Measuring social capital in Indonesian community forest management

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ABSTRACT
Social capital provides an overview of a community’s togetherness, unity, and mutual trust in achieving common goals towards sustainable development. Community forest management requires a certain level of social capital for sustainable forest management. This study aims to identify and analyze key factors influencing the community’s social capital in forest management. The key factors influencing the level of social capital in a community include internal factors such as individual characteristics and knowledge of community forest management, and external factors such as extension activities, the role of the forest farmer group, and access to information. Using the theoretical framework of social capital and multiple linear regression models, we found that social capital was significantly influenced by both internal and external factors, indicating a need to improve these factors. To increase the value of social capital for maintaining the sustainability of community forest management, the results of this Indonesian case suggest that individual characteristics, procedural knowledge of community forest management, and the role of forest farmer groups need to be considered for forest management based on the social capital of forest communities.

Introduction

For a long time, communities depending on forest resources have been regarded as an obstacle in forest resource management, because various activities by communities, such as illegal logging and slash-and-burn farming, caused deforestation and forest degradation (Geist and Lambin 2002). Governments have expended huge efforts to control communities’ activities to protect existing forests. However, a new approach to the concept and roles of communities in forest management has emerged. The community has been reconsidered as an alternative way of forest management including forest conservation. The Forest Principles, signed at the United Nations Conference on Environment and Development in 1992, recommend sustainable forest management (SFM) to meet the social, economic, ecological, cultural, and spiritual needs of present and future generations (Park and Lee 2014). According to Article 12d of the Forest Principles: “Appropriate indigenous capacity and local knowledge regarding the conservation and sustainable development of forests should, through institutional and financial support and in collaboration with the people in the local communities concerned, be recognized, respected, recorded, developed, and as appropriate, introduced in the implementation of programs. Benefits arising from the utilization of indigenous knowledge should therefore be equitably shared with such people” (UN 1992).

Community forest management (CFM) has been recognized over the past three decades as an approach to SFM. CFM has been practiced for many years throughout the world (Pagdee et al. 2006) including in Asia (Poffenberger 2006). In CFM, communities have access to the land and its resources, participate in decisions concerning the forest, and protect and restore forests (Brendler and Carey 1998). The community plays a positive role in resource management as a small spatial unit, as a homogenous social structure, and as shared norms (Agrawal and Gibson 1999).

Recognizing the roles of the community in natural resource management, the concept of social capital has gained support in explaining collective action by lowering transaction costs and inhibiting free-riding in natural resource management (Ostrom 1994). Recently, social capital is regarded as a determinant of successful CFM for the sustainability of forests and communities. Several factors may affect the level of social capital; therefore, there is a need to identify and analyze the relationships between these factors. Several studies focus on social capital and community-based forest resource management (Djamhuri 2008; Akiefnawati et al. 2010; Garcia-Amado et al. 2012; Chand et al. 2015). Djamhuri (2008) determined that social capital facilitates the effectiveness of collective actions in forest security and benefit sharing in forest management by Javanese rural communities. Akiefnawati et al. (2010) featured the importance of both bonding and bridging forms of social capital between actors as a means of conflict resolution in Hutan Desa in Lubuk Beringin, Indonesia. Garcia-Amado et al. (2012) found that social networks facilitate the effective management of natural resource management, but do not guarantee its long-term success. Furthermore, Chand et al. (2015) estimated the production efficiency of community forestry in Nepal. They examined social capital, finding that it contributed positively to production efficiency. In summary, previous works focused primarily on analyzing the effective roles of social capital in CFM.

However, most works do not evaluate the factors affecting elements of social capital. A more detailed analysis on social capital will be invaluable in understanding the practices of CFM, and establishing and implementing related policies by
government. Based on this context of social capital and CFM, this study aims to identify and analyze the key factors influencing social capital in Indonesian CFM, especially in the buffer zone of Indonesian national parks. The research results could provide valuable insights for relationships between social capital and CFM.

