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Local community's perspective on the current state and management of "Sendang Kalimah Toyyibah" Spring

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ABSTRACT

"Sendang Kalimah Toyyibah" is important spring with socio cultural value. However, the increasing activity might cause ecological changes which may affect the sustainability. This research aimed to study the condition of "Sendang Kalimah Toyyibah" based on local society's perspective to analyze the correlation of the condition toward the management policies, and to formulate the management strategy for sustainable management of the spring. The research was conducted from April to May 2018, through field observation. The research instrument used was questionnaire with three level of likert scale measurement. Data analysis was conducted by descriptive and statistical analysis with correlation and crosstabulation. The result showed that most of the respondents agreed that the spring has changed in the last 5 years. The local factor related to the change of the spring is the development of facilities. However, the change of the spring was not followed by the change of ecological condition, such as reduced debit, decreased water quality and decreased forest coverage. The current management of "Sendang Kalimah Toyyibah" was limitation of exploitation. However, currently there is no replantation effort or development of preservation area even though some respondents suggested that some plants species is no longer found in the spring ecosystem. Suggested management plan included plantation of the spring surrounding to increase plants density and diversity.

Keywords: local community, management policy, perspective, spring, sustainability

I. INTRODUCTION

The spring "Sendang Kalimah Toyyibah" is one of water resource existed in Nyatnyono Village, Western Ungaran District, Semarang Region, Central Java which has been utilized for decades. The existence of "Sendang Kalimah Toyyibah" instead of having ecological value also has historical and religious values as well (Wulandari, 2011). Thus, the sustainability of the spring should be maintained.

Spring is a vulnerable ecosystem due to its dependency to its buffering ecosystem such as catchment area. Thus, various factors could affect the sustainability of springs. One of the trending concern regarding the spring sustainability is the climate changes. Global climate change had been considered as significant factor which cause the loss of, decreased flow, and drought of spring (Poudel and Duex, 2016). However, the degradation of spring is not only caused by natural factor, human activities might affect the spring. The impact of human activities might not be visible in short period, but might take years to show significant impact (Tan, et al, 2015). Thus, human activity in the spring related ecosystem should be controled in order to avoid the damage as well as its impact to the sustainability of the spring.

The management of spring is highly related to the surrounding communities. However, their knowledge is needed to perform appropriate management plan as well as conservation effort (Oyarzun and Oyarzun, 2011). Lack of society's knowledge might cause to inappropriate management, since the exploitation of springs usually related to large amount of money. Local society, especially the community which lives around the spring generally has direct contact to the resource. Thus, the development of public facilities might stimulate the modification of the ecosystem (Raghavendra and Deka, 2015). Unfortunately, the modification of the landscape

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in the spring ecosystem might cause severe impact on the sustainability of the spring. The decreasing forest coverage or change of plants composition could affect the aquifer, resulted the change of water quality and quantity.

The presence of human society is a factor that would change the condition of nearby resources. The presence of community generally alter the exploitation of the natural resources (Stern, 2011). Thus, the risk of degradation increased. Human consciously utilizes the natural resources for their livelihood. However, increasing population and technology might intensify the exploitation, resulted the greater risk of degradation. Thus, the utilization of natural resources should be well managed.

Conflict of interests is generally become a problem in the management of natural resources (Boelens et al, 2011). Every natural resources consisted of two management scale, including local and global (Stern, 2011). Local scale is only related to its nearby environment or society. However, some resources also has global impact, where its management policy might impact the larger scale of the related resources. This aspect is rarely considered in the management of natural resources locally.

One of the most important ecological aspect of spring is the existence of plants species. Each species has particular role to the spring (Wiryani et al, 2018). Several plants might also be associated each other ((Wiryani et al, 2015). Thus, preservation of spring ecosystem is required to maintain the appropriate functionality of the plants community. Communities with particular interest in the management of certain resource would try to get involved in the management (Tonković, 2015). However, the limited understanding on the ecosystem might cause to mismanagement of the resource. Thus, in order to produce best management policy, the community should attain appropriate knowledge.

