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# Certification of forest watershed services: A Q methodology analysis of opportunities and challenges in Lombok, Indonesia

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ABSTRACT

This study examines opportunities and challenges of applying *certification of forest watershed services* to a payment for watershed services (PWS) scheme. The certification has potential to mitigate the problem of incomplete information in a PWS scheme, but necessary enabling conditions remain untested, including stakeholder support. To examine stakeholder perspectives, Q methodology was conducted with intermediaries, buyers, and sellers of a PWS scheme in West Lombok, Indonesia. Stakeholders revealed interest in using certification as a capacity-building tool, towards which they indicated a willingness to bear associated costs. However, their preferences indicated confusion about the meaning of certification and skepticism as to its transparency, as well as a need for as-of-yet unavailable simple but scientific standards. The study contributes to analyzing the feasibility of certification as a tool for disclosure of information.



## 1. Introduction

Since the early 1990s, forest certification schemes have emerged for sustainable timber production in managed forests, including the Forest Stewardship Council (FSC) (Auld and Bull, 2003; Cashore et al., 2006; Elliott and Schlaepfer, 2001). As a market-based mechanism, forest certification intends to disclose information on sustainable production of wood products to consumers so that consumers can support sustainable wood production (Rametsteiner and Simula, 2003; Teisl and Roe, 2000). A history of FSC implementation demonstrates that forest certification would also improve forest governance (Cerutti et al., 2011; Pettenella and Brotto, 2012) and stakeholder communication (Tsanga et al., 2014), but its implementation can be restricted by high certification costs and low certification demand (Durst et al., 2006).

There has long been interest in application of forest certification to ecosystem services management for sustainable forest management beyond timber markets (e.g., Griscom et al., 2014; Jaung et al., 2016; Rametsteiner and Simula, 2003; Vogt et al., 2000) as many studies indicate potential links between forest certification and management of various ecosystem services, including forest watersheds (Dias et al., 2015; Jaung et al., 2016). At the same time, the application has been motivated by the expansion of ecosystem services markets, including a payment for watershed services (PWS) scheme (Brouwer et al., 2011; Ezzine-de-Blas et al., 2016; Landell-Mills and Porras, 2002; Wunder, 2015). For this reason, the FSC[1] has tested possibilities to expand its scope from timber to a PWS scheme.

An expansion of forest certification to a PWS scheme would result in a potential certification scheme, which this study defines as *certification of forest watershed services*. Forest watershed services generate a range of services, including improved water quality, increased water quantity, and reduced flood risk, and these services have been traded in PWS schemes (Brouwer et al., 2011; Landell-Mills and Porras, 2002; Escobar et al., 2013). In practice, however, many PWS schemes suffer from incomplete information on actual provision of promised services despite the important role of such information in achieving and assessing scheme outcomes, including effective conservation and cost efficiency (Brouwer et al., 2011; Hanley and White, 2014; Muradian et al., 2010; Wunder et al., 2008). Forest certification has been applied to mitigation of incomplete information on the quality of wood products (Rametsteiner and Simula, 2003; Teisl and Roe, 2000); thus, certification of forest watershed services has the

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[1] Forest Certification for Ecosystem Services (ForCES) (2016, April 10). Retrieved from http://forces.fsc.org. This study was conducted as a part of the ForCES project.

**Table 1**
Payment for watershed services (PWS) schemes with certification applications.

| PWS location | Kapingazi River, Kenya[a] | Munich, Germany[b] | New York, the US[c] |
|---|---|---|---|
| Leading institutions | The World Agroforestry Centre (ICRAF) | Stadtwerke München (SWM, or Munich water utility) | New York City |
| Certification application | Implicit | Explicit | Explicit |
| Certification type | Organic certification / eco-label | Organic certification | Origin certification |
| Certification scheme | – Rainforest Alliance (RA)<br>– UTZ certified (UTZ) | – Bioland<br>– Naturland<br>– Demeter | – Pure Catskills |
| Certification benefit to PWS | Social, economic, and environmental safeguards of upstream farms | Providing a monitoring and verification system for the PWS scheme | Promoting farm products from the PWS regions |
| Certification costs | Financial supports from various institutions, including Rainforest Alliance (RA), Solidaridad (UTZ), and WorldBank (UTZ). | SWM subsidizes farmers to join organic certification. Farmers need to pay a join fee to organic associations. | Farmers pay an annual fee to the Watershed Agricultural Council who manages the certification system. |

[a] Sources: Firmian et al. (2011), Mitei (2011), Schoonhoven-Speijer (2012), UTZ certified (2015).
[b] Sources: Alpine Convention (2011), Barataud et al. (2014), Escobar et al. (2013), Grolleau and McCann (2012), Vlahos and Schiller (2014).
[c] Sources: DEP (2014), Grolleau and McCann (2012), Pires (2004), Pure Catkills (2015).

potential to mitigate the problem of incomplete information in PWS schemes, such as information on quantification of watershed services and safeguards of forest watersheds.

