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## **The Potential of Social Capital in the Implementation of Payment for Environmental Services in Tawang Retention Pond**

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### **Abstract**

A high level of space and land utilization in the city of Semarang, Indonesia, has caused degradation of natural resources, both terrestrial and aquatic. In particular, the impact of flooding and high spring tides has worsened over time. Payment for Environmental Services (PES) is now being developed globally as a market-based instrument to attribute value to ecosystem, environmental and social services provided by natural resources, recognizing the value of social capital. Local networks and communities play important roles and have positive impacts on economic welfare and local development. The aim of this study is to analyse the potential of social capital as source of support in implementation of PES in Tawang Retention Pond. This research use mixed methods (both qualitative and quantitative approaches) to produce a more complete picture by combining and comparing information from different sources.

The result shows that the characteristics of the community surrounding Tawang retention pond is included in a type of Bridging Social Capital which is characterized by a sense of spontaneous (reciprocity), mutual trust and social networks such as members of the SHGs (Self-Help Groups) who indulge in the activities of gathering, social funds that bridge the poor to join a self-help community groups. This qualitative result is strengthened by the results of correlation analysis where there is a significant correlation between social capital and PES with a coefficient of 59.5%. This means social capital is potentially an important factor in the application of PES.

**Keywords:** Payment for environmental services; Social capital

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## Introduction

Semarang City is the capital city of Central Java Province, Indonesia, located in the north of the island of Java. The city covers a total area of 373.7 km<sup>2</sup> comprising a lowland coastal zone in the northern part (Kota Bawah) with slopes of 0 – 20°, and upland areas in the southern part (Kota Atas), reaching up to 450m ASL in latitude (see Figure 1) [1].

From the social and economic perspective, the presence of Tanjung Emas as its port/dock has stimulated rapid growth and development in Semarang City. The high rate of industrial growth has made a significant contribution to economic success in the region.

However, the high intensity of space and land utilization has caused degradation of natural resources, resulting in reduced quality of life; local problems include soil erosion, sedimentation, seawater intrusion, floods and springtides, land subsidence, air pollution, overcrowding and congestion. These environmental impacts seem to be worsening over time, particularly floods and springtides (see Figure 2) and are compounded by various social issues such as unemployment, income inequality, social conflict and persistently high rates of poverty.

Government efforts to tackle flooding and springtides have included various development programs including a water reservoir at Jatibarang, the West Canal Flood normalization, Kali Baru, Kali Asin and Kali Semarang, canal flood channels, drainage subsystem constructions with pumping equipment, as well as tidal drainage with polder system, namely Tawang Retention Pond (*Kolam Retensi Tawang*) which is popularly known as the Tawang Polder, located in Northern Semarang (see Figure 3). The area of Tawang Polder (the retention pond) is approximately 1 acre; built on the land of Perusahaan Terbatas Kereta Api Indonesia (PT KAI), a state rail-

way company, located in front of Tawang train station with a catchment area of approximately 70 acres. This project was built in 2001 with World Bank funding, through the Department of Public Works, and has three goals: (1) to control floods and springtides; (2) to provide an open space for the surrounding community; and (3) to protect the heritage and culture of the old city area (see Figure 4).

The numerous operational problems caused by the Tawang retention pond triggered a research for alternative management methods to ensure its optimal function under the principles of pro-poor, pro-jobs and pro-environment sustainable management. In this context, coastal zone management in Semarang city as a whole and the management of the retention pond (polder system) in particular, to cope with floods and springtides using technological approaches as well as environmental management instruments such as Payment for Environmental Services (PES) have attracted growing interest.

PES is a market-based instrument based on the principle that those who benefit from environmental/ecosystem services should pay, and that producer of such services should be compensated. In PES mechanisms, environmental service providers receive payments depending on their ability to deliver environmental services. Conceptually, the economic rationale underlying PES is the “beneficiary pays” [2].

Studies on PES from an Asian perspective indicate that more people appreciate non-monetary or “in-kind” rewards [3]. Especially in developing countries, PES scheme are used not only for conservation purposes, but also to benefit the poor. This scheme is used to transfer financial resources from those who need the services provided by environments such as forest to people who are socially and financially vulnerable.

