

Tunggu Tubang and Ulu Ayek: Social Mechanism of Sustainable Protected Forest Management

Edwin Martin^{1*}, Didik Suharjito², Dudung Darusman², Satyawan Sunito³, Bondan Winarno¹

¹Environment and Forestry R&D Institute of Palembang, Jl. Kol. H. Burlian Km 6.5 Palembang, Indonesia 30154

²Department of Forest Management, Faculty of Forestry, Bogor Agricultural University, Academic Ring Road, Campus IPB Dramaga, Bogor, Indonesia 16680

³Department of Communication and Community Development Sciences, Faculty of Human Ecology, Bogor Agricultural University, Kamper Road, Campus IPB Dramaga, Bogor, Indonesia 16680

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Abstract

Practices and traditional knowledge of smallholder farmers living forests is a potential resource to enhance landscape management. However, knowledge of the smallholder-forest relationship is still rare to explore social mechanisms that allow their relationship lasting long. The research aims to obtain further understanding of the traditional practices of forest management in Semende, South Sumatera. We visited 32 villages in Semende and stayed on several occasions in the 10 villages. We used descriptive phenomenological approach to understand the social process of successful forest management by farmers. We find the key that leads to the relations of sawah-forest to be able to be maintained against changes, that is consistent attitude towards the core values of life, whatever happens and changes. Social mechanism in the form of practices of knowledge-institution-tunggu tubang is an integral package to ensure the sustainability of forest. The social mechanism is driven by the values of respect for the elderly, extended family, real work, the search for stability and serenity in the bonds of humanity. These findings may be valuable lessons for improving forest policy.

Keywords: protected forest, sawah, upland, smallholder, cultural value orientation

**Correspondence author, email: abinuha1976@yahoo.co.id, ph.: +62-8127865909*

Introduction

Competition for land between agriculture and forest production results in agriculture to become the main driver of deforestation in the world for the last decade, which is approximately 80% (Kissinger *et al.* 2012). Conflict resolution between the conservation of natural resources and agricultural production attracted the attention of many parties. Baudron & Giller (2014) discussed the criteria to be able to choose between land sparing and land sharing, as a model of harmony. Farming systems in developed countries is trying to find a mutually supportive relationship between the ecosystems conservation and agricultural production, especially for food (Harper & Crane 2012). The land sparing concept that separates intensive farming and wild nature did not work to conserve local forest in Tanzania (Quandt 2016). However, smallholder farmers' tree-based systems are increasing recognized as efficient agricultural and natural resource production systems, which provide water conservation and other ecosystem services (Roshetko *et al.* 2008).

According to the study of de Snoo *et al.* (2013), the payment instrument is not a sustainable way to strengthen the quality of the landscape. They recommended to research

knowledge-based policy instruments of cultural aspects, normative behavior or identity conception of farmers. Conserve natural resources by imitating the traditional management of anthropogenic habitat is a paradigm in developed countries (Wright *et al.* 2012). Practices and traditional knowledge are potential resources to manage the landscape better (Padoch & Sunderland 2013).

von Heland & Folke (2014) state that the conservation of ecosystem services by traditional communities in South Madagascar are generated by an interdependent social-ecological system in which knowledge, practice, and beliefs coevolve. Unfortunately, the information from von Heland & Folke does not explain how the traditional system can withstand the pressure changes by development and increase of economic necessity. Tiwari *et al.* (2010) examined forest management practices by traditional society of Meghalaya in North-East India. They documented and analyzed traditional forest management system and its contribution to food security. However, the study did not explain how the system can be sustained in a dynamic situation. Knowledge of smallholder-forest relationship is still rare to explore the social mechanisms that allow their relationship last long.

One location where farming communities live in close proximity with the forests is Semende in the uplands of South Sumatera. Semende people is a swidden agriculture community known to convert for agricultural use, so it is interesting to investigate how the forest in their native villages remain sustainable. As most communities in the uplands of Sumatera, they experience the process of development, affiliated with the market, and actively associated with various other communities. Of 32 Semende villages, 30 villages have the area of food production in the form of paddy field (*sawah*). The villages have *sawahs* to show the diversity of forest cover; there are some villages with intact natural forest cover in the upstream of villages, some villages display scattered natural forest cover, and there are some villages that did not look at all natural forests. Questions on performance are:

- 1 what are the social mechanisms that allow harmony between smallholder and forest,
- 2 what value orientation is held by Semende farmers that the practice of *sawah*-forest management remained persist in the midst of change,
- 3 what policies are needed to support the conservation of *sawah*-forests.