**Social capital**

In terms of definition, social capital has broad dimensions. Social capital is not similar to human capital, although the concept of social capital begins from the development of human capital. Woolcock (1998, p. 154) explained that the classical economist identified land, labor, and physical capital as the three basic factors shaping economic growth. In the 1960s, neo-classical economists introduced the notion of human capital. Becker (1962) argued the effects of investment in human capital such as education to earnings. Regarding physical and human capital, sociologists, economists, and political scientists working within the field of the so-called “new economic sociology” (Swedberg 1997) have begun to discuss social capital, a broad term encompassing the norms and networks facilitating collective action for mutual benefit (Woolcock 1998, p. 155). Furthermore, Coleman (1988) highlighted the differences between physical capital, human capital, and social capital. If physical capital is wholly tangible and embodied in observable material form, then human capital is less tangible, embodied in the skills and knowledge acquired by an individual. Social capital is less tangible, for it exists in the relations between persons. Fukuyama (2001, p. 7) defined social capital as “an instantiated informal norm that promotes cooperation between two or more individuals.” Social capital is instantiated in an actual human relationship and leads to cooperation in groups. Therefore, it is related to traditional virtues such as honesty, keeping commitments, reliable performance of duties, and reciprocity. Cooperation in communities that hold the norm with traditional virtues can be a driving factor of successful development in any sector. Bourdieu (1986, p. 248) described social capital as one form of capital and as “the aggregate of the actual or potential resources linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition.” Both Coleman (1988) and Bourdieu (1986) viewed social capital as resources in communities for achieving the common interests of the group. The similarity especially focuses on the individual as a unit of analysis in social capital studies.

Social capital experts have their own perspectives regarding the elements forming social capital. Coleman (1988) mentioned that the forms of social capital consist of obligations, expectations, trustworthiness of structures, information channels, norms, and effective sanctions. On the other hand, Putnam (1993, p. 167) stated that social capital refers to the features of social organization such as trust, norms, and networks that can improve the efficiency of society by facilitating coordination and cooperation for mutual benefit.

Meanwhile, in the early 21st century, Uphoff (2000) classified the elements of social capital into two categories; namely structural and cognitive. The structural category is associated with various forms of social organization, particularly roles, rules, precedents, and procedures as well as a wide variety of networks that contribute to cooperation in mutually beneficial collective action (MBCA). The cognitive category derives from mental processes, reinforced by culture and ideology, specifically norms, values, attitudes, and beliefs that contribute to cooperative behavior and MBCA. The norms, values, attitudes, and beliefs that constitute cognitive social capital rationalize cooperative behavior and make it respectable. These two social capital domains are intrinsically connected, because although networks, roles, rules, precedents, and procedures can have observable lives of their own, ultimately they all emerge from cognitive processes. Structural social capital assets are extrinsic and observable, while cognitive social capital assets are not. However, both the social structural and cognitive realms are linked in practice (and in social science theory) by subjective behavioral phenomena known as expectations (Uphoff 2000).

Hasbullah (2006) classified the elements of social capital into six elements: trust; participation in a network; reciprocity; social norms; values; and proactive action. Trust, trustworthiness, or confidence is the form by which to take risks in the social relationship, which is based on the feeling of certainty that others will do something as expected and act in a pattern of mutual support. In other words, this is the assumption that at least others will not act in a way that harms the group (Putnam 1993). Trust, as a main component of social capital, makes it possible to maintain peaceful and stable social relations, which form the basis for collective behavior and productive cooperation (Newton 2001). Mutual trust in society unites communities and contributes to the improvement of social capital (Fukuyama 1997). Hasbullah (2006) and Fu (2004) divided trust into three levels, namely: (i) the individual level, which refers to individual wealth, personal variables, and individual characteristics; (ii) the level of social relations as a collective attribute to achieve group goals; and (iii) the level of a social system, which is public value development facilitated by the existing social system. Trust is an important element in building social capital. A lack of trust in communities decreases the level of social capital. As capital, trust establishes cooperation between individuals in groups or among groups and other groups.