Any sustainable development policy requires consideration of social and

environmental, as well as the economic contexts. Francis Fukuyama illustrates the notion of social capital that includes elements of trust and belief (“Vertrauen”) that are important drivers of change [4]. His study also found that grass-roots associations and local networks play important roles with positive impacts on economic welfare and local development.

The condition of settlements and sanitation in villages near the retention pond such as Purwodinatan (upstream of the pond) as well as Tanjung Mas and Bandarharjo (down-

stream of the pond) is poor, leading to conflict and erosion of social capital.

Those internal and external problems indicate that the Tawang retention pond is not working properly from the stakeholder or community care perspective, so the retention pond is not well maintained. It is ironic if all the problems associated with the slogan of Semarang city ATLAS (*Aman* or safe, *Tertib* or orderly, *Lancar* or Current, *Asri* or beautiful and *Sejahtera* or Welfare), but the reality is the very opposite.



Figure 1 Map of Semarang City, Indonesia.

## Objective

This study explores the important question of to what extent does social capital offer potential as a source of support in the implementation of PES in Tawang Retention Pond.

There are many studies on polder systems that take an engineering approach. However, there have been relatively few undertaken from the social and environmental perspectives. So far, there is no study of the “polder system”

which incorporates the PES approach as a model to handle floods and springtides.

## Methods

This research used mixed methods to produce a more complete picture by combining information and data from several sources [5]. Data were collected by means of questionnaire, focused group discussion (FGD) and in-depth interviews.

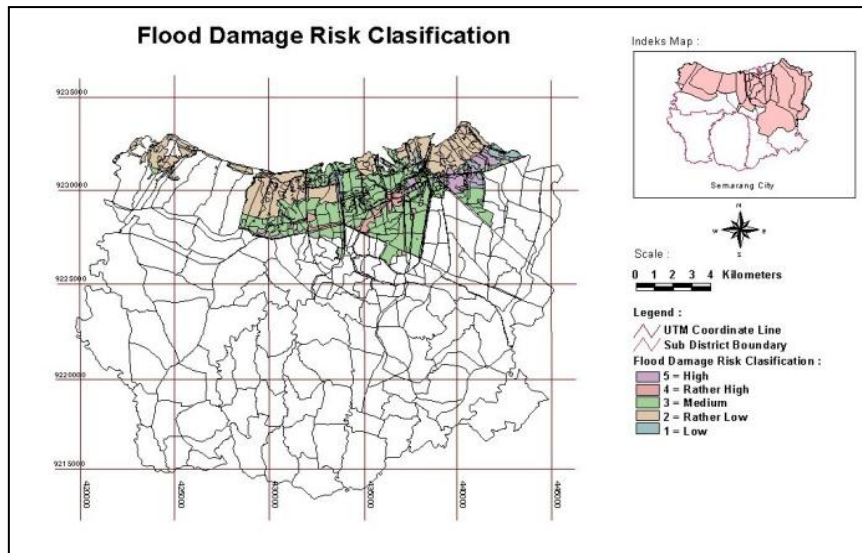


Figure 2 Flood Damage Risk Classification of Semarang City, Indonesia.