The research aims to obtain further understanding of the traditional practices of *sawah*-forest management in Semende, South Sumatera. The findings are expected to be a cornerstone of both the ethical and operational of forest management, especially for protection functions in Indonesia.

Methods

Theoretical framework Berkes (2008) offered the concept of traditional ecology knowledge (TEK) to understand and analyze local practices which are crucial in the conservation of natural resources. TEK is defined operationally as “*a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment*” (Berkes 2000). Not all TEK is enduring or ecologically wise; depending on the local social mechanism (Berkes *et al.* 2000). These social mechanisms may be thought of as a hierarchy that proceeds from local ecological knowledge to social institutions, to mechanisms for cultural internalization, and to world views (Figure 1). Knowledge and institutions require a mechanism for cultural internalization, so that learning can be encoded and

remembered by social groups. World views or cosmology give shape to the cultural values, ethics, and basic norms of a society (Berkes *et al.* 2000).

The main components for the creation of traditional practices and knowledge that generate ecological sustainability is a worldview in the form of proper environmental ethic (Berkes *et al.* 2000). Kluckhohn and Strodtbeck in 1961 published a framework for analyzing the worldview of a person or society, as used by Uddin (2015) in his research. Kluckhohn and Strodtbeck suggested 5 dimensions of value to be analyzed, such as orientation: man and nature, the nature of human life, time, activity, and relational.

Referring to the concepts of Berkes, Berkes *et al.*, and Kluckhohn & Strodtbeck in advance, this study describes the harmonization of *sawah*-forest by smallholder of Semende and challenges in the midst of change and development. This description is taken from the context of farmers' experiences itself, thus an explanation of the relation of *sawah*-forest derived from their perspective

Semende people in the uplands of South Sumatera occupy 32 villages in 3 subdistricts in Muara Enim Regency (Figure 2). Most areas outside the residential areas are protected forests. The field research was conducted in December 2013 to August 2015.

We used descriptive phenomenological approach to obtain universal description of the farmers-*sawah*-forest relation. Descriptive phenomenology “*calls for exploration of phenomena through direct interaction between the researcher and the objects of study...it calls upon investigators to set aside preconceptions through the procedures involved in bracketing...The lived experience itself, as described by participants, is used to provide universal description of the phenomenon*” (Wojnar & Swanson 2007).

TEK related cultural change can be more explained in a social unit such as villages (Reyes-García *et al.* 2014). In each Semende villages we asked about the phenomenon of forest: why did they conserve the forest? why were there no forest? We discussed this matter with village leaders and *sawah* farmers. Further, we decided to go back and lived in 10 villages representing the diversity of *sawah*-forest experiences. We had a conversation with participants to dig deeper into their experience managing *sawah*-forest: what had happened to the undisturbed or damaged forest? why there a *sawah* managed or abandoned? The conversation was mostly done in the field, walking transects from settlements,