Fukuyama (2002) states that the understanding of social capital as norms and values promoting cooperation frequently originates in phenomena such as religion, shared historical experiences, and other deeply embedded cultural traditions that can be shaped only with great difficulty. From a policy standpoint, the most difficult situation to deal with is a society that thoroughly lacks social trust. Therefore, social trust as part of social capital stems from religion, shared historical experiences, and embedded cultural tradition. Social capital needs a social network to connect these resources through coordination and cooperation to achieve certain interest in an association. The key to success in establishing social capital depends on the ability of a group of people in an association to be involved in a social networking relationship (Hasbullah 2006). Social capital is tinged with a tendency for the exchange of kindness among individuals in the group and between groups, which is sometimes altruistic. Altruism is the passion to help others and give attention to the interests of other people. In a community and social group with strong reciprocity, the community will ultimately demonstrate a high level of social capital. Hasbullah (2006) added that a community with strong reciprocity might not necessarily have a large enough positive impact on other groups. For a community with an inward-looking typology, strong reciprocity will be a positive value for its environment, but will not necessarily result in a positive value for the other groups. Otherwise, in a group with strong reciprocity and an open outward-looking character, a wider positive impact is possible.
A social norm is a set of rules that are expected to be obeyed and followed by members of the public in a particular social entity (Hasbullah 2006). Social norms are influential and have a role in controlling the community’s attitudes and behaviors. These norms are usually not written, but are understood and adopted by each member of the community to determine their behavior in developing relationships in a social community. Effective norms can constitute a powerful form of social capital. This social capital facilitates certain actions and constrains others (Coleman 1988). Furthermore, values have an important role in human life and are usually embedded and nurtured in a community’s culture or ethics. In a community, culture has a certain value that dominates the development of ideas in conducting an activity together. The domination of certain ideas in communities forms and influences the rules of the behavior forming a cultural pattern (Hasbullah 2006). An important element of social capital is the strong desire of the members of the group to participate and look for a way to be involved in community activities (Hasbullah 2006). Community members can demonstrate proactive behavior to enrich the community materially and socially without harming others.

**Community forest management in Indonesia**

Indonesia is covered by 131.2 million ha of forests. Of this, 0.84 million ha of forestland is under the CFM, which amounts to 1% of the national forest estate (Gilmour 2016, p. 26). A legal framework for social forestry or CFM has been introduced in Indonesia. Ministerial regulation No. P.1/2004 (although it was already repealed and replaced by Ministerial regulation No. P.37/2007) defined social forestry as a system for forest resources management in national and private forest areas that provides an opportunity to local communities as key players or primary partners to improve their prosperity and perform SFM (Damayanti et al. 2013, p. 27). Indonesia has a long history of social forestry programs. The Forest Community Development Program (FCDP; Program Pembinaan Masyarakat Desa Hutan) included income-generating activities, infrastructure development, and conservation of natural resources, and was initiated in 1991 by the Directorate General of Forest Production (Kusumanto and Sirait 2002, p. 11). In 1995, the Directorate General of Rehabilitation and Social Forestry initiated the Community Forestry Program (Program Hutan Kemasyarakatan) to increase local community participation in forest resource management (Kusumanto and Sirait 2002, p. 11). In the Gunug Kidul District, Hutan Kemasyarakatan (HKM), a new social forestry program, was formulated in 2001 and established in 2002 (Djamhuri 2008, pp. 84–85). Here, the transfer of rights from the state to community members was a useful approach in establishing an effective incentive structure that provides net gain to the community. As a state-owned enterprise with the authority to manage forests in Java, Perum Perhutani developed a collaborative forest management process with the community, Managing Forest with the Community (Pengelolaan Hutan Bersama Masyarakat [PHBM]), to improve the community’s welfare and quality of life (Djajanti 2006). In the case of PHBM in Gunug Lasem Forest subdistrict, CFM provides the community with more equitable access to forest resources, particularly in harvesting non-timber forest products (Djajanti 2006). However, CFM does not guarantee the alleviation of poverty of forest-dependent communities. It has been set only to ensure the subsistence economy of the communities, and is yet to provide them with an escape from poverty in PHBM community forestry in Java (Maryudi and Krott 2012).

**Research design and methods**

**Study area**

This study was conducted in Mount Ciremai National Park (MCNP) (Figure 1), which is located at 108°20’– 108°40’E longitude and 6°40’–6°58’S latitude. The MCNP region covers a total area of 15,500 ha, with around 8700 ha located in the administrative area of Kuningan District, West Java Province, and around 6800 ha in Majalengka District. The management of MCNP was divided into two national park management sections (NPMS) based on administrative locations (NPMS I for Kuningan and NPMS II for Majalengka). The analysis was conducted at NPMS II for Majalengka, which was divided into five resorts and had seven subdistricts with 18 buffer villages. Based on data from the MCNP buffer zone, the community forest included 15 villages with 2783 farmers in 42 forest farmer groups.