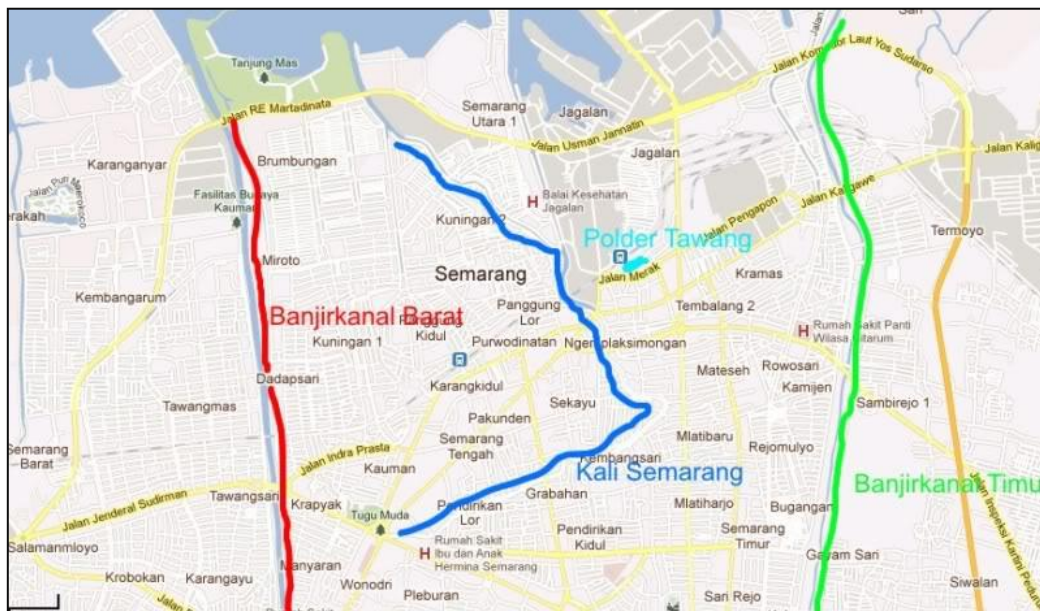


Figure 3 Polder Tawang in northern Semarang.



Figure 4 Tawang Retention Pond after completion in 2001.

Qualitative analysis in this study followed the interactive model as described by Miles and Huberman [6]. Data from interviews, FGD, observation and documentation were recorded in the notes field comprising two parts (descriptive and reflective data). The quantitative approach used statistical tests to evaluate the correlation between social capital variables and PES variables.

The sample subjects were representatives of Semarang Municipal Government, entrepreneurs and community leaders, as well as ordinary inhabitants of Tanjung Mas, Bandarharjo and Purwodinatan (villages surrounding the pond). The 36 respondents from the government, entrepreneurs and community leaders were selected by purposive sampling, whereas the 115 respondents from households in the three villages were selected by random sampling using the Lameshow formula (1997). The sampling formula is:

$$n = \frac{Z_{1-\alpha}^2 + Z_{1-\beta}^2 \sqrt{(P_0 + P_1) / 2}}{(P_0 - P_1)^2}$$

- n = number of samples  
 $Z_{1-\alpha}$  = Z significance value  
 $Z_{1-\beta}$  = Z power value  
P = Proportion of variables  
 $P_0 - P_1$  = Precision  
P =  $(P_0 + P_1) / 2$

Based on the above formula, the numbers of samples based on the proportion of variables are at 5%, the desired error rate of 0.5 and the degree of confidence in this study is 95%. The calculation of the heads of families in three villages can be seen in the table below:

25 and 52 family heads were sampled each from Purwodinatan and Bandarharjo villages and 35 from Tanjung Mas, giving a total of respondents from households are 115.

## The relationship between social capital and PES

Academic debate about the concept of social capital began in the early 1980s when a French sociologist Pierre Bourdieu documented observed social capital in European societies. Since then, interest in the concept has broadened, particularly since publication in 1988 of a work by American sociologist James Coleman entitled *Social Capital in the Creation of Human Capital*. The debate over social capital intensified with Robert Putnam's 1993 publication *Making Democracy Work: Civic Traditions in Modern Italy* that saw a performance in difference eye chain of 20 regional governments in Italy in the expansion of existing institutions in the community. Social capital can be defined simply as a set of values or informal norms shared among members of a group that allows the establishment of cooperation among them [7].

In theory, concept and application, there are at least four types of environmental services recognized by the global community, which are: environmental services in water management, in biodiversity, in environmental services via carbon sequestration, and in landscape aesthetic. The policy is intended to help maintain and/or improve environmental quality and quality of life for the community through sustainable ecosystem management. According to Hadi [8], contemporary PES models in Indonesia are very small in scale and are not accorded high priority.