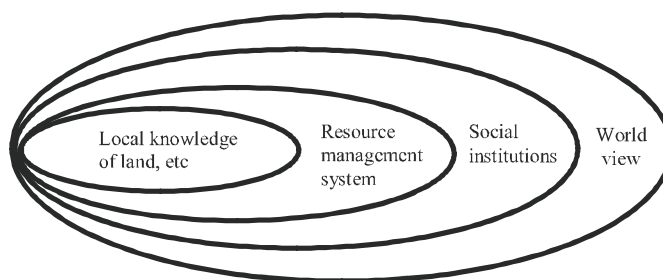


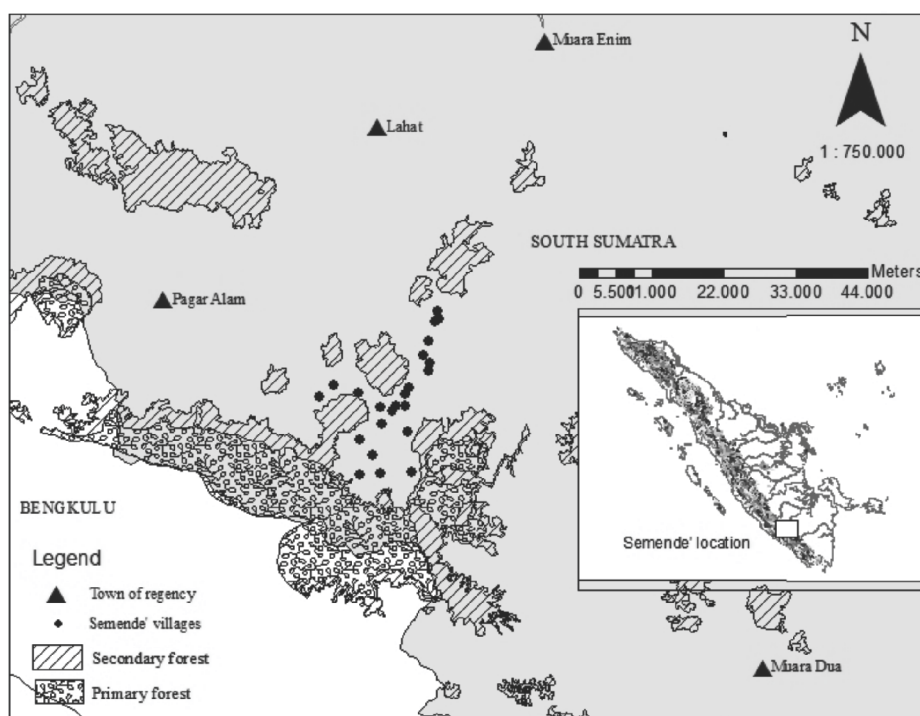
Figure 1 Level of analysis in traditional knowledge and management system (adapted from Berkes *et al.* 2000).

sawah, into the forest. In addition to record all important conversations of the participants, we also recorded greetings, questions, and responses from people encountered every day in every village.

We followed the steps of phenomenological data analysis (Shosha 2012) to obtain units of meaning based on participants' awareness. We reconstructed the general meaning forest conservation mechanism based on respondent unit, then published a newspaper opinion column on the meaning of forest conservation. Reader of the column were asked to respond with their opinion regarding the essence of the meaning forest conservation, and thus partake in efforts to improve the validation of the study.

Results and Discussion

General description of farming communities and forests in Semende The villages in Semende are near a protected forest of Bukit Jambul. Semende peoples are primarily rice and coffee farmers (Table 1). In the study area, not all forests look like forests. The natural forests near the Semende villages are guarded by community, as upstream areas that provide water for their *sawahs*. Our informant responded to our study focus on their traditional forest: "*Our forests are better than yours*". The forest becomes destination for research on natural vegetation. During carrying out field research, we met 3 teams of researchers from various institutions that are looking at potential medicinal plants,



Source: Courtesy of Balai Pemantapan Kawasan Hutan Wilayah II Palembang, 2013

Figure 2 Villages of Semende communities in the uplands of South Sumatera.

Table 1 General description of villages in Semende, South Sumatera

Biophysical and socio-economic conditions	Semende darat Ulu (SDU)	Sub district of Semende Darat Tengah (SDT)	Semende darat Laut (SDL)
Altitude (m) ^a	943–1,800	997–1,024	600–1,017
Total villages	10	12	10
Total population (people) ^a	16,403	10,064	13,256
<i>Sawah</i> area (ha) ^a	1,828	1,219	1,120
Surplus of rice in 2014 (kg) ^a	3,194	2,363	4,558
Coffee plantation (ha) ^a	2,786	2,720	11,076
Villages dominated by <i>sawah</i> ^b	5	9	0
Villages dominated by coffee ^b	5	3	10
Villages with <i>sawah</i> directly irrigated from forest ^b	7	4	4
<i>Sawah</i> converted into coffee garden (unit) ^b	87	105	207

Note: ^a Data of BPS Muara Enim (2015), ^b Data of field visits (2014/2015)

non-timber forest products, and vegetation constituent to primary forests.

The phenomenon of the remnant natural forests that are managed by Semende indicates that traditional smallholders have developed a system considered to be more sustainable than state's scientific forest management. In fact, values, norms, and practices in traditional society still in accordance with the rules of conservation that are designed by state (Iswandono *et al.* 2015). In Semende, the performance of *ulu ayek* forests is better than state's protected forest.

The existence of natural forest and land use in the landscape of Semende are described by study participants through their experience interacting and managing *sawah*-irrigation-forests relation. The essence of the explanation of participant always starts from the aspect of tradition, then about the social aspect when facing anomalous facts, and ends with aspects of cultural values as a reference entity of their lives.

Forests are *ulu ayek* of our *sawahs*: traditional aspect The existence of undisturbed natural forests upstream of *sawahs* and villages in Semende are described by the farmers as a provider of water needs. *Sawah* in the hills require continuous large quantities of water. The need is growing as populations increase and the forested areas are reduced. DG-1, a farmer from Danau Gerak Village said, "...before the village is crowded and not a lot of gardens, irrigation water used to be enough from the roots of trees around here, but after the people grew and the jungle was opened, the water source turned to the forests".