**Data**

Data were obtained through field observations, a literature review, a survey, informal interviews, and document analysis. Primary data were collected through a survey using a structured questionnaire. The questionnaire was prepared based on the Social Capital Assessment Tool (SCAT) (Krishna and Sharder 1999) and the Social Capital Integrated Questionnaire (SC-IQ) (Grootaert et al. 2004). The questionnaire targeted households (forest farmers) that were members of the forest farmer groups.

In total, 15 buffer villages developed community forests with 2783 community forest farmers from 42 forest farmer groups. Data were collected from relevant institutions such as Extension Agencies of Agriculture, Fisheries, and Forestry of Majalengka Regency (BP4K Majalengka), the Forestry Agency of Majalengka Regency, the Mount Ciremai National Park Office, and the Central Agency of Statistics of Majalengka Regency. Samples were obtained using the Slovin formula and a simple random sampling technique, because of homogeneous population characteristics. Data were constructed by collecting samples from 118 households of community forest farmers in 31 forest farmer groups.

**Research design**

A qualitative descriptive analysis was conducted to investigate: (i) individual characteristics; (ii) knowledge of CFM; (iii) external factors; and (iv) social capital elements. The score for each sub-variable was obtained based on survey results and analyzed using the interval value formula:

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\text{Interval value} = \frac{\text{Difference between the highest total score and the lowest total score}}{\text{Class number}}
\]

Individual characteristics, knowledge of CFM, and external factors were evaluated based on three categories: (i) low (lowest); (ii) moderate; and (iii) high (highest). In addition,
the category of social capital elements was based on the continuum of social capital (Uphoff 2000). Here, the categories were “minimum,” “low,” “moderate,” and “high,” and their scores were 1 (lowest), 2, 3, and 4 (highest), respectively.

We developed an empirical model to determine the relationships between social capital and key influencing factors. Social capital, as a dependent variable (Y1), includes trust, social networking, social norms, proactive action, and concerns. The level of trust of various stakeholders including community leaders, forest farmer groups, forest agencies, extension agencies, and the national park office was measured.

Social networking was measured by the number of joined groups, motivation to join groups, willingness to participate and coordinate in the group, interaction of respondents with other members in the group, and intensity of attendance in a group’s internal and external meetings. Social norms were measured by the level of obedience to religion rules, customary norms and governmental regulation, honesty and decency in daily life in the community, and behavior to avoid conflicts among community members. Proactive action includes: efforts to share information, experiences, and knowledge with others; clean and safeguard the environment; and participation in solving conflicts in community life and in the government’s development program. Concerns refer to attitudes that show concern, solidarity, and empathy to community members and the surrounding environment. Influencing factors comprise internal factors (X1, X2) and external factors (X3) as independent variables. Internal factors include age, formal education, non-formal education, land ownership, level of income, level of health, number of family dependents, period of stay, period of community forest development, motivation to participate in community forest development, and conceptual and procedural knowledge. Conceptual knowledge is the understanding of the concept of community-to-community forest development, regulations,
and benefits. Procedural knowledge describes the ability of
the community to manage their community forest such as
through planting, harvesting, and marketing. Procedural
knowledge refers to the technical abilities of CFM. External
factors include forestry extension activities, the role of farmer
groups, and access to information. The variable of forestry
extension activities is measured with the frequency of
forestry extension activities, the position of the committee of
forestry extension activities, the benefit of forest extension,
and so on. The roles of forest farmer groups include the
improvement of knowledge and skills, and producing and
marketing community forest products. The variable of access
to information refers to the availability of information mea-
sured according to the number of accessible information
sources, level of respondents’ understanding of the received
information, and level of information benefits.

To conduct an empirical analysis, we used multiple linear
regression models with SPSS. Figure 2 describes the research
framework of social capital with all variables.

Results

Status of community forest management

Community forests in buffer villages of the MCNP developed
monoculture and mixed forest/agroforestry systems mainly
in upland areas. The Majalengka management section of the
MCNP comprises seven subdistricts with community forests,
where 2783 persons joined forest farmers groups among the
total population (i.e. 45,043) in buffer villages. Furthermore,
others developed community forests as part of their own
businesses. CFM demonstrated a traditional management
pattern known as “tumpangsari,” a system passed down from
ancestors. This method was introduced in Java in the late
19th century as a reforestation method mostly in state-owned
teak forests for timber production (Djamhuri 2008, p. 84).
This traditional pattern was known as an agroforestry system,
and the selection of cultivation systems in CFM was based on
land suitability, community needs, community culture, and
market demand.