Because certification of forest watershed services is a potential scheme, however, its enabling conditions have been unknown, including support and demand for its application in PWS schemes. The aim of this study is to examine opportunities and challenges of applying the certification scheme to PWS schemes by a Q methodology analysis (e.g., Brown, 1980) of PWS stakeholder perspectives in West Lombok, Indonesia. Since PWS schemes are a potential market for certification of forest watershed services, PWS stakeholders are considered as potential certification stakeholders, and their perspectives are assumed to affect certification implementation for several reasons. Consensus of certification stakeholders is a likely requirement in the establishment of standards, as it is in other voluntary certification schemes (AWS, 2014; Cashore et al., 2006; Kollmuss et al., 2010). Stakeholder insights are likely to influence designs and standardization processes of the certification scheme, as has been the case in developing the FSC standards (Auld and Bull, 2003; Balzarova and Castka, 2012; Cashore et al., 2006; Elliott and Schlaepfer, 2001). In addition, stakeholder perspectives are an indicator of potential demand for certification. Thus, an analysis of PWS stakeholder perspectives is an effectively means to identify market challenges and opportunities associated with developing certification of forest watershed services.

## 2. Certification in PWS schemes

Certification of forest watershed services faces challenges associated with limitations of forest watershed management, PWS schemes, and forest certification (Meijaard et al., 2011, 2014). First, forest watershed management is difficult to systematize due to the complex, heterogeneous, and site-specific nature of upstream and downstream management (Meijaard et al., 2011, 2014). This uncertainty is seen as likely to undermine a market mechanism, such as certification, and challenges the development of its standards. Standards development is further challenged by the limited extent of scientific expertize in quantification of forest watershed services and by the need to develop standards that are simple enough for application by upstream communities (or PWS service providers). Second, demand for by PWS schemes may be limited or non-existent (Meijaard et al., 2014). Many PWS schemes are financed by government or development agencies rather than service users such that decisions may be less influenced by market factors. Third, certification of forest watershed services is subject to high certification costs and low uptake in tropical forests like forest certification (Meijaard et al., 2011). The high costs of forest certification act as a barrier to entry to small firms and landowners; only firms with high economies of scale could afford the costs without external support. Uptake of the certification scheme could be also less successful in tropical forests compared to temperate forests, according to the uptake of forest certification (Durst et al., 2006).

In contrast, potential opportunities for certification of forest watershed services can be envisaged from PWS schemes, where conventional certification schemes are already in place (Table 1). Such certification applications can be described as either *implicit* or *explicit*. An implicit application uses certification as a medium to build the enabling conditions for a PWS scheme, while explicit application utilizes certification as part of the implementation of a PWS scheme.

A case of implicit application is the PWS scheme in Kapingazi River, Kenya, led by the World Agroforestry Centre (ICRAF). The scheme aims to manage upstream watersheds of Kapingazi River, where a number of tea and coffee farms exist (Firmian et al., 2011). Before the PWS scheme was launched, some of these farms had already obtained agricultural certification, such as UTZ certified[2] and Rainforest Alliance (Firmian et al., 2011; Mitei, 2011; UTZ certified, 2015). It is expected that these certification schemes have benefited the PWS scheme by improving farmers' capacity to implement organic practice and by incorporating social and economic safeguards (Firmian et al., 2011; Schoonhoven-Speijer, 2012).

Cases of explicit application include the PWS schemes in Munich, Germany, and New York City, USA. The PWS scheme in Munich explicitly utilizes organic certification (e.g., Bioland, Naturland, and Demeter) as a monitoring and verification system (Alpine Convention, 2011; Escobar et al., 2013; Grolleau and McCann, 2012). Upstream farmers in Mangfall Valley in Munich can become eligible to receive full payment from the scheme when they join and maintain organic certification as reduced agricultural inputs by organic practice contribute to improving water quality (Barataud et al., 2014; Vlahos and Schiller, 2014). This financial incentive rapidly increased the number of certified farms from 23 in 1993 to 150 in 2010 (Barataud et al., 2014). By applying organic certification, the Munich PWS scheme did not have to establish a new system of monitoring and verification which involves high costs.

[2] UTZ means "Good" in the Mayan language (Ingenbleek and Reinders, 2013).

The PWS scheme in New York City, USA, uses a certification of origin, whereby local farm products from the Catskills region are labeled as "Pure Catskills" (Grolleau and McCann, 2012; Pure Catkills, 2015). The Catskills region is the major watershed for New York City, and local farmers are paid by the city for improved watershed management (Grolleau and McCann, 2012; Pires, 2004). The Pure Catskills label, launched in 2004, complements those direct payments through a buy-local campaign promoting Catskills farm products to the city consumers based on claims of the region's contribution to the city's clean drinking water (DEP, 2014; Pure Catkills, 2015). Pure Catskills is managed by the Watershed Agricultural Program, which works as a PWS intermediary and provides technical support to farmers to improve their water management (Grolleau and McCann, 2012).

Despite these cases, no studies specifically analyze PWS stakeholder perspectives on certification of forest watershed services, which we assume critical to certification development and implementation. Thus, the study analyzes diverse perspectives on the certification scheme to shed light on its opportunities and challenges by employing Q methodology with key informants from buyers, sellers, and intermediaries of the PWS scheme in West Lombok, Indonesia.