In the past, knowledge of the social-ecological interactions produced by the urge to live independently in isolation. Now, the knowledge is maintained and transmitted because *sawah*-irrigation-forest relationship has been proven to provide stability in the production of food from time to time. Semende people call an agricultural landscape unit an *ataghan*. Stability of *ataghan sawahs* is inseparable from the stability of the water produced by forests in the upstream.

Rice cultivation requires water management, thus they know and understand water conservation measures. Semende people call waterways in the forest that drain water from the spring as *luang*, irrigation canals as *siring*, irrigated channel divider called as *tanggam*, and springs called as *mude ayek* or *entup-entup*. DG-1 explained their reasons for prohibiting the destruction of forests, "...As long as the water is still flowing, the forest around *siring* from the first *tanggam* to *mude ayek* should not be cut down. When forests are cleared, the water in the *luang* will be drying, I am sure it would be dry. Water begins from *entup-entup* and roots of wood, most of the roots of timber..."

Natural forests also sporadically seen among coffee plantations. Forests are dispersed across the landscape *jurang* (steep slope). The Semende people categorize land into 4 types, *jurang*, *tebing* (strong slope), *guring limauan* (gentle slope), and *datar* (level). For them, *jurang* must be forested, because of landslides risk. *Siring* as waterways towards *sawahs* is generally through the hills in the category of *jurang* and *tebing*, so the area above the *siring* are traditionally determined as forest, called as *ghimbe ulu ayek*. If people depend their lives to resources that

are in limited circumstances, then they have strong incentive to use resources sustainably (Berkes 2013). The concept of *ulu ayek* forest is similar to the definition of protected forests in Indonesian Forestry Law, but not identical.

"*Ghimbe ulu ayek* border in our village is an area that has not been opened or cultivated by the people, it means that ancestor agreed the land should be left as *ghimbe*. Another border is the area where the water flows towards *Siring*. In our village there are approximately 500 ha of forest as *ulu ayek*. *Ulu ayek* means water is spilled into our territory and we are the people who take care of it (SG-1)"

TEK about the importance of the forest around the spring and ducts accumulate well over *sawahs* land tenure system. *Sawah* is property controlled by a *tunggu tubang*. *Tunggu tubang* is the eldest daughter in a family that is assigned to maintain, preserve, and exploit ancestral treasure, as family treasure. A *tunggu tubang* is forbidden to sell the *sawah* and may only cultivate it crops such as coffee. Some of *sawahs* are located at the edge of forests usually includes dry land plots that are planted by coffee, fruit trees, and small forest at the *jurang*. Forest can not be felled by *tunggu tubang* because it is a family asset. Traditional knowledge systems tend to have ethical and moral context, does not separate between culture and nature (Berkes 2008).

Ulu ayek forests are traditionally protected to be converted into agricultural land, but the villagers are allowed to use a limited amount of timber for domestic needs. The chief of *ataghan* holds customs authority to prohibit or allow logging in their *ulu ayek* forest. The tree use is typically done by the poor family or for the purposes of making a small house in *sawah* called *dangau*. The accumulation and transmission of plant species knowledge can take place by this resource use institutions. Michon *et al.* (2007) conceive this such management as domestic forests.

The rules of allowable cut trees are made by the member of an *ataghan* (individually called *tuan sawah*). This institution runs through the mechanism of monitoring that are held by *datuk ayek* or *ketue siring*, a supervisor who appointed by a *tuan sawah* meeting. SG-2 told the effectiveness of *siring*-forest monitoring in the Segamit Village, "...*ataghan Endikat Bengkulu* has irrigation along 10 km, *Resam Padi* along 3 km, *Padu Ringkih* along 15 km, each of them are supervised by *ketue siring*. If *ulu ayek* forest are interrupted that will be reported, then it is overrun by *tuan sawah*".

Ulu ayek forest's institutions are applied only to the forest directly as water sources or the *siring's* protection. Monitoring and implementation of the ban has strong social reasons for a direct link between *sawah* and the forest. In some villages, not all the *ataghan sawahs* take water from forest directly, but to get water from nearest river that springs are far outside the village (Figure 3). This such relation could not form *sawah*-forest institution.