This model policy program can be either nature-based business, sports challenges-based business, use of water-based business, carbon trade business or forest and environment rescue effort. According to the review of World Bank within the program of *Development Of Policy For The Payment For Environmental Services In Viet Nam And Considerations For Its Replicability In The*

*Asia-Pacific Region* in essence pointed out that the development of the concept of payment for environmental services needs to focus on four criteria: a) realistic scheme that considers the type and magnitude of the availability of environmental services, a fair amount of incentives, threats and opportunities, as well as the level of trust among the stakeholders; b) a sharper focus on performance (conditional); c) carrying the principle of *voluntary*: recipients of environmental services and environmental services provider; d) address the needs of the poor and the removal of barriers (pro-poor), especially in the countryside for a better life.

PES can be defined as a service provided by function of natural or artificial ecosystem whose value and benefits may be affected directly or indirectly by the stakeholders. An environmental service is the provision of environmental services, settings, advocates of natural processes, and the preservation of cultural values by a natural succession and human beings that is beneficial to the survival of human life.

Multifunctional payment reward mechanisms can be grouped into 3 (three) forms. The first form is a self-regulated agreement, i.e. the agreement is between the service provider and the recipient of services, usually closed, narrow in scope, and decided in face-to-face negotiations, such agreements tend to be simple, with minimal or no government involvement of interference. For example, an eco-label scheme, certification, purchase of development rights to the land where the service is located, direct payments between beneficiaries of services that are outside the location and the land owner responsible for the availability of multifunctional services. The second form is a public payment scheme. This approach is often used when the government intends to provide an institutional foundation for a program. The government can obtain funds through several types of fees, taxes and tax exemption. The last form is open market scheme. This one is rarely used and tends to be applied in advanced/developed countries. The government can define any goods or services from a multifunction watershed that can be traded.

**Table 1** Proportion of samples

No.	Villages	Alpha	Power of study	Precision (P1-P0)	Number of population (N)	Number of samples (n)
1	Purwodinatan	0.5	95%	5%	1.494	25
2	Tanjung Mas	0.5	95%	5%	8.802	52
3	Bandarharjo	0.5	95%	5%	6.100	38
Number of samples						115

In managing the Tawang Retention Pond, the government has been unable to manage with the standard polder system, due to limited financial resources for operational maintenance, constraints in quantity and quality of human resources as well as lack of coordination, communication and commitment among Local Government Task Forces

(*Satuan Kerja Perangkat Daerah/SKPD*). All these weaknesses are in fact linked to problems that can be traced back to the project's planning stages, and that are caused by: (1) absence of a project planning document on retention pond development that covers organizational preparation for implementation as well as stages of operations and

maintenance (O & M), preparation of procurement plan for goods/services, preparation of implementation plans; preparation of resettlement plans, preparation of financing plans; training O&M, socio-economic studies, and EIA documents; and (2) absence of an community-based organizational structure to manage and maintain the pond.

If commitment to these regulations can be realized, then the polder system with PES model, where there is a transaction between the government and the public (G to C) particularly with the poor, and or cooperation with the community (C to C) that utilizes land area of the retention pond, will constitute a transactional relationship between the users and the service provider. For example, the government supported by the people surrounding the retention pond makes a "Polder Care Community" program with only minimal funds, and then PES will be one of the new instruments in environmental management. Of course, in the social context, PES is not easy to implement. According to Pagiola [9], the entry point of PES is social capital, which is considered as an important decision in the implementation, since all efforts to realize the pro-environment retention pond would require local wisdom as well as the culture of the community discipline in managing the environmental wisdom.

The strong social capital owned by Semarang citizens is expected to optimize the potency of PES to achieve the objective of a sustainable Tawang retention pond. Normatively, this basis is consistent with the Regional Regulation on the Environment and Spatial Planning, and more specifically Regional Regulation No. 4/2008 on Poverty Reduction. As mentioned in section one of Article 2 that the goal of poverty reduction is intended to: 1) ensure the protection and fulfillment of basic rights of the poor; 2) accelerate the decline in the number of poor

people; 3) increase community participation, and 4) ensure consistency, integration, synchronization and synergies in poverty reduction. The scope of poverty reduction includes: identification of the rights and obligations of the poor people, strategies and programs, implementation and supervision, and community participation.