## 3. Methods

### 3.1. Q methodology

Q methodology is a qualitative-and-quantitative method designed to analyze subjective experience or key viewpoints of participants (Brown, 1980; McKeown and Thomas, 2013; Watts and Stenner, 2012). Developed by William Stephenson (1953), the method has been applied in diverse fields from environmental studies to psychology in order to examine stakeholder perceptions or discourses around specific topics (Barry and Proops, 1999; Watts and Stenner, 2005; Webler et al., 2009). Recently, Q methodology has been applied in many studies on ecosystem services and climate change (e.g., Armatas et al., 2014; Fisher and Brown, 2014; Lo, 2013; Schneider et al., 2015). A key strength of Q methodology is its systematic examination of holistic perspectives of participants by employing quantitative logic, which integrates hypothetico-deductive approach into Q methodology (Watts and Stenner, 2005; Webler et al., 2009).

The method involves the following steps: developing diverse statements on a subject (or Q statements) (Section 3.2); asking participants to sort these statements following a quasi-normal distribution (or Q sorts) (Sections 3.3 and 3.4); examining correlations among Q sorts by using inverted factor analysis and extracting dominant perspectives (or factors) from the correlations (Section 3.5); and interpreting the extracted factors (Sections 4 and 5) (Brown, 1980; McKeown and Thomas, 2013; Watts and Stenner, 2012). Our application of these steps for this study is detailed below.

### 3.2. Q statements

A total of 48 Q statements were established, covering a wide range of challenges and opportunities of developing certification of forest ecosystem services (Table 3). The statements were based on online surveys of FSC experts and supporters, including FSC Network Partners, the World Wide Fund for Nature's Global Forest & Trade Network (WWF-GFTN), Greenpeace, and on a literature review of enabling conditions of forest certification and eco-labels.

Following Dillman's tailored design (Dillman, 2011), two online surveys asked FSC experts and supporters about expected challenges and opportunities of developing the certification scheme based on their experience with FSC certification and knowledge of regional conditions. *The first survey* was conducted with the FSC Network Partners around the world from April 16–30, 2012. Contact emails were collected from the websites of the FSC and FSC Network Partners. 47 emails were sent out, two emails bounced back, and 18 responded from 18 different countries. The response rate was 40% (=18/45). *The second survey* targeted the WWF-GFTN network, Greenpeace, and FSC supporters identified from the first analysis. The survey was conducted from July 10 to August 10, 2012. 72 email contacts were collected (WWF: 31, Greenpeace: 34, other agents: 7), and 25 responded. The response rate was 35% (=25/72).

The literature on forest certification was reviewed in order to round out the range of previously mentioned challenges and opportunities into the Q statements (e.g., Auld and Bull, 2003; Cashore et al., 2006; Chen et al., 2011; Durst et al., 2006; Kozak et al., 2004; Rametsteiner and Simula, 2003).

### 3.3. Study site and participants

The study was conducted in West Lombok, Indonesia, where a well-known scheme of payment for watershed services (PWS) is being implemented (Fig. 1). Consequently, the scheme has been examined by many studies (e.g., Fauzi and Anna, 2013; Pirard, 2012; Pirard et al., 2014; Prasetyo et al., 2009; Schweizer et al., 2016; WWF, 2014). On Lombok Island, the upstream forests in Mountain Rinjani are major water catchment areas (Magdalena et al., 2013; WWF, 2014). These watersheds support the main water source of the island's piped water, managed by a local state water company, or Perusahaan Daerah Air Minum (PDAM). Piped water of PDAM Giri Menang is a major water source for the residents in Mataram City and West Lombok District. Historically, Lombok's upstream forests suffered from various deforestation activities resulting in a reduction of water quality and the disappearance of upstream springs (Fauzi and Anna, 2013; Prasetyo et al., 2009). Initiated in 2003, the PWS scheme aims to improve forest management and community livelihoods (WWF, 2014). Main achievements of the scheme include establishment of West Lombok government regulation (No. 4/2007) to support watershed services management, a charge of service fees to buyer users since 2009 through regulatory enforcement, and development of a multi-stakeholder institution, called Institusi Multi Pihak (IMP), in 2007 for independent management of the PWS scheme and its funding (WWF, 2014).

There are three major stakeholder groups in the PWS scheme: sellers, buyers, and intermediaries (Table 2). The Q methodology analysis focused on key informants from these groups who were considered to have sufficient experience or engagement with the PWS scheme. The key informants were identified by consultations with local experts. *The sellers* are upstream communities with forests (WWF, 2014). The study interviewed four village heads from upstream communities with PWS experience. *The buyers* are households and private businesses using water of PDAM Giri Menang in West Lombok.[3] The households and private businesses pay Rp. 1000 (or USD 0.10) and Rp. 2000 per month, respectively, for PWS ecosystem service fees (WWF, 2014). The fees are added to their PDAM water bills. The study interviewed six members of a water user association (or Asosiasi Pelanggan PDAM Menang-Mataram) as key informants representing PDAM users in West

[3] We would like to emphasize that the PDAM water users in Mataram City do not pay for the ecosystem service fees; they are not PWS buyers although their perceptions were studied in the initial development of the PWS scheme. Mataram City government allocated annual funds for the PWS scheme (e.g., 1 billion rupiahs, or USD 10,000, in 2013) (WWF, 2014). However, continuation of this government funding is uncertain at the time of writing.