"The hills opened by people for gardening coffee are upstream of Beghasang, Turunan, and Berujung; none of those rivers are becoming the water source of our *sawahs*. So, our community does not prohibit people from other villages to cut the forest. It is only Nibung upstream that is

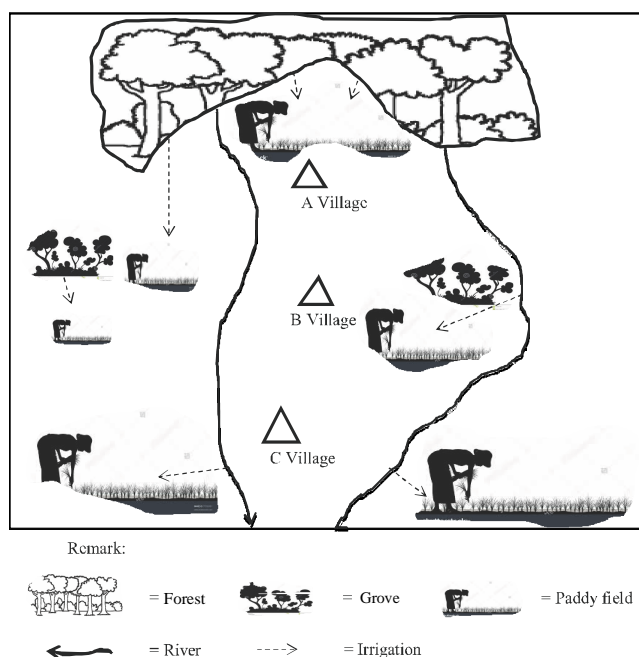


Figure 3 The illustration of *sawah*-forest relationship in Semende villages.

supervised and guarded by people, as water source of *sawahs*. Once someone had tried to cut down the *ulu ayek* forest, the *tuan sawahs* come up with knives, they said 'this is for you who will destroy our family' (PA-1).

Several groups of *sawah*-forest scattered in the villages are managed strictly. *Tuan sawah* prohibit extraction all kind of herbs in units of the remaining forest. Those *sawahs* rely on water source from spring within small forest, approximately 20–30 ha. As we are asked by informants to observe directly a small forest in area of coffee farms at the Aremantai Village, we met a farmer who were looking for firewood, then asked why he did not take wood from the forest, he said: "no one dares take anything, *tuan sawah* will take violent action for theft of wood, they know their own wood, it has been like that for a long time ago".

Ekawati & Nurrochmat (2014) concluded that ecological uses improving the sustainability of protected forest, but the uses of economic ruin it. Previous descriptions show that for Semende people who are successful conserve forests, ecological and economic benefits are synergies; timber products and water used for domestic purposes, as capital basis in arranging other livelihood. They maintain the ecological benefits of forest because of the economic benefits. The flow of economic benefits are integrated with ecological benefits establish of livelihood for the people, something that is highly respected by Semende people.

Monitoring and sanctions are 2 important aspects which are often referred to as the critical success of *sawah-ulu ayek* forest. SG-2 said, "...*ketue siring* always keep an eye on the state of *siring*, even at work breaks days, so that the forests are always protected...". Violations of the rules are always followed by sanctions. The application of sanctions is always involving the village head, as the formal and informal authority.

"There were incidents of tree felling in this *ulu ayek* forest. Suspected were reported by the *datuk ayek* to the village's head. Village head fined the violators. The money from the fine was used by *datuk ayek* to repair the *siring*". (DG-1)

Ulu ayek forests which avoided from deforestation so far is an indication that the rule enforcement by *tuan sawah* run effectively and efficiently. This contrasts with the intervention of law enforcement by the government which is only effective in certain situations but it is meaningless in political and economic crisis or at the time of soaring coffee prices, and does not reach remote areas (Gaveau *et al.* 2009).

Sawah-forest link is missing: social relationships aspect

Farmers experience shows that some *ulu ayek* forests have failed to sustainably. TEK which links *sawah*-forest relationship is faded away; the institutions were not established, defeated by other institutions, not considered by another ethnic, or is changing. This pattern of failed relationships can start from deforestation which leads to reducing *sawah* water or ruining the *siring*, and then followed by *sawah* abandonment. Semende people call abandoned *sawah* as *tekelambu*. If the *sawah* is already *tekelambu*, the forest in the upstream area no longer needs to be maintained.

TA-1 from Tanjung Agung Village told the reason behind the conversion of *sawahs* into coffee plantations. "Our *sawahs* at Batu Pikak could not be maintained anymore because of the water shortage. Water is reducing since the upstream of *sawahs* are opened to coffee plantations by residents of Tanjung Tiga... We could not stop deforestation since the forest is theirs. Who was the first to come and find life there is considered to be the proprietor of the land". So, *ulu ayek* forest does not become institutions when it was occupied by other residents before the establishment of *sawahs*. *Ulu ayek* forest is not under the authority of *tuan sawah* if they have no a history of *siring* development or never controlled it.