The surrounding of "Sendang Kalimah Toyiybah" consisted of various plants species with particular role in the infiltration, filtration and absorption of water resources (Wiryani et al, 2018). However, the ecosystem is dominated by some plant species. Thus, the spring is vulnerable to the ecosystem changes. Slight environmental change, especially on the dominant plants might cause significant disturbance on the spring sustainability. This research aimed to study the current condition of "Sendang Kalimah Toyiybah" spring based on local society's perspective, to analyze the correlation of the condition toward the management policies, and to formulate the management strategy for sustainable management of the spring.

II. MATERIAL AND METHODS

The research was conducted in "Sendang Kalimah Toyiybah" spring from April to May 2018. Data collection was performed by field observation using questionnaire as the instrument. There were 11 items utilized in the questions list, including the topic of condition, the changes, utilization, and management of "Sendang Kalimah Toyiybah" spring surrounding environment. Likert scale was used to measure the respondents' responses, involving three agreement levels, including the choices of "not knowing", "disagree", and "agree".

Thirty respondents from the local community were occupied in this research. Collected data was then tabulated and presented to describe the perception of the local community about the current condition of "Sendang Kalimah Toyiybah". Validity and reliability tests were conducted before statistical analysis was conducted. Further data analysis was conducted with correlation, while the correlation pattern was achieved from crosstabulation.

III. RESULTS

The result showed that the local community of "Sendang Kalimah Toyiybah" surrounding had various perception about the condition of the spring. This might be caused by the level of knowledge and awareness of the community. Complete descriptive analysis result of the questionnaire is presented in the Table 1. According to the observation data as presented in Table 1, the preferences of the responses were highly varied. However, most of the respondents agreed that the "Sendang Kalimah Toyiybah" spring ecosystem had experienced some changes. The respondents also agreed that the exploitation of the spring is limited through certain local roles. Dominant disagreement was observed from the questions concerning the reduced spring debit, changes of water quality, decreasing forest area, disappearing plant species, as well as replantation and preservation activities.

Table 1. Proportions of the respondents' perception

No.	Statement	Proportion of Answers		
		Not Knowing	Disagree	Agree
1	There are changes in the ecosystem of "Sendang Kalimah Toyyibah" spring over the past 5 years	13.4%	33.3%	53.3%
2	There has been developments of the "Sendang Kalimah Toyyibah" spring facilities	13.4%	43.3%	43.3%
3	The debit of "Sendang Kalimah Toyyibah" spring water is reduced	0.0%	90.0%	10.0%
4	There is a change of the spring's water quality in "Sendang Kalimah Toyyibah"	13.3%	86.7%	0.0%
5	The extent of surrounding forest near "Sendang Kalimah Toyyibah" is decreased	6.7%	93.3%	0.0%
6	Some plants specieses are missing from "Sendang Kalimah Toyyibah" area	0.0%	53.3%	46.7%
7	The exploitation of "Sendang Kalimah Toyyibah" is limited through certain local roles	0.0%	10.0%	90.0%
8	There have been replantation effort in the "Sendang Kalimah Toyyibah" surrounding	3.3%	93.3%	3.3%
9	Preservation area is available in "Sendang Kalimah Toyyibah" area	20.0%	80.0%	0.0%

Further data processing was conducted to measure the validity and reliability of the observation data. The analysis resulted that two items were not valid for further processing, including item 4 and item 7. The remaining items were then analyzed for reliability. The result showed the Cronbach's alpha index was 0.719 which was higher than the r table (0.6021). Thus, all of the remaining items were reliable for further analysis.

Analysis of correlation was conducted for the valid and reliable variables. Thus, only 7 of the items were analyzed. Question item 1 was set as the fixed variable which was related to the remaining variables. Thus, there were 6 correlation analyzed. Bivariate correlation was used in the analysis. The result of the analysis is presented in Table 2.