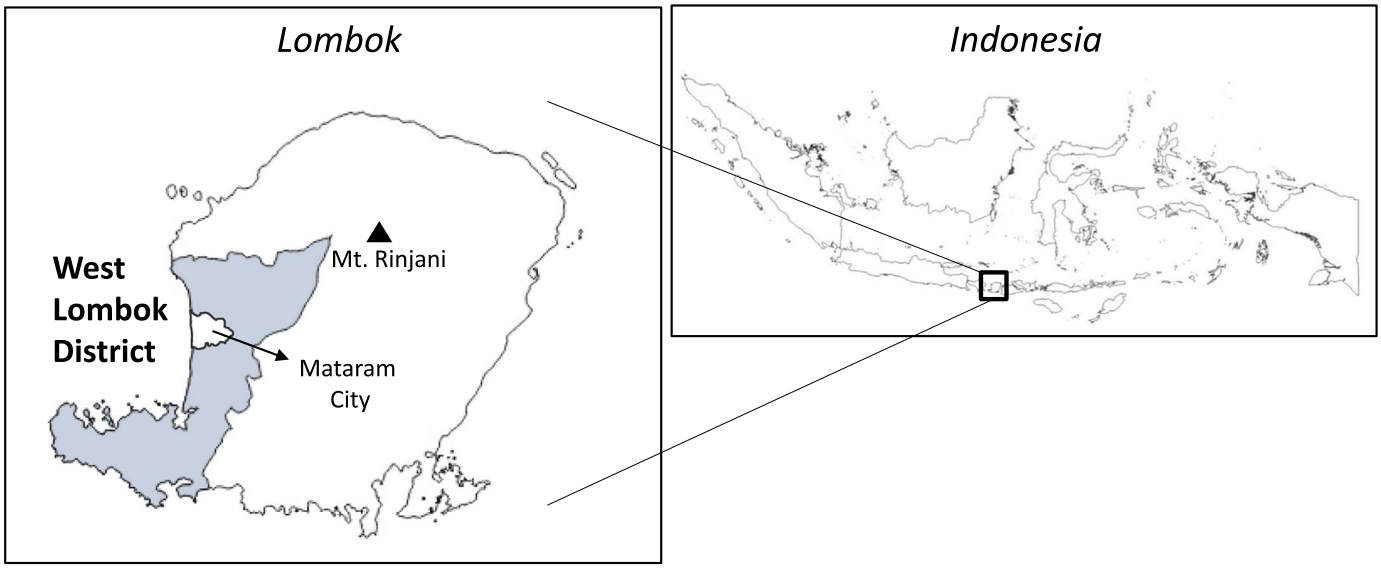


**Fig. 1.** Study site, West Lombok in Indonesia.

**Table 2**
Participants of the Q methodology analysis.

| PWS stakeholders (no.) | Descriptions |
|---|---|
| Sellers (4) | Village heads of the upstream communities |
| Buyers (6) | Members of the water user association |
| Intermediaries (9) | Officers from the IMP office |
| | Officers from PDAM Giri Menang |
| | Officers from the West Lombok Forest Service |
| | Officers from WWF-Nusa Tenggara |
| | Officers from TRANSFORM |

Lombok. The association was established in the early development stage of the PWS scheme whose objective was to represent the buyer group to the PWS scheme. Although its activities have been rather limited, the association obtained legal status in 2015, which improves the formal basis for the association's role as it attempts to perform its function. *The intermediaries* are members of the IMP. The IMP members consist of multiple institutions, such as the West Lombok Forest Service, the IMP office, PDAM Giri Menang, and the WWF-Nusa Tenggara office (WWF, 2014). The study interviewed seven members of the IMP. In addition to the IMP members, two participants from a local NGO, TRANSFORM, were also included in the study due to their expertize in the development history of PWS scheme and upstream forest watershed management in West Lombok.

A total of 25 participants joined the interviews, resulting in 25 corresponding Q sorts. However, only 19 of them were used for the data analysis since the researchers concluded that six of the participants (=25 – 19) were ineligible as key informants because they lacked relevant information on PWS (five participants), or did not produce sufficient quality of a Q sort based on the researchers' judgment (one participant). In spite of the data reduction, 19 participants are not only acceptable for Q methodology but also fit the recommended ratio of participants to Q statements. Q methodology is not restrictive in terms of the size of the participants; highly effective Q studies can be conducted with small numbers of participants (Watts and Stenner, 2005). For Q methodology, Webler et al. (2009) recommend a ratio of 15 participants to 45 Q statements, which is close to our ration of 19 to 48.