## Results

### *1) Descriptive analysis of social capital*

Social capital provides the basis for synergy in implementing organizational tasks. By incentivizing collaboration, PES can leverage greater impact, as compared with working alone. New intellectual capital will evolve when each person shares his/her insights; however, sharing such insights requires a pre-existing social network. The ability to build such a social network is referred to social capital. Social capital is also manifested in the ability to embrace diversity while respecting cultural and religious differences. Recognition and appreciation of differences is a requirement for growing creativity and synergy. The ability to get along with different people, appreciate and take advantage of these differences will collectively provide for the good of all. Here is presented a description of the respondents regarding the community's social capital.

The data presented in Table 2 illustrate that the majority of respondents live in villages where social relations have evolved to be mutually beneficial. In this survey, 40% of respondents strongly agreed that a spirit of mutual support exists among community members. Also in the current survey, 61.7 % of respondents reported they live in a neighborhood where public participation in environmental development activities is collective, spontaneous and based on sincerity.

Table 2 also highlights the high level of mutual trust among community members, as

well as the high level of concern for others in dealing with disasters such as floods and springtides and other disasters, which the community must periodically confront.

### 2) *Descriptive Analysis of PES*

The following table describes respondent feedback concerning the PES Tawang Sustainable Retention pond. The table highlights the overwhelming demand from more than 90% of respondents for active participation

from both public and private sectors in operational management of the Tawang Retention pond.

### 3) *Correlation Analysis*

Using SPSS, a correlation coefficient of 0.595 was found between the social capital variable and the PES variable. Given the significance of this association, social capital is potentially an important factor in the effective application of PES.

**Table 2** Respondents' feedback on social capital indicators

No	Indicators of Social Capital	Percentage of Respondents' Answers					Validity	Reliability
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
1	There is a pattern of social relations that is mutually beneficial	0	0	18.3	60.8	20.9	100	0.700
2	There is a spirit of mutual help	0	0	33.9	26.1	40.0	100	0.710
3	Participation is collective, spontaneous, and sincere	0	7.0	24.3	61.7	7.0	100	0.730
4	The participation is mobilized by community leaders	0	7.0	6.0	80.0	7.0	100	0.310
5	Good participation in the ideas, energy, money and material	0	0	13.0	62.7	24.3	100	0.610
6	Participation in the form of money according to the ability of people	0	7.0	6.9	60.9	25.2	100	0.720
7	Mutual trust is still strong in the community	0	7.0	13.9	53.9	25.2	100	0.420
8	Social ethic values are still strong	0	6.0	20.0	47.0	27.0	100	0.440
9	Proactive measures in disaster remains high	0	0	7.0	60.0	33.0	100	0.590
10	Social norms written and unwritten still in order	0	7.0	13.9	65.2	13.9	100	0.650

0.728

### Discussion

Analysis of the data and information gleaned from the study of environmental impacts of the development of this retention pond suggests that this project does not conform at least with the spirit of the applicable laws.

First, the retention pond is a product of the policy of the reformation era that was poorly targeted, and was not implemented efficiently or effectively as stipulated in the 2004 National Development Planning Act No. 25 Year 2004 (d) which states, "A policy must be able to ensure that development activities are effective, efficient, and well-targeted".



Secondly, the retention pond was constructed without conducting an document of Environmental Impact Assessment and Environmental Management Plan and Environmental Monitoring (EIA and RKL/ RPL) as required under the 1997 Environmental Management Act No. 23, together with the Management and Environmental Control and Government Regulation (PP) 27 (1999) updated as PP 27 (2012) concerning IEA requirements. In planning

such developments, feasibility study and environmental impact assessment study are required, as well as institutional development plans and local revenue improvement action plans contained in the document program implementation SSUDP (Surakata Semarang Urban Development Program) funded by the World Bank in 1997.