The buffer village communities in the MCNP under the
Majalengka Management Section work in the agricultural
sector as land-owning farmers, sharecroppers, or farm work-
ers. Major commodities produced include crops and vegeta-
bles in the agricultural sector. The plantations in community
forests produce coffee, cloves, coconuts, and avocados. Some
community members work as breeders, traders, and govern-
ment employees. Regarding farming commodities, they pro-
duce chickens, cattle, goats, and sheep. Many community
members work in the agricultural sector, and therefore they
depend on agricultural land and require lands for their farm-
ing activities. However, community land ownership in the
MCNP buffer zone is only 0.2 ha per household; therefore,
community members depend on resources and land within
the MCNP area (Mount Ciremai National Park 2011).

For respondents, the economic condition of the agricul-
tural sector is crucial. Community forests represent a farming
business of high economic value and provide farmers with
opportunities for additional income. According to the survey,
farmers’ average annual income from the community forest
business is Rp. 61,925,455 (around US$5160). In the livestock
business, farmers earn an average annual income of Rp.
11,137,179 (around US$928), and for other types of agricul-
tural business lines, an average annual income of Rp.
16,518,919 (around US$1377). According to the results, there
was a significant increase in farmers’ income from commu-
nity forests, indicating that CFM provided economic benefits
for forestry development and increased community welfare
around the forest area (Table 1).

Regarding occupations, 92.37% of the respondents were
farmers, followed by entrepreneurs (3.39%), farm workers
(2.54%), village officers (0.85%), and teachers (0.85%)
(Table 1). This clearly indicates that most community mem-
bers rely on the agricultural sector as their major source of
livelihood. Although some had insufficient land for farming,
they still worked in the agricultural sector as farm workers.

Respondents were homogeneous in terms of sociocultural
characteristics. They had similar ethnic and religious back-
grounds in that all were male, Sudanese, and Muslim. These
characteristics were representative of buffer village
communities in the Majalengka Management Section of the MCNP. Here, no social conflict was expected between community members because they formed homogeneous communities with the same ethnic, cultural, and religious background.

**Measurement of internal and external factors as well as social capital**

We measured key variables including internal and external factors, as well as social capital through the survey. For internal factors, we first measured individual characteristics including age, formal education, non-formal education, land ownership, level of income, level of health, number of family dependents, period of stay, period of community forest development, and motivation to participate in community forest development. In addition, we measured two levels of individual knowledge on CFM, namely conceptual and procedural knowledge. As external factors, we measured the level of forestry extension activity, role of forest farmer groups, and access to information in the respondent’s community. Finally, social capital including level of trust, social networks, social norms, proactive actions, and concern was measured in terms of total score, average, and maximum-minimum scores.

Regarding individual characteristics of communities, measurement results indicate that respondents were of productive age, had low levels of formal education, lacked non-formal education, had wide land ownership, had moderate levels of income, were generally healthy, had few family dependents, showed long periods of stay, spent little time in conducting community forest development, and had moderate levels of motivation for participating in community forest development. These individual characteristics were in the moderate category with a score of 17.24 from the class level of 16.67–23.34 (Table 2). The community’s individual characteristics can affect development and management of community forests, because such characteristics reflect those individuals involved in CFM.

In addition, results indicate that the level of knowledge on CFM was high overall (Table 3). While respondents had a high level of conceptual knowledge on CFM, they demonstrated a moderate level of procedural knowledge (Table 4). Respondents understood the concept of CFM based on their traditional knowledge and experiences, while they acquired procedural knowledge of forest management, which is not stereotypical in practice.

External variables including forestry extension activities, the role of forest farmer groups, and access to information scored within the moderate category of scales (Tables 5–6). A community cannot only stabilize employment and income sources, but can also build strong social bonds through extension activities. However, results show that communities in the study area did not actively develop and participate in extension activities. In addition, community people recognize the role of forest farmer groups and access to information on a moderate level.