### 3.4. Q sorts

Before the interviews, participants received a brief presentation by a local facilitator about the PWS scheme in West Lombok and certification of forest watershed services. Later, participants were asked to sort the 48 Q statements on a quasi-normal distribution built for this study (Fig. 2). The distribution featured a 13-point scale from +6 to −6. When sorting the 48 Q statements, participants were asked to use twelve labeled cups designed to reduce their cognitive burden. First, they were asked to sort the Q statements into three cups labeled as "agree," "neutral," and "disagree." Later, these results were sorted into nine sub-categories by the participants. The sub-categories were "highly agree," "agree," and "less agree" for the results in the *agree* category; "positively neutral," "neutral," "negatively neutral" for the results in the *neutral* category; and "less disagree," "disagree," "highly disagree" for the results in the *disagree* category. After all the Q statements were sorted under the sub-categories, the participants were asked to place the sort results on the distribution board following the researchers' guidance.

### 3.5. Analytic procedures

Collected Q sorts were analyzed with a Q methodology software, PQMethod 2.35 (Schmolck, 2014). Using the software, we conducted principal component analysis and rotated its results using a varimax rotation. We chose a number of factors (i.e., the perspectives) based on two criteria: (1) factors whose eigenvalues are higher than 1, following the Kaiser-Guttman criterion (Guttman, 1954; Kaiser, 1960) and (2) factors that load at least two Q

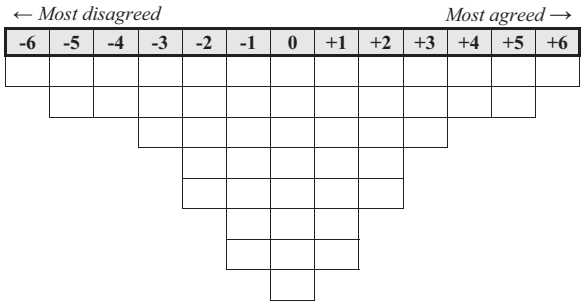


**Fig. 2.** Quasi-normal distribution used for the Q sorts.

**Table 3**
Statement rankings of *Factor A*, *B*, and *C*.

| Q statements | | Factors | | |
|---|---|---|---|---|
| | | A | B | C |
| *Bundling of ecosystem services for certification* | | | | |
| 1 | I think watershed certification needs to manage forest carbon as well. | 1 | −4 | −1 |
| 2 | I think watershed certification needs to manage forest biodiversity as well. | 3 | 4 | 0 |
| 3 | I think watershed certification needs to manage forest ecotourism as well. | 0 | 0 | −1 |
| 4 | I think watershed certification needs to manage timber as well. | −2 | −6 | −2 |
| *Market demand for ecosystem services* | | | | |
| 5 | I think there would be buyers for forest carbon in Sesaot forests. | −3 | 0 | −1 |
| 6 | I think there would be buyers who pay for watershed protection in Sesaot forests. | −1 | 2 | −4 |
| 7 | I think there would be buyers who pay for biodiversity conservation in Sesaot forests. | −1 | 0 | −6 |
| 8 | I think there would be many ecotourists who want to experience Sesaot forests' biodiversity and culture. | 1 | 0 | 0 |
| *Types of information disclosure from certification* | | | | |
| 9 | I think watershed certification should improve the water quantity in the downstream. | 2 | 0 | 0 |
| 10 | I think watershed certification should tell buyers about the quality of certified water (e.g., pH level and temperature). | 2 | 2 | 0 |
| 11 | I think water buyers need to know the quality of water that they buy. | 3 | 2 | 6 |
| 12 | If our water comes from protected watersheds, people protecting these watershed should get economic benefits. | 1 | 3 | 2 |
| 13 | If our water comes from protected watersheds, biodiversity of these watersheds should be protected. | 4 | 3 | 2 |
| 14 | If our water comes from protected watersheds, people protecting these watersheds should get social benefits, such as reducing social conflicts over the watersheds. | 5 | 1 | 1 |
| *Buyers and certification* | | | | |
| 15 | I am often confused with many certification labels in the market. | −4 | −2 | 3 |
| 16 | I am usually not interested in knowing the meanings of certification labels on the water bottles that I am buying them. | −5 | −4 | −5 |
| 17 | Meaning of a certificate label should be explained on the Internet to help buyers of certified products. | 0 | −5 | 5 |
| 18 | I often feel hard to understand certification labels on water bottles but these labels must be still important. | −2 | −2 | 3 |
| 19 | A procedure to issue watershed certification in Lombok should be transparent to the public. | 6 | 3 | 2 |
| *Economic benefits from certification* | | | | |
| 20 | Certified water should not be more expensive than non-certified water. | −6 | −1 | 4 |
| 21 | Certified water should receive a price premium from water buyers. | −2 | 1 | −5 |
| 22 | Watershed certification should have a global market to sell certified water. | −1 | −1 | −3 |
| 23 | Watershed certification should have a national market to sell certified water. | 0 | −3 | −1 |
| 24 | Watershed certification should have a regional market to sell certified water. | 0 | 1 | −2 |
| *Non-economic benefits from certification* | | | | |
| 25 | Watershed certification should improve watershed management in the upstream. | 2 | 5 | 4 |
| 26 | Watershed certification should improve local communities' capacity to manage watersheds. | 3 | 6 | 2 |
| 27 | Watershed certification should support improving watershed regulations in Lombok. | 0 | −3 | −3 |
| 28 | Watershed certification should support improving water users' environmental perceptions on the upstream watersheds. | 4 | 1 | 1 |
| *Certification cost* | | | | |
| 29 | Cost of watershed certification should be low. | −5 | 1 | 1 |
| 30 | Certification's auditing cost should be low. | −3 | 2 | 2 |
| 31 | If certification requires improving watershed management, the cost of this improvement should not be too high to forest owners. | −4 | −2 | −2 |
| 32 | Certification initiatives should subsidize certification cost to keep the certification cost low. | −1 | 1 | −1 |
| 33 | NGOs should subsidize certification cost to reduce its cost. | −2 | −1 | −5 |
| 34 | Governments should subsidize certification cost to reduce its cost. | 0 | 0 | 5 |
| *Certification system* | | | | |
| 35 | Watershed certification should be audited by an independent agent rather than by the upstream communities. | −1 | −1 | 1 |
| 36 | Watershed certification should provide special support for small forest holders. | 1 | −1 | −3 |
| 37 | Certification standards should provide well-established methods to forest owners if certification requires measuring water quality. | 0 | 1 | −1 |
| 38 | Certification standards should allow forest owners to use their own methods to measure water quality if these methods are scientific enough. | −2 | 0 | −4 |
| 39 | Certification standards should be simple even if they are less scientific. | −3 | 2 | 0 |
| 40 | Certification standards should be scientific although they might become a bit complicated. | 0 | −3 | 1 |
| 41 | I think developing standards would be the main challenge of implementing watershed certification in Lombok. | −1 | 1 | 2 |
| *Stakeholder capacity* | | | | |
| 42 | Watershed regulations are critical to implementing watershed certification. | 2 | 4 | 0 |
| 43 | Lombok has a secured watershed regulation. | 3 | −2 | −2 |
| 44 | Local governments need capacity building to support watershed certification technically and administratively. | 5 | −1 | 1 |
| 45 | Local NGOs need capacity building to support watershed certification technically and administratively. | 1 | −1 | 0 |
| 46 | Upstream forest holders need capacity building to implement watershed certification. | 1 | 5 | −1 |
| 47 | Water users need more education to understand watershed certification. | −1 | −2 | −2 |
| 48 | International organizations, such as UN and NGOs, should support watershed certification in Lombok technically and administratively. | 2 | 0 | −1 |