Table 2. Pearson's correlation indices

Item	Fixed Variable = item 1		
	Pearson's Correlation	Sig.	Conclusion
2	0.773	0.000	Significant
3	0.281	0.133	Not Significant
5	0.526	0.003	Significant
6	0.131	0.489	Not Significant
8	0.363	0.049	Significant
9	0.281	0.133	Not Significant

The analysis of correlation results showed there were three items which had significant correlation with the changes of "Sendang Kalimah Toyyibah" spring ecosystem. The first variable was the development of the spring facilities. The analysis resulted the correlation level of 77.3% which was highest than the remaining variables. Crosstabulation analysis was conducted to understand the relation of both variables. The result is presented in Table 3.

Table 3 shows the crosstabulation between the change of spring ecosystem and the development of spring facilities. According to the analysis, the correlation of both variables was strong. The crosstabulation data showed that there was related proportion in the trend in which the respondents who agreed that the spring ecosystem had changed also agreed that there was development of spring facilities. However, according to the analysis, it could be concluded that most of the respondents agreed that there was development of spring facilities as well as the change of spring ecosystem (36.7%). It could be suggested that the development of spring facilities has relation with the change of spring ecosystem.

Table 3. Crosstabulation between the change of spring ecosystem and development of spring facilities

		Development of spring facilities			Total	
		Not Knowing	Disagree	Agree		
Change of spring ecosystem	Not Knowing	Count	4	0	0	4
		% of Total	13,3%	,0%	,0%	13,3%
	Disagree	Count	0	8	2	10
		% of Total	,0%	26,7%	6,7%	33,3%
	Agree	Count	0	5	11	16
		% of Total	,0%	16,7%	36,7%	53,3%
Total	Count	4	13	13	30	
	% of Total	13,3%	43,3%	43,3%	100,0%	

The second variable was the decreasing forest extent with correlation level of 52.6%. This indicated fair correlation between both variables. However, none of the respondent agreed that the extent of the forest in “Sendang Kalimah Toyyibah” was decreased. Thus, it couldn't be concluded whether decreased of forest extent was related to the change of spring ecosystem. Complete crosstabulation result is presented in

Table 4.

Table 4. Crosstabulation between the change of spring ecosystem and decrease of forest extent

		Decrease of forest extent		Total	
		Not Knowing	Disagree		
Change of spring ecosystem	Not Knowing	Count	2	2	4
		% of Total	6,7%	6,7%	13,3%
	Disagree	Count	0	10	10
		% of Total	,0%	33,3%	33,3%
	Agree	Count	0	16	16
		% of Total	,0%	53,3%	53,3%
Total	Count	2	28	30	
	% of Total	6,7%	93,3%	100,0%	

The last variable was the replantation of trees in the spring surrounding with correlation level of 36.3%. This indicated low correlation even though it was significant. According to the crosstabulation analysis, it was known that only one respondent agreed that there had been replantation activity. However, most of the respondents (93.3%) disagreed that forest replantation was ever conducted. Thus, it could be concluded that the change of spring ecosystem was nor related to the replantation of the forest. Complete analysis result of crosstabulation between the change of spring ecosystem and the forest replantation is presented in Table 5.

Table 5. Crosstabulation between the change of spring ecosystem and forest replantation

		Replantantion of trees			Total	
		Not Knowing	Disagree	Agree		
Change of spring ecosystem	Not Knowing	Count	1	3	0	4
		% of Total	3,3%	10,0%	,0%	13,3%
	Disagree	Count	0	10	0	10
		% of Total	,0%	33,3%	,0%	33,3%
	Agree	Count	0	15	1	16
		% of Total	,0%	50,0%	3,3%	53,3%
Total	Count	1	28	1	30	
	% of Total	3,3%	93,3%	3,3%	100,0%	

IV. DISCUSSION

The management of natural resources should integrate the ecological, economic and social aspects in order to improve the community's participation (de Jonge, 2012). The management of natural resource generally involves various level of institution depend on the scale and/or importance of the resource. However, sometimes the resources is simply managed by local community. Thus, the management would be localized and tend to disobey related resources.