### Table 1. Individual characteristics of respondents.

| Variables/operational definitions | Parameters/operational indicators | Score/category | Frequency % |
|-----------------------------------|-----------------------------------|----------------|-------------|
| 1. Age (X1.1)                     | a. Less productive: 63–70 years old | 1 Low          | 9 7.63     |
|                                   | b. Quite productive: 64–66 years old | 2 Moderate    | 46 38.98   |
|                                   | c. Productive: 30–45 years old    | 3 High        | 63 53.39   |
| 2. Formal education (X1.2)        | a. Elementary                      | 1 Low          | 95 80.51   |
|                                   | b. Middle school                   | 2 Moderate    | 11 9.32    |
|                                   | c. High school/university           | 3 High        | 12 10.17   |
| 3. Non-formal education (X1.3)    | a. Never                           | 1 Low          | 103 87.29  |
|                                   | b. Some: 1–2 times                 | 2 Moderate    | 12 10.17   |
|                                   | c. Often: ≥ 3 times                | 3 High        | 3 2.54     |
| 4. Land ownership (X1.4)          | a. Narrow: 0.8 ha                  | 1 Low          | 51 43.22   |
|                                   | b. Quite wide: 0.81–2.86 ha        | 2 Moderate    | 42 35.59   |
|                                   | c. Wide: > 2.87 ha                 | 3 High        | 25 21.19   |
| 5. Level of income (X1.5)         | a. < Rp. 666,261                   | 1 Low          | 4 3.39     |
|                                   | b. Rp. 666,262–Rp.12,672,072       | 2 Moderate    | 108 91.53  |
|                                   | c. > Rp. 12,672,073                | 3 High        | 6 5.08     |
| 6. Level of health (X1.6)         | a. Bad: > 20 days                  | 1 Low          | 9 7.63     |
|                                   | b. Healthy enough: 10–20 days      | 2 Moderate    | 57 48.31   |
|                                   | c. Healthy: < 10 days              | 3 High        | 52 44.07   |
| 7. Number of family dependents (X1.7) | a. 0–3                           | 1 Low          | 97 82.20   |
|                                   | b. 4–8                            | 2 Moderate    | 16 13.56   |
|                                   | c. > 9                            | 3 High        | 5 4.24     |
| 8. Period of stay (X1.8)          | a. Short: < 29 years               | 1 Low          | 16 13.56   |
|                                   | b. Quite long: 29–53 years         | 2 Moderate    | 74 62.71   |
|                                   | c. Long: > 53 years                | 3 High        | 28 23.73   |
| 9. Period of CF development (X1.9)| a. Short: < 21 years               | 1 Low          | 107 90.68  |
|                                   | b. Quite long: 21–40 years         | 2 Moderate    | 9 7.63     |
|                                   | c. Long: > 40 years                | 3 High        | 2 1.69     |
| 10. Motivation in CF development (X1.10) | a. Encouragement from the outside | 1 Low          | 60 50.85   |
|                                   | b. Own desire because of higher profits | 2 Moderate  | 31 26.27   |
|                                   | c. Own desire because of concern for forest | 3 High | 27 22.88   |

Table 2. Evaluation of individual characteristics.

| No. | Individual characteristics | Score | Average | Category  |
|-----|----------------------------|-------|---------|-----------|
| 1   | Age                        | 290   | 2.46    | 2 Quite productive |
| 2   | Formal education           | 153   | 1.30    | 1 Education low     |
| 3   | Non-formal education       | 139   | 1.18    | 1 Non-formal education |
| 4   | Land ownership             | 210   | 1.78    | 2 Land quite wide   |
| 5   | Level of income            | 238   | 2.02    | 2 Income moderate   |
| 6   | Level of health            | 278   | 2.36    | 2 Healthy enough    |
| 7   | Number of family dependents| 144   | 1.22    | 1 Low               |
| 8   | Period of stay             | 248   | 2.10    | 2 Quite long        |
| 9   | Period of CF development   | 131   | 1.11    | 1 Short             |
| 10  | Motivation in CF development| 203   | 1.72    | 2 Moderate          |

Total: 2034 17.24 Moderate

Note: "∞" means rounding off to the nearest integer.
Table 3. Respondents' knowledge of community forest management.

| Knowledge          | Total score interval | Category level | Frequency | %   |
|--------------------|----------------------|----------------|-----------|-----|
| Conceptual         |                      |                |           |     |
| < 13               | Low                  | 0             | 0         |     |
| > 13–18            | Moderate             | 22            | 18.64     |     |
| > 18               | High                 | 96            | 81.36     |     |
| Total              |                      |                | 118       | 100.00 |
| Procedural         |                      |                |           |     |
| < 25               | Low                  | 5             | 4.24      |     |
| > 25–35            | Moderate             | 88            | 74.58     |     |
| > 35               | High                 | 25            | 21.19     |     |
| Total              |                      |                | 118       | 100.00 |

Note: “=” means rounding off to the nearest integer.