sorts (Brown, 1980). An eigenvalue indicates a percentage of total variance of the data explained by each factor (Brown, 1980). The criteria resulted in three factors: *Factor A*, *B*, and *C*. We selected Q sorts of those factors when factor loadings of Q sorts were significant at $p < 0.01$. In this study, factor loadings higher than 0.59 were significant at $p < 0.01$ based on an equation, $2.58 \times (1/\sqrt{n})$ (Brown, 1980; Watts and Stenner, 2012), where $n$ is the number of Q sorts. After Q sorts of the three factor were chosen, z-scores of the 48 Q statements were calculated for *Factor A*, *B*, and *C*. These z-scores determined the Q statements' rankings (+6 to −6) with *Factor A*, *B*, and *C* on the quasi-normal distribution (Fig. 2). These rankings of the Q statements were used to label and interpret *Factor A*, *B*, and *C* (Table 3).

## 4. Results

Three factors were identified from the stakeholders of the payment for watershed services (PWS) scheme in West Lombok, Indonesia (Table 3). These factors were: cautious anticipation of improvement in the PWS scheme associated with adoption of certification (*Factor A*); anticipation of benefits to upstream communities accrued through adoption of certification (*Factor B*); and skepticism about certification in general (*Factor C*). These factors explained 51% of the total variance and loaded 14 participants out of the 19 participants. The remaining five participants yielded neither significant nor compounded loadings.

### 4.1. Factor A: Cautious anticipation of improvement in the PWS scheme associated with adoption of certification

*Factor A* explained 28% of the total variance whose eigenvalue was 6.56, representing PWS stakeholders' major perceptions on certification of forest ecosystem services. Eight participants were loaded to the factor at a 1% significance level (0.59). Four participants were from the state intermediaries of the PWS scheme. The four other participants came from the water user association.

*Factor A* represents cautious anticipation of improvement in the PWS scheme associated with adoption of certification. On the one hand, caution is required in the certification application process. Procedures of certification implementation should be transparent to the public (19: +6).[4] The local government does not yet have sufficient administrative and technical capacity to support certification (44: +5). On the other hand, certification is expected to benefit to the PWS scheme, particularly through stakeholder capacity building. The certification scheme should improve PWS buyers' environmental knowledge, such as their understandings of forest watershed services, (28: +4) and PWS sellers' administrative and technical capacity to manage forest watersheds (26: +3). The certification scheme would be more beneficial by incorporating disclosure of information on social safeguards (14: +5), environmental safeguards such as biodiversity (13: +4/2: +3), and water quality (11: +3) of upstream watersheds. Due to these expected benefits, the costs of certification should be bearable (20: −6/29: −5/30: −3) as long as certification delivers these values in a transparent way (19: +6).