On several occasions of *sawah-ulu ayek* forests observation, we encountered cases of forest clearance for coffee plantations. The informants explained that the *tuan sawah* could not stop it because of historical reasons. Semende culture respects to history of land use; they call the forest that was once the coffee plantations as *belukagh*. Merely descendants may reuse the *belukagh*. In some places, *belukagh* institution defeat *ulu ayek* institution. Berkes *et al.* (2000) noted that not all traditional practices is ecologically wise.

Traditional institutions are not able to stop violations by farmers of other ethnic community in the border areas. TAB-2 recount his experience facing the destruction of *ulu ayek* forests by a group of people from neighbor ethnic community. "We couldn't stop the actions of Padang Kandis people [Besemah ethnic] who felled the forest. Our community member is not dare to open the forest, because it respects *tuan sawah*, but they have no feel that way. We avoid the quarrel, so the case we handed to the government". If the forest land already transformed into coffee plantations then that activity becomes socially acceptable. "We can not evict people who have planted coffee...if they lose their livelihood

so this village will not be secure” (TAB-3).

Robinson *et al.* (2014) stated that less deforestation is not related to the form of tenure, but by security of tenure. If we learn from the case of broken social bonds that lead *ulu ayek* deforestation, then the state should give formal support to improve tenurial security, such as providing communal forest management rights certificates for the group of *tuan sawah*. Anyway, recognition and accommodation of government to local institutions is an important factor in achieving sustainable protected forest (Nursidah *et al.* 2012).

Several villages in Semende, such as the Tanjung Agung and Penindaian have experienced severe fires in their settlement, in the 1960s. This tragedy triggered mass migration to Lampung Province and surrounding areas. *Tunggu tubang* are forced to abandon their *sawah* and house. There is no longer of overseeing *ghimbe ulu ayek*. Forest destruction can't be avoided. Migration broke the *sawah*-forest relationship. Without *sawah* as source of livelihood, local knowledge of *sawah*-forest relation is skipped, rule-in-use/institution as social mechanism (Berkes *et al.* 2000) has changed.

The changing of the economy needs, such as the increase of children school fees, purchase of household needs beyond food, and the desire for a better life encourages some *tunggu tubang*'s families to migrate to other areas. MD-1 tries to understand the reasons why *tunggu tubang* migrate, "...*sawah farming has no progress, it is difficult to have better life, if gardening coffee we could go to Hajj, buy a car, build homes, and send children to school...*". Changing in life circumstances shift the priority of *sawah* farming became coffee plantations. However, these changes only on the ways to meet the economy needs, not shifting the main perspective. Orientation of life values is still preserved and taught through the existence of their social structure.

"Nowadays, *tunggu tubang* are allow to work outside the *sawah*, with *sawah* cultivation done by others under sharing cropping system, such as *sasih* or *maro*. Parents will usually remind that the need of rice in a year will not decrease and *tunggu tubang* should always consult with the family when making decisions that are important to in their lives (TT-3).

Current knowledge emphasizes that poverty alleviation and livelihood diversification is the key to overcome the problem of the forests destruction by farmers (Meijer *et al.* 2015). Rice cultivation generates lower revenue than coffee farming. However, for Semende's *sawah* farmers, food stability and cultural obligations have higher value than money. Traditional knowledge of *sawah*-forests is not just knowledge but as a way of life, an authority system for resource use. The power of traditional knowledge is not in the *sawah*-forest specifically, but in the life processes that allow farmers and the extended family to maintain kinship.

Forest-sawah-tunggu tubang: the humanity binding
Cases of *ulu ayek* forest and *sawah* conversion are a sign that TEK and institutions are not enough to explain why the natural forests around the Semende villages are sustainable. The facts show that there are some cases of *ulu ayek* forest destruction, but the history and the changes were never able to eliminate the phenomenon of *sawah*-forest interaction.

Sawah and *tunggu tubang* are like two sides of a coin. The culture of *sawah*-forest relation internalized the *tunggu tubang* mechanism, an entity that contains the doctrine, responsibilities, roles, and values. Once again, traditional knowledge systems tend to have ethical and moral context, does not separate between culture and nature (Berkes 2008).