Table 4. Evaluation of community forest management knowledge.

| No. | Knowledge of community forest management | Score | Average | Category |
|-----|------------------------------------------|-------|---------|----------|
| 1   | Conceptual knowledge                      | 332   | 2.81±3  | 3 High   |
| 2   | Procedural knowledge                      | 256   | 2.17±2  | 2 Moderate |
| Total|                                          | 588   | 4.98    | High     |

Note: “=” means rounding off to the nearest integer.

Table 5. External factors.

| External factors | Total score interval | Category level | Frequency | %   |
|------------------|----------------------|----------------|-----------|-----|
| Extension activity |                      |                |           |     |
| < 13             | Low                  | 0             | 0         |     |
| 13–18            | Moderate             | 68            | 57.63     |     |
| > 18             | High                 | 50            | 42.37     |     |
| Total             |                      |                | 118       | 100.00 |
| Role of forest farmer groups |                |                |           |     |
| < 15             | Low                  | 6             | 5.08      |     |
| 15–21            | Moderate             | 72            | 61.02     |     |
| > 21             | High                 | 40            | 33.90     |     |
| Total             |                      |                | 118       | 100.00 |
| Access to information |                  |                |           |     |
| < 10             | Low                  | 6             | 5.08      |     |
| 10–14            | Moderate             | 83            | 70.34     |     |
| > 14             | High                 | 29            | 24.58     |     |
| Total             |                      |                | 118       | 100.00 |

Table 6. Evaluation of external factors (n = 118).

| No. | External factors | Score | Average | Category |
|-----|------------------|-------|---------|----------|
| 1   | Forestry extension activity | 286   | 2.42±2  | 2 Moderate |
| 2   | Role of forest farmer groups | 270   | 2.29±2  | 2 Moderate |
| 3   | Access to information | 259   | 2.19±2  | 2 Moderate |
| Total|                  | 816   | 6.90    | Moderate |

Note: “=” means rounding off to the nearest integer.

As a result, the social capital of communities in the study area scored within the high category of scales with a total score of 74 from the minimum score of 68.5 (Table 7). All elements of social capital, namely trust, social norms, proactive actions, and concern scored within the high category, except for a moderate level of social networking. The high level of social capital in the community also implies how well communities maintain community forests as a common asset. Based on social interrelation patterns of social capital elements, the type of social capital in buffer village communities in the MCNP under the Majalengka Management Section was bonding-social capital, which is characterized by homogenous communities with an inward-looking orientation to ideas, relationships, and concerns. Because all respondents had similar ethnic and religious backgrounds, communities in the study area tended to shun changes emanating from outside, to be conservative, and to prioritize solidarity-making to develop themselves and their groups in accordance with community values and norms.

Key determinants of social capital

We investigated the impacts of internal and external factors on the level of social capital in a community, because a community’s social capital plays an important role in achieving the community goal of sustainable development including sustainable CFM.

Based on a multiple linear regression analysis, we determined that social capital (32.3%) was significantly influenced by individual factors such as age, level of income, number of family dependents, residence period, and motivation to participate in CFM (Table 8). However, formal education, non-formal education, health, land ownership, and length of CFM did not have significant impacts on social capital. Therefore, individuals can pursue connections or interactions socially to manage their resources, because different forms of social capital to build social networks require considerable time, money, information, and prestige until benefits can be realized. In addition, social capital (31.8%) was significantly influenced by the procedural knowledge of CFM, not by conceptual knowledge. This suggests that procedural knowledge of CFM such as the practical skills of planting, harvesting, and marketing is an internal factor inherent in an individual community that can facilitate relationships between community members and strengthen social capital by being distributed to others.