### 4.2. Factor B: Anticipation of benefits to upstream communities accrued through adoption of certification

*Factor B* explained 14% of the total variance with an eigenvalue of 1.87. Four participants were loaded at a 1% significant level. Three of them belonged to non-state intermediaries of the PWS scheme. One participant was a village head of an upstream community.

*Factor B* represents anticipation of benefits to upstream communities accrued through adoption of certification. Certification needs to improve the upstream communities' capacity to manage forest watersheds (26: +6), which would consequently improve the upstream watershed management (25: +5). Disclosure of information on forest biodiversity is vital for certification (2: +4) because protection of forest biodiversity plays a significant role in forest watershed management (13: +3). However, it is important to notice that as yet the upstream communities do not have sufficient capacity to implement the certification scheme (46: +5). Therefore, certification standards should be simple and applicable by the upstream communities due to the communities' low capacity, even if scientific rigor of the standards might be compromised to some degree (39: +2/40: −3). It is recommended that certification incorporates economic safeguards of the upstream communities (12: +3). Certification costs, such as auditing cost, should be affordable to the upstream communities (30: +2/29: +1), and a price premium for certified watershed services would benefit the upstream communities as well (21: +1/20: −1).

### 4.3. Factor C: Skepticism about certification in general

*Factor C* accounted for 9% of the total variance. Its eigenvalue was 1.46. Two participants were loaded at a 1% significance level: one was a member of the association of water users (or PWS buyers), while the other was a village head of an upstream community (or PWS sellers).

*Factor C* represents general skepticism about certification. It is critical for PWS buyers to know what improvement in water quality they are paying for (11: +6). Consequently, certification would be worthwhile only if certification successfully improves upstream watershed management (25: +4). Despite this benefit, the certification scheme should not increase the current ecosystem services fee of the PWS scheme (20: +4); thus, the government should subsidize adoption of certification and internalize its costs into the PWS scheme (34: +5). It is also important to stress that many buyers are often confused by many certification labels in the market (15: +3). It is challenging for buyers to understand the meaning of these labels (18: +3). Thus, certification information should be publicly available through information posted on the Internet (17: +5).

## 5. Discussion

Our results support the existence of three predominant views (or factors) on certification of forest watershed services among PWS stakeholders in West Lombok, Indonesia (Table 4). These factors and their comparisons shed light on the holistic perspectives of stakeholders as to the opportunities and challenges of applying the certification scheme to the PWS scheme.

First, PWS stakeholders considered certification of forest watershed services as a capacity-building tool (Table 4). It indicated that a price premium for certified watershed services would seldom be a criterion for PWS stakeholders to adopt the certification scheme. The motivation for capacity-building via certification was supported by all the three factors. The only discrepancies among these factors were in the intended targets of capacity building and relative importance of their preferences. The motivation to learn from certification is also observable from other PWS schemes utilizing certification as well as forest owners obtaining forest certification. The PWS schemes in Kenya and Munich, for instance, indicate that organic certification can benefit PWS implementation by building the capacity of upstream farmers (Alpine Convention, 2011; Firmian et al., 2011) (Table 1). These PWS schemes demonstrate that the motivation would exist with both implicit and explicit application of certification in PWS schemes. Moreover, the motivation is identified as one of the main reasons for forest owners to obtain forest certification (Overdevest and Rickenbach, 2006); the motivation is observable from other certification schemes as well.

However, the value attached to the potential to learn from certification does not mean that the incentive of a price premium for certified watershed services is insignificant. Rather it highlights that there are various motivations for PWS stakeholders to adopt certification of forest watershed services. A price premium is an important enabling condition for successful uptake of voluntary certification (Chen et al., 2011; Overdevest and Rickenbach, 2006;

[4] Here, 19 is a Q statement number (Table 3) and +6 is the Q statement's ranking in *Factor A*. This format is consistently applied in this paper.

**Table 4**
PWS stakeholder perspectives on certification for forest watershed services.

| Perspectives | Challenges | Opportunities |
|---|---|---|
| *Factor A*: cautious expectations to improve the PWS scheme | • Building transparent certification<br>• Low stakeholder capacity<br>• Securing international community support | • Improving stakeholder capacity<br>• Disclosing information on watershed safeguards<br>• Potential support for certification costs<br>• Disclosing information on service quality<br>• Improving watershed management |
| *Factor B*: expectations to benefit upstream | • Low upstream capacity<br>• Building simple standards<br>• Maintaining low certification costs | • Improving capacity of upstream communities<br>• Improving watershed management<br>• Disclosing information on biodiversity and economic watershed safeguards<br>• Disclosing information on watershed services |
| *Factor C*: skepticism on certification | • Internalizing certification costs<br>• Buyer confusions about certification<br>• Building scientific standards | • Disclosing information on watershed services<br>• Improving watershed management |

Rametsteiner and Simula, 2003), and this was apparent in the results linked to *Factor B*. As a result, it is very likely that the absence of a price premium would inhibit implementation and uptake of the certification scheme, which confirms the view of Meijaard et al. (2011, 2014).