Local society is the key stakeholder, actual manager as well as victim of related resource (Muhamad et al, 2014). The level of knowledge of particular stakeholders plays important role in determining the management of a resource (Jovovic et al, 2017). Social aspect of resource management is generally related to the culture. However, as the era changes, the value of traditional culture faded. Traditional community usually has low knowledge about sustainable management of natural resources. However, they uphold the cultures as representation of traditional policy in the application of sustainable management inherited by the elders (Martin et al, 2016).

Generally, the perspective of sustainable is different among stakeholders (Muhamad et al, 2014). Sustainable development means that the development should support the stakeholder's interest (Tonković, 2015). Thus, the arrangement of sustainable development plan commonly involved a long debate among sectors. The resource management based on society's perspective may lead to the sustainability or the damage of the ecosystem. The lack of community's knowledge about the sustainable management of resource management may inhibit the conservation effort (Buwono et al, 2017).

Based on the analysis result, the local community of "Sendang Kalimah Toyyibah" seems to be less aware toward the sustainability of the spring. However, most of the respondents agreed that there has been changes occurred in the spring. Unfortunately, no exact reason could be achieved from the research. Some question items that was asked were rejected to be mentioned as the factor of ecosystem changes. Another possibility is that the changes in the "Sendang Kalimah Toyyibah" spring was caused by the degradation of its catchment area.

Increasing necessity on the utilization of natural resources often arise conflict of interest. Water is also considered as the source of conflict and death instead of as a source of life (Ftaïta, 2011). However, the main focus of the resources sustainability maintenance is generally focused on the economic dimension while the ecological aspect is often less considered (Herdiansyah et al, 2014). Various problems arises toward the existence of water resources, including its scarcity and degradation (Ftaïta, 2011). Ecological aspect related to the problems are including the high dependence of spring to its catchment area which is located in the upper area. Unfortunately, the location of the catchment area is usually quite far from the spring itself.

Integrated management plan is required to achieve sustainable spring management. It means that the management should consider various aspects related to the spring, such as ecological, economic, socio-culture, as well as political (Herdiansyah et al, 2014). Preservation zone should be developed to maintain the sustainability water supply to the springs. Preservation zone could occupy a very large coverage depend on the location of the springs toward its sources (Diana dan Pasha 2015). The conservation activity should also be emphasized rather than the utilization activity.

In order to achieve optimum integrated spring management of "Sendang Kalimah Toyyibah", ecological and social aspects should be considered. Ecological consideration includes the valuation of the resource, both economic and ecological. While the improvement of social should also be improved, such as: community's understanding on the sustainable management, ecological linkages related to spring, the cost and benefit of the resources utilization, both ecological and economic and improve the awareness of the community toward sustainable management of the spring (de Jonge, 2012).

The condition of "Sendang Kalimah Toyyibah" spring has changed during the last 5 years. The local society suggested that the change was related with the development of spring facilities. However, the change of the spring seemed to be caused by the change of the catchment area since some environmental parameters did not show significant relation.

REFERENCES

- Boelens R, Mesquita MB de, Gaybor A, Pena F. (2011). Threats to a Sustainable Future: Water Accumulation and Conflict in Latin America. *Sustain Dev Law Policy*. 2011;12(1):41-5.
- Buwono NR, Muda GO, Arsad S. (2017) Pengelolaan Mata Air Sumberawan Berbasis Masyarakat di Desa Toyomarto Kecamatan Singosari Kabupaten Malang. *J Ilm Perikan dan Kelaut*. 2017;9(1):25-36.