Tunggu tubang not merely a term for the oldest daughter who was assigned to maintain the treasures of ancestors, but implies to continuously produce food for the family, especially for the elderly. The following explanation is commonly heard from Semende's family. "*Tubang is a tube made of bamboo that has a cover. The benefit is to store daily foodstuffs. The tube is placed in the kitchen, so food becomes 'smoked' and 'preserved'*. Therefore, *tunggu tubang* is also interpreted as waiting for the tube, keeping the food that is always available for family members who back home. The concept is derived in the form of *sawah*, food producers should last long. So, *tunggu tubang* is an entity that written by Berkes *et al.* (2000) as cultural framework for resource management.

Sawah is controlled by *tunggu tubang* after her marriage. *Tunggu tubang*'s wedding ritual is different from the other children, because it is the highest accumulation of culture and values transmitting of Semende people. The task of *tunggu tubang* as unifier of the entire family of her maternal that is guided and supervised by *meraje*, brothers of mother. *Meraje* will ensure that the *tunggu tubang* executes custom commands to manage legacy, in the form of houses and *sawah*, without be sold. *Tunggu tubang* is obliged to take care of her parents and grandparents who live in the house. *Tunggu tubang* is a guarantee for family elder to be cared by their own daughter, so they can live peacefully in old age.

The common understanding states that the forest communities will support ecosystem services if their needs are accommodated (Muhamad *et al.* 2014). Participants description indicate that the guarantee of forest conservation and forest communities to support environmental services is not enough just from the aspect of needs of the community, but must involve a social mechanism that allows the intergenerational understanding, because each generations needs are different. *Tunggu tubang* house is a gathering place for the entire family of maternal; an interaction that teaches values to care for and respect the elderly, and also extended family. The main provision of this duty is food sovereignty.

Stability of *sawah* reflected in status and value. *Sawah* is cultivated by *tunggu tubang* but it is owned by many people and across generations, so the status of *sawah* is permanent. In Semende, *sawah* were converted into the coffee garden is still called *sawah*, even when transformed into the forest (tree-based) system. TA-2 recounted his experience as *tunggu tubang*. "*When coffee prices increase, no sawahs converted to coffee plantations. For us, though we have a lot of money but we still need to eat rice, because money can't be eaten*". TA-3 said the difference in value between *sawah* and coffee plantations, "...*Rice is more valuable, the output and the price is stable, but coffee's prices could drop and the output depends on the season*".

Institutions that protect forests were born from *sawah* culture. *Sawah* is ideal form of agrarian community who want to live independently and serene, derived from the

concept of *tunggu tubang*. In general, these results strengthen the conclusions that were made by Von Heland & Folke (2014), culture and ecosystems are interdependent; culture forms ecosystems, ecosystems provide services to livelihoods, the two were inseparable. However, we found that the key which causes both can survive from changes, namely the consistent attitude toward principal values of life, whatever happens and change.

Rice farmers in Semende hold on to their tradition, the task of the present, and hope for the future. *Sawah* is always associated with the orientation of the past and the present, as a capital for stepping to the future. They plant coffee to face the challenges of the needs for today and the future. TT-1 said, “...we are still harvesting rice by hand, ani-ani. We sell rice only if it is urgent. Therefore, we still keep the rice that is harvested in 5 years ago. Rice stored at granary in sawah, called tengkiang. For us, selling rice is very urgent situation as a result of unavailable the source of other incomes”. As a husband of *tunggu tubang*, TT-1 has 2 ha of sawah and coffee plantations. He recently bought new land. “This land will be converted to a coffee plantations for the source of my livelihood, it will not be belong to the *tunggu tubang*”.

In the terms of human relationship, Semende farmers hold the principle of respect for other people's work. This attitude can be seen from the tradition of mutual assistance in certain cases and tolerance to work for a livelihood. Mutual assistance or *bebiye* occurs in the rite of building house and planting coffee. When building roofs (*negakka bubungan*), all the heads of the household came to help, as a symbol of respect for those who want to meet their basic needs. *Bebiy*e also occurs when a smallholder family has coffee farm establishment activity, at the time of planting. They appreciate the effort to achieve self-reliance. Kluckhohn and Strodbeck, as cited by Uddin (2015), categorized this relational orientation as collateral.

