general, stakeholders agreed that biophysical problems (forests destruction in

the upstream Ciliwung Watershed) are usually resulted by institutional and socio-economic problems that have not been resolved. In relation to socio-economic aspect, communities are more focused on how to obtain income to meet their daily needs rather than how to conserve resources along the watershed.

Hence, there should be programs that could provide solutions based on the three main aspects (institution, socio-economy, and biophysical condition) to improve the management of forest resources in the upstream watershed area. The solutions can be implemented in the form of: (1) strengthening the institutional arrangement and building capacity of both government and community; (2) increasing the economic development of community by providing 'incentives' for the upstream communities conserving forest resources in upper Ciliwung Watershed; and (3) prioritising institutional arrangements in improving the management of upper Ciliwung Watershed.

REFERENCES

Allen, S.D., Wickwar, D.A., Clark, F.P., Dow, R.R., R.Potts, & Snyder, S.A. (2009). *Values, beliefs, and attitudes technical guide for forest service land and resource management, planning, and decision making general technical report PNW-GTR-788*. U.S. Department of Agriculture: Pacific Northwest Research Station.

Aragones-Beltran, P., Garcia-Melon, M., & Montesinoe-Valera, J. (2017). How to assess stakeholders' influence in project management? A proposal based on the Analytic Network Process International *Journal of Project Management. 35* (3),451-462 doi:10.1016/j.ijproman.2017.01.001.

Asdak, C. (2010). *Hidrologi dan pengelolaan daerah aliran sungai*. Yogyakarta: Gajah Mada University Press.

Boone, H. N., & Boone, D. A. (2012). Analyzing likert data. *Journal of Extension*, *50*(2), 22-30.

Bourgoin, J. (2012). Sharpening the understanding of socio-ecological landscapes in participatory land-use planning. A case study in Lao PDR. *Applied Geogtaphy*, *34*, 99-110.

Bryson, J. M. (2003). *What to do when stakeholders matter: A guide to stakeholder identification and analysis techniques*. Washington, D.C : Georgetown University Public Policy Institute.

Bryson, J. M. (2004). What to do when stakeholders matter. *Public Management Review*, *6*(1), 21--53.

Ellison, D., Morris, C.E., Locatelli, B., Sheil, D., Cohen, J., Murdiyarso, D., . . . Sullivan, C.A. (2017). Trees, forests and water: Cool insights for a hot world. *Global Environmental Change*, *43*, 51-61.

Evans, K., Jong, W. D., Cronkleton, P., & Nghi, T.H. (2010). Participatory methods for planning the future in forest communities. *Society and Natural Resources*, *23*, 604-619.

Gene, E., Lickens, F., Boorman, F., Johnson, N., & Pierce. (1970). Effects of forest cutting and herbicide treatment on nutrient budgets in the Hubbard Brook watershed-ecosystem. *Ecological Monographs*, *40*, 33-47.

Herman, L. M., & Thissen, W. A. H. (2009). Actor-actor analysis methods and their use for public policy analysists. *European Journal of Operational Research*, *196*, 808-818.

Iqbal, M. (2007). Analisis peran pemangku kepentingan dan implementasinya dalam pembangunan pertanian. *Jurnal Litbang Pertanian*, *26*(3), 1-11.

Kazadi, K., Lievens, A., & Mahr, D. (2016). Stakeholder co-creation during the innovation process: identifying capabilities for knowledge creation among multiple stakeholders. *Journal of Business Research*, *69*(2), 525-540.

Kementerian Kehutanan. (2013). Penyusunan Rencana Detil Penanganan Banjir di Wilayah Jabodetabekjur. *Laporan Penelitian* Balai Pengelolaan Daerah Aliran Sungai Citarum-Ciliwung.

Kiswari, Y., Fathoni, A., & Minarsih, M. M. (2016). Pengaruh kepuasan kerja, persepsi pegawai dan komitmen organisasi pegawai terhadap organizational citizenship behavior. *Journal of Management*, *2*(2), 1- 20

Krupnik, T. J., & Jenkins, M. W. (2006). *Linking farmer, forest and watershed: Agricultural systems and natural resources management along the upper Njoro River, Kenya*. Global, Area, & International Archive, University of California, Davis.

Martono, N. (2015). *Metode penelitian sosial: Konsep-*

konsep kunci. Jakarta: Rajagrafindo Persada.

Meo, I. D., Cantiani, M. G., Ferretti, F., & Paletto, A. (2011). Stakeholders' perception as support for forest landscape planning. *International Journal of Ecology*, *2011*, 685708, 1-8.

Nurrochmat, D.R., Dharmawan, A. H., Obidzinski, K., Dermawan, A., & Erbaugh, J. T. (2016). Contesting national and international forest regimes: Case of timber legality certification for community forests in Central Java, Indonesia. *Forest Policy and Economics*, *68*, 54-64.

Ostrom, E. (2009). A general framework for analyzing sustainability of Social-Ecological Systems. *Science*, *325*, 419. doi:10.1126/science.1172133

Race, D., & Millar, J. (2008). Social and community dimensions to ACIAR projects ACIAR. *Training Manual*. Australian Centre for International Agricultural Research, Canberra: Charles Sturt University.

Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., . . . Quinn, C. H. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, *90*, 1933–1949.

Robbins, & Stephen. (2003). *Perilaku organisasi*. Jakarta: Gramedia.

Stojanovska, M., Blazevska, A., Stojanovski, V., & Nedanovska, V. (2012). Perception of villagers from Ali Koch and Rastani towards forest management performed by the PE "Macedonian Forests". *South-east European forestry, 2*(2),73-79. doi:10.15177/seefor.11-08.

Voinov, A., Kolagani, N., McCall, M.K., Glynn, P.D., Kragt, M.E., Ostermann, F.O., . . . Ramu, P. (2016). Modelling with stakeholders - Next generation. *Environmental Modelling & Software*, *77*, 196-220.

Zavyalova, A., Pfarrer, M. D., Reger, R. K., & Hubbard, T. D. (2016). Reputation as a benefit and a burden? How stakeholders' organizational identification affects the role of reputation following a negative event. *Academy of Management Journal*, *59*(1), 253-276.