- Diana D, Pasha GK. (2015). Pelestarian dan Peran Masyarakat di Kawasan Sekitar Situ Cisanti. *J Pendidik Geogr.* 2015;15(1):24–36.
- de Jonge VN, Pinto R, Turner RK. (2012). Integrating Ecological, Economic and Social Aspects to Generate Useful Management Information Under the EU Directives' "Ecosystem Approach." *Ocean Coast Manag* [Internet]. 2012;68:169–88. Available from: <http://dx.doi.org/10.1016/j.ocecoaman.2012.05.017>
- Ftaïta T. (2011) Community Water Management. Is it Still Possible? Anthropological Perspectives. *Anuário Antropológico.* 2011;2:195–212.
- Herdiansyah H, Soepandji BS, Seda FS, Dewi O. (2014). Conflict Management of Renewable Natural Resources in the Border of Indonesia-Malaysia: Sustainable Environmental Approach. *Procedia Environ Sci* [Internet]. 2014;20:444–50. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S1878029614000577>
- Jovovic R, Draskovic M, Delibasic M, Jovovic M. (2017). The Concept of Sustainable Regional Development – Institutional Aspects, Policies and Prospects. *J Int Stud* [Internet]. 2017;10(1):255–66. Available from: http://jois.eu/?326,en_the-concept-of-sustainable-regional-development—institutional-aspects-policies-and-prospects
- Martin E, Suharjito D, Darusman D, Sunito S, Winarno B. (2016). Tunggu Tubang and Ulu Ayek: Social Mechanism of Sustainable Protected Forest Management. *J Manaj Hutan Trop.* 2016;2(2):85–93.
- Muhamad D, Okubo S, Harashina K, Parikesit, Gunawan B, Takeuchi K. (2014). Living Close to Forests Enhances People's Perception of Ecosystem Services in A Forest – Agricultural Landscape of West Java, Indonesia. *Ecosyst Serv* [Internet]. 2014;8:197–206. Available from: <http://dx.doi.org/10.1016/j.ecoser.2014.04.003>
- Oyarzun J, Oyarzun R. (2011) Sustainable Development Threats, Inter-Sector Conflicts and Environmental Policy Requirements in the Arid, Mining Rich, Northern Chile Territory. *Sustain Dev* .19:263–74.
- Poudel DD, Duex TW.(2016). Vanishing Springs in Nepalese Mountains: Assessment of Water Sources, Farmers' Perceptions, and Climate Change Adaptation. *Mt Res Dev.* 37(1):35–46.
- Raghavendra S, Deka PC. (2015). Sustainable Development and Management of Groundwater Resources in Mining Affected Areas: A Review. *Procedia Earth Planet Sci.* .11:598–604.
- Stern PC. (2011) Design Principles for Global Commons: Natural Resources and Emerging Technologies. *Int J Commons.*5(2):213–32.
- Tan P, George D, Comino M. (2015). Cumulative Risk Management, Coal Seam Gas, Sustainable Water, and Agriculture in Australia. *Int J Water Resour Dev* [Internet]. 31(4):682–700. Available from: <http://dx.doi.org/10.1080/07900627.2014.994593>
- Tonković AB. (2015). Sociological Aspects of Sustainable Development Perspectives in Central Lika Through the Prism of Human and Social Capital. *Sociol i Prost* [Internet]. 2015;53(2):163–80. Available from: http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=207846
- Wiryani E, Murningsih, Jumari.(2018). The Abundance and Importance Value of Tree in “Sendang Kalimah Toyyibah” Surrounding and Its Implication to the Spring. *J Phys Conf Ser.* 2018;1025:012032.
- Wiryani E, Anggoro S, Mulyani S.(2015). Association of 15 Most Abundant Vegetations Around “Sendang Kalimah Toyyibah” Springs, Ungaran, Semarang, Central Java, Indonesia. *Int J Appl Environ Sci* [Internet]. 2015;10(2):799–808. Available from: <http://www.ripublication.com>
- Wulandari RS. (2011). *Jenis dan Fungsi Mitos Cerita Sendang Kalimah Thoyyibah di Makam Waliyullah Hasan Munadi Kabupaten Semarang.* Universitas Negeri Semarang..