Furthermore, the role of forest farmer groups significantly contributed to the social capital of a community (Table 8). The only external factor to influence social capital is the role

Table 7. Evaluation of social capital (n = 118).

| No. | Social capital elements | Score | Average | Maximum-minimum score |
|-----|-------------------------|-------|---------|-----------------------|
| 1   | Trust                   | 2456  | 21      | 21–7                  |
| 2   | Social networking       | 1821  | 15      | 21–7                  |
| 3   | Social norms            | 2081  | 18      | 18–6                  |
| 4   | Proactive actions       | 1672  | 14      | 15–5                  |
| 5   | Concern                 | 697   | 6       | 6–2                   |
| Total|                        | 8727  | 74 High | 81–27                 |

Note: Significance at 0.1°, 0.05°, 0.01°.
of forest farmer groups (27.9%). Other sub-variables such as forestry extension activities and access to information had no significant effects on social capital. The role of forest farmer groups had the greatest effect on social capital.

Discussion and conclusions

This study investigated key factors that influence the social capital of a community in forest management. We found that the social capital of a community is determined by internal factors such as individual characteristics and knowledge of CFM, and external factors such as extension activities, the role of the forest farmer group, and access to information. Using the theoretical framework of social capital and multiple linear regression models, we estimated the level of social capital for buffer zone communities in the MCNP under the Majalengka Management Section and relationships between social capital and influencing factors. Elements of social capital scoring in the high category included trust, social norms, proactive actions, and concern. Social networking scored within the moderate category for communities in the MCNP.

The results imply that individual characteristics, procedural knowledge of CFM, and the role of forest farmer groups should be considered by the MCNP office when managing the park’s buffer zone in Indonesia to improve the value of social capital in terms of maintaining the sustainability of CFM.

Overall, some variables had significant relationships with social capital. Among individual characteristics, age, level of income, health, number of family dependents, period of stay, and motivation to participate in CFM had significant relationships with social capital. In particular, the level of income had a significant effect on social capital, which is consistent with previous findings (Uphoff 2000). Knowledge of CFM (conceptual and procedural knowledge) also scored highly. External factors in the moderate category included forestry extension activities, the role of forest farmer groups, and access to information. Procedural knowledge of CFM and the role of forest farmer groups were significantly related to social capital. The results indicate that gaining practical skills pertaining to land preparation, plant species, and seedling production, rather than understanding basic concepts, regulations, market potency, and benefits of CFM is related to social capital in CFM. The process of sharing procedural knowledge might enhance the level of social networking, proactive action, and concerns.

Many studies have shown that knowledge transfer and management is important in developing social capital (Vallejos et al. 2011). It was also found that forest farmer groups, who contribute to improving knowledge and skills and producing and marketing forest products, play a significant role in forming and maintaining social capital. This result indicates that social capital elements can be developed based on togetherness and cooperation with forest farmer groups, and that such efforts involve interactions and relationships. This is consistent with the definition of social capital by Fukuyama (2002), who stated that social capital represents shared norms or values that promote social cooperation instantiated in actual social relationships. This implies that social capital includes an important qualitative dimension crucial for its effectiveness in promoting social cooperation.

In conclusion, the measurement and analysis results for social capital in the high category suggest that the MCNP office should take greater responsibility in managing buffer zones by promoting community members’ concern for CFM to increase community welfare and reduce their dependence on national park areas. Specifically, this can be accomplished by carefully considering the value of social capital belonging to neighboring communities. Because social capital is substantially influenced by knowledge on CFM and the role of forest farmer groups, these factors should be emphasized both quantitatively and qualitatively by the MCNP office. An indirect increase in forestry extension activities is likely to increase community members’ knowledge on managing their community forests. In this regard, the Extension Agency of Forestry of Majalengka Regency should make efforts to enhance knowledge of CFM through forestry extension activities, and strengthen the role of forest farmer groups to facilitate the sustainability of CFM by the Majalengka Regency based on its community timber demand.

This study focused on identifying the key determinants of social capital in a community, because this social capital can contribute to the capacity of sustainable community-based forest management. However, we did not investigate the impact of these social capital factors including individual factors, social knowledge, and external factors on the sustainability of CFM. To understand how social capital improves CFM practices, we must measure the effects of social capital on them. In this study, this remains unexplored. For future study, we may extend our understanding of how social capital and associated factors can enhance CFM practices by measuring the direct and indirect impacts of social capital on sustainable CFM.

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