Second, certification of forest watershed services would depend on financial inputs of intermediaries of PWS schemes other than sellers and buyers. Theoretically, market-based certification depends on demand from both sellers and buyers. As direct customers, sellers pay for achieving certificates to capture a price premium for certified products. As indirect customers, buyers pay for a certified product so as to benefit from credible disclosure of information on product quality. However, our study identifies that PWS intermediaries are another source of demand for certification of forest watershed services, a finding supported by stakeholder perspectives on certification costs (Tables 3 and 4). On the one hand, *Factor A* showed acceptance of certification costs. This rather unusual viewpoint would be partially explained by a strong motivation of stakeholders to learn from the certification scheme: they would be willing to cover certification costs if the certification scheme were to improve the PWS scheme. On the other hand, *Factor B* and *C* were against high certification costs. *Factor B* preferred low certification costs although it was somewhat tolerable to costs of improving watershed management for certification adoption (or indirect costs of certification). *Factor C* strongly preferred government subsidies on certification costs. As a result, these perspectives suggest that one way to satisfy all three factors is adoption of certification with a financial support of PWS intermediaries. Of course, this would be the case only if intermediaries consider that certification values outweigh certification costs. The Munich water utility, for instance, supports all costs to farmers of adopting organic certification in order to benefit from the PWS scheme (Alpine Convention, 2011). The decision to provide the financial support was based on the facts that organic certification can help upstream farmers improve soil management and water quality (Grolleau and McCann, 2012) and that certification costs (0.01 euros per cubic meter of consumed tap water) are in fact lower than the expected costs of water purification (0.30 euros per cubic meter) (Alpine Convention, 2011).

Third, the need of PWS stakeholders for simple but scientific standards is a challenge for certification. Stakeholders had contradictory requests for certification standards. On the one hand, *Factor A* disagreed with sacrificing scientific rigor of standards for the sake of their simplicity. *Factor A* was also neutral in regards to increasing the complexity of standards in order to make them more scientific. In contrast, *Factor B* preferred simple standards and opposed the introduction of complex standards. This challenge is addressed by Meijaard et al. (2011): scientific standards are vital for a certification scheme to effectively manage site-specific complexities of forest watersheds. But complex standards may discourage the participation of small forest holders who may not have the resources to decipher and implement them.

Fourth, forest biodiversity was considered an important component of certification of forest watershed services. PWS stakeholders were interested in the protection of forest biodiversity to improve watershed management despite their pessimistic views on a market for biodiversity. This indicates that they consider forest biodiversity as a strategy to improve forest watersheds rather than as the foundation for tradable biodiversity credits in the market. The early history of the PWS scheme in West Lombok sheds some light on this perspective. The PWS scheme was initially launched to reduce upstream deforestation in Lombok when deforestation was found to be the main cause of the rapid disappearance of upstream springs (Fauzi and Anna, 2013; Prasetyo et al., 2009). The interest in biodiversity also suggests potential synergies between forest certification and certification of forest watershed services; FSC forest certification, for example, has a special emphasis on forest management that conserves biodiversity such as High Conservation Value Forest (HCFV) (Cashore et al., 2006).

Indeed, these opportunities and challenges of certification of forest watershed services are not conclusive. Because the characteristics of forest watersheds are diverse and site-specific (Meijaard et al., 2011), we cannot reject the possibility that stakeholders in PWS schemes elsewhere exposed to different socio-ecological conditions and they would see the questions differently. In spite of these limitations, the study successfully shows that there is a diversity of viewpoints among PWS stakeholders with regard to the certification scheme. These viewpoints would support future studies on certification of forest watershed services in other regions by providing a reference point of stakeholder viewpoints from Lombok, Indonesia. Some of our findings also contribute to the previous literature on the certification of ecosystem services (Meijaard et al., 2011, 2014) by revealing an unexpected stakeholder interest in the certification scheme (namely capacity building of PWS stakeholders via certification). Thus, these new findings advance the state of our knowledge as to the factors affecting feasibility in implementation of certification of forest watershed services.

## 6. Conclusions

This study explores the challenges and opportunities of applying certification of forest watershed services by investigating a payment for watershed services (PWS) scheme in West Lombok, Indonesia. Q methodology applied to PWS stakeholders revealed their three dominant perspectives (or factors): cautious

anticipation of improvement in the PWS scheme associated with adoption of certification; anticipation of benefits to upstream communities accrued through adoption of certification; and skepticism about certification in general. These factors revealed several opportunities and challenges for the potential certification. The opportunities included that stakeholders were interested in the certification scheme as a capacity-building tool. The challenges included their confusion about the meaning of certification labels in the market, concern about certification transparency, and contradictory requests for certification standards to be simple for easy adaptation to local stakeholders but to be scientifically rigorous for accurate measurement of watershed services.

In addition to these perspectives of PWS stakeholders, further knowledge is required for a complete assessment of the feasibility of certification of forest watershed services. Knowledge gaps include the degree to which such as certification would economically benefit upstream communities (e.g., via generation of price premiums); feasibility for a certification system to improve PWS stakeholders' technical and administrative capacity to manage forest watersheds and adopt the certification scheme; how to deliver credible watershed information to PWS buyers; and feasibility of developing scientific standards for such a certification scheme (e.g., to establish measurable indicators, and watershed models adaptable to diverse ecosystems). These will require further case studies on PWS schemes elsewhere.

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