**Table 3** Respondents' answer on the implementation of PES

No	Indicators of Social Capital	Percentage of Respondents' Answers						Validity	Reliability
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total		
1	Policy realignment is required	0	0	5.2	61.8	33.0	100	0.500	0.924
2	Institutional governing body of polder is necessary	0	0	6.1	63.5	30.4	100	0.640	
3	Governing body is semi-independent and democratic	0	0	7.0	40.0	53.0	100	0.760	
4	Government funding sources, public and private	0	0	6.1	47.8	46.1	100	0.580	
5	Application of compensation is appropriate to regulation	0	0	0	54.8	45.2	100	0.870	
6	The application of compensation using incentive / disincentive schemes	0	0	0	68.7	31.3	100	0.750	
7	Reward systems can create job opportunities	0	0	0	72.2	27.8	100	0.420	
8	Reward system supports ecologically polder	0	0	0	73.0	27.0	100	0.630	
9	The poor as a provider	0	0	0	53.0	47.0	100	0.780	
10	Changes in the management of the polder system	0	0		60.9	39.1	100	0.630	
11	The amount of compensation determined value of deliberation	0	0	7.0	53.0	40.0	100	0.840	
12	Polder-concerned movement are very important	0	0	7.0	40.0	53.0	100	0.800	

The qualitative analysis concludes that the characteristics of the community surrounding Tawang retention pond in Purwodinatan, Bandarharjo and Tanjungmas Villages includes the type of Bridging Social Capital proposed by Robert D. Putnam in his social capital theory. This type of community is characterized

by a sense of spontaneous (reciprocity), mutual trust and social networks (e.g. members of the Self-Help Groups). Social capital is evidenced by the spirit of togetherness in taking responsibility for flood prevention. Result of FGD and in-depth interviews demonstrates a willingness to raise funds for flood prevention

of between USD 0.04 to USD 0.08/person. There is also a sense of solidarity and mutual assistance in the spontaneous action taken before and after the floods (e.g. floods and springtide response rehearsals). The most prominent bridging characteristic is the presence of the independent *Kelompok Sosial Masyarakat* (Social Community) ‘Sagorake’ (channel, culvert People of Kebonharjo) who were able to organize 11 *Rukun Warga* (pillars of citizens) to manage the drainage in order to clean the garbage. The qualitative findings are supported by the results of correlation analysis which indicate a significant correlation between social capital and PES with a coefficient of 59.5 %.

The essence of social capital lies on how people are able to work together to build a network to achieve a common goal. Eva Cox (1995) in Hasbullah (2006) describes social capital as a series of human relationships supported by networks, norms, and social trust that allows efficient and effective coordination and cooperation for mutual benefit and virtue [10]. Social capital has basic elements, namely participation in a network, reciprocity, trust, social norms, values, and proactive actions undertaken by individuals and groups within a community. The schematic model of the relationship between social capital and PES is described below in Figure 5.

Figure 5 highlights the strong influence of social capital on PES application. Communities with strong social capital marked by participation, responsibility, confidence, values and liveliness are more likely to succeed in building a strong PES performance, characterized by strong institutional capacity, togetherness and tolerance, support from stakeholders, cooperation, religious values and beliefs as well as institutional sustainability. The pattern of social capital and PES relationship requires the ability of individuals and the community to join and participate actively in

an association (organization) conducted under the principles of voluntariness, equality, and freedom.

Next is kindness exchange either among individuals within a group or between groups (reciprocity), and mutual trust within the community that could build unity. Social norms become important as a collection of rules that are adhered to and followed by the people, along with social mechanism to articulate and support in a proactive way the achievement of common goals such as hard work and social harmony. Proactive action refers not only to individual involvement in each activity but also attempts to find a way for their involvement in every activity. These elements of social capital will support the application of PES.