Respecting the work of others is practiced in many

aspects of Semende people's lives. SG-1 explained about the omission of making new coffee plantations in the *ulu ayek* region. “The others ethnic use traditional system of *belukagh balek ghimbe*, where if someone abandoned his garden and it becomes forest, others have the right to control the land. For us, who first opened the forest then they has the right to use it again, even though the land has become forest”. TAB-4 answered the question why they did not stop the destruction of protected forest areas. “We can only take care of the *ulu ayek forest* that is in our village. Forests that has been already converted to coffee plantations are difficult to reforest, because if it is done it will disrupt the lives of others”. This respect for the work of others has also saved the *ulu ayek* forests until now, as stated many participants. “I let this land remain forested, because I still respect to the *tuan sawah* who cultivate paddy fields. If the sawah has not been cultivated, so I and others will use it as coffee plantation”.

Other research mention that a conservation ethic and a culture of nature conservation in traditional communities of the Himalayas is inseparable from religion (Negi 2010). Previous statements showed the values that apply more generally to the farming communities (Table 2). Although Semende people are moslem, phenomenological approach in this study did not obtain expressions and meanings using religious arguments.

It is clear that the remaining natural forests in Semende are the outcome of local social mechanisms. Forest is designed by TEK that considers the natural biophysical properties, protected by *sawah*-forest institution based on TEK and social obligations, preserved by a mechanism for cultural internalization in the form of *tunggu tubang*, inside the range of the value orientation that appreciates the real work and prioritize food sovereignty (Figure 4). As mentioned by Berkes *et al.* (2000), those local social mechanisms inseparable, interrelated, and coevolving to the daily practices.

Ulu ayek forest management held by Semende farmers is

Table 2 Cultural value orientation of Semende farmers

Concepts		Description	
Activity orientation	Working to meet livelihood (needs)	Working to achieve a and stable life serene	-
Time orientation	Present	Past	Future
Relational orientation	Respecting consensus among the farmers and extended families (collateral)	-	Appreciating the work of others (individualistic)

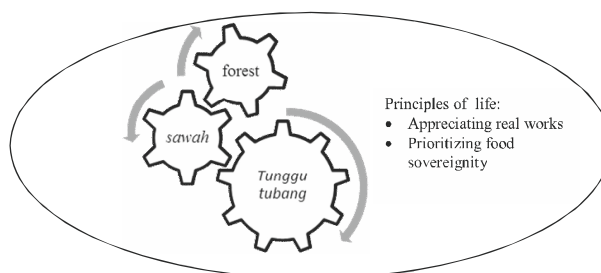


Figure 4 The local social mechanism of *sawah*-forest conservation by Semende people.

a system similar to the proposed paradigm "domestic forest" by Michon *et al.* (2007). Conservation of forests for protection of water resources is widely practiced by various communities in Indonesia, such as Tobelo Dalam tribe in Halmahera (Tamalene *et al.* 2015), the indigenous village of Tenganan, Bali (Suryadarma 2012), the Nagari Simanau in West Sumatra (Hamzah *et al.* 2015), and Idas Village, Sanggau Regency (Damiati *et al.* 2015), and Kampung Kuta in Ciamis West Java (Aulia & Dharmawan 2010). In "domestic forest" paradigm, forest management integrated with agriculture, regeneration occurs naturally, and the timber is not the main outcome of the forest. Learning from this research, protected forests conservation succeed not by "land sparing" but land integration, as part of smallholder life. Forests and *sawahs* objectively separate but subjectively both of them are integrated, inseparable.

Conclusion

Sawah culture delivers TEK of *sawah*-forest in Semende upland. This local knowledge generates institutions that protect the continuity of food production. *Sawah*-forest institution work effectively and last a long due to the existence of cultural framework in the form of *tunggu tubang*. The social mechanism in the form of practices of knowledge-institution-*tunggu tubang* is an integral package to ensure the sustainability of forest. The social mechanism is driven by the values of respect for the elderly, extended families, the real work, and the search for serenity in the bonds of humanity. If the local social mechanism is not running or one of the element of package is lost, the forests are threatened, because farmers do not have the sociological reasons for keeping forests from conversion desire.

Recommendation

Social mechanisms of *ulu ayek* forest conservation by Semende communities provide evidence of performance better forest management than of protected forest by the state. This is a lesson learned for policy improvement. The definition of protected forests should include the phrase "protection of life support systems for certain community", so that the object and the subject become obvious. Stipulation of protected forest should not deter use of resources, both timber and non-timber products for domestic needs of the community managers. Groups of people who recognized and empowered to manage protected forest are those that exhibit certain dependencies between the practices of everyday life and the existence of natural forests.

The state should give formal support to improve tenurial security, such as providing communal forest management rights certificates for the group of *tuan sawah*. Recognition and accommodation of government to local institutions is an important factor in achieving sustainable protected forest.

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