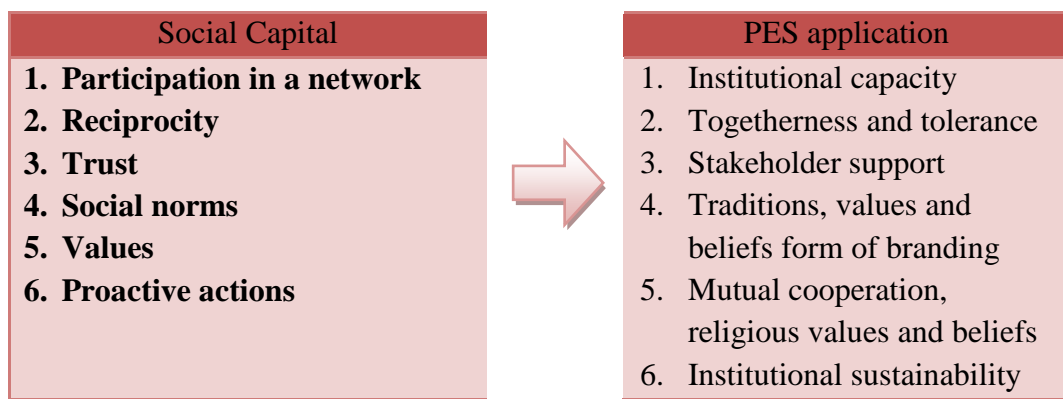
In river basin conservation, the poor frequently lack security of tenure/land leasing so they cannot participate in the contract as sellers of environmental services. In the case of Indonesia, PES can provide opportunities for farmer groups, licensees or environmental volunteers that give them an assurance in leasing of land, on condition that they conserve the forests and provide watershed services. For direct costs of investment and management, the opportunity cost (the cost of access that can be used for other purposes) can be calculated as the cost of planting land with vegetation to mitigate CO<sub>2</sub> emissions compared with the estimated value of the loss of environmental services due to agricultural use of the land. Small scale farmers are often more productive than large scale farmers since they use their own labour to cultivate the land. PES can be implemented more simply via a contract with farmer or community groups rather than individuals, involving NGOs to manage implementation of a programme for sustainable polders.

In a river basin, upstream activities can affect downstream areas. For example, the

tillage that does not apply upland conservation measures will result in increased rates of erosion and sedimentation in rivers, reservoirs and irrigation structure. Upstream activities may also bring positive impacts in term of increased availability of irrigation water and groundwater. As water flows do not recognize administrative boundaries, any integrated approach to water management will encounter cross-border issues and conflicts of interest between upstream and downstream actors concerning rights, obligations, responsibilities and benefits.

To allow effective management and conflict resolution, integrated watershed management requires clear and inclusive policies and

effective coordination. This also applies to application of PES to the polder system. A mutually beneficial cooperation between upstream and downstream actors needs to be established and communicated, with unified management to ensure shared responsibilities and shared benefits. This requires strong stakeholder commitment to implement PES in polder system management. In this context, there is potential to apply PES to other polders located in the city. For example, Polder Banger, completed in 2012, is characterized by similar dynamic of social and political capital, environmental wisdom and community consciousness and cohesion.



**Figure 5** Schematic Model of the Relationship between Social Capital and PES.

**Conclusion**

An ideal model of the implementation of PES in polder management requires scientific contributions, especially from the perspective of the social sciences (social capital). Based on the results of the qualitative analysis, the characteristics of the community surrounding Tawang retention pond includes a form of Bridging Social Capital characterized by reciprocity, mutual trust and social networks such as members of the SHGs. Social capital is evident from the spirit of community cohesion and spirit of responsibility for com-

munity action for flood prevention. The FGD and in-depth interviews revealed a willingness to pay to raise funds for flood prevention, valued at between USD 0.04 to USD 0.08/person. This is reinforced by a sense of solidarity in spontaneous action before and after flood events (flood and springtide). These qualitative findings are supported by the results of correlation analysis, which found a significant correlation of 59.5% between social capital and PES. This implies that social capital is potentially an important factor in application of PES in this location.

The implementation of PES in Tawang retention pond is a strategic policy of the future; given that, Semarang City has abundant water resources in the multi-purpose framework to create rich polder environmental services such as scenic beauty and carbon sequestration. This policy could be realized if social capital is harnessed and reinforced. In the context of PES, an innovative regional autonomy policy present a challenge for the government to realize the mandate of Act No. 32/2004 on Regional Government and Law No. 32/2009 on the Protection and Environmental Management and Law No. 7/2004 on Water Resources.

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