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Agroforestry and Forestry in Sulawesi series:

Landscape management strategies in Sulawesi: review of intervention options

Atiek Widayati, Ni'matul Khasanah, Sonya Dewi and James M Roshetko

World Agroforestry Centre

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Abstract

Rural livelihoods many times have to face situations where utilization of natural resources result in damages or degradation of the ecosystems or environment. Such situations are commonly found in cases of, among others, communities living in forest margins and engaged in forest product extraction or communities living in the upstream catchment and practicing agriculture on sloping land. Conservation efforts in such areas should bear the principles of livelihood support in order to be sustainable and well-participated by the local actors. Addressing multiple interests is a key, hence the participatory and multistakeholder approaches for landscape management strategies development and planning. Overall aim of this review is to present lessons learnt from landscape management strategies developed with various actors and stakeholders in six landscapes in South Sulawesi, Southeast Sulawesi and Gorontalo, Sulawesi Island, Indonesia. The landscape management strategies represent three domains of intervention: a) rewarding well-maintained upstream landscape for source water provision, b) community management rights in forest with conservation status and c) collaborative land rehabilitation in upstream catchments. The review focused on observing affecting factors, opportunities and challenges for each strategy and adopted SWOT in analyzing the livelihood assets/capitals involved. Across the three types of strategies under review, natural capital was the key aspect, especially as the strength for ecosystem service rewards and as challenges for the other strategies. Limiting factors are dominated by the social capital encompassing gaps in regulation, low institutional capacities and prolonged land tenure conflicts. To some extent, human capital also poses challenges with the low capacities of the actors involved. Opportunities identified from the strategies represent all types of capital, such as village enterprise (financial capital), improved and sustainable practices on land management (human and natural capital), collective actions and mutual benefits (social capital). Threats that need to be anticipated are mainly related to social capital, referring to the reliance on local champions or local leaders and the potential changes in direction of policies and political situations. These findings are expected to provide lessons learnt for similar context in other areas, with the challenges and limiting factors to be anticipated prior to the entire process of landscape management strategy development.

Keywords

landscape management strategies, sustainable livelihood capitals, ecosystem service, Sulawesi

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1 Introduction

1.1 Ecosystem services and landscape approach

Fulfillment of and support to human life have been provided by the productions of goods of the various natural capitals, such as foods, fiber and timber, just to name a few. Aside from benefiting from the goods produced, humans also benefit from the services provided by the ecosystems, such as clean water and fertile soils; these have then defined the bases of the 'ecosystem services' concept (Costanza 1997; de Groot 2002). Ecosystem services can be divided into four categories: regulating, provisioning, supporting and cultural services (de Groot 2002; MEA 2003). Unsustainable utilization of the natural capitals or excessive production cause depletion or degradation of ecosystem services, such as erosion and sedimentation due to the establishment of agriculture on sloping lands or flash flooding during heavy rains caused by forest loss in the upstream catchment.

Landscape provides multiple functions directly or indirectly linked to the natural capitals or ecosystems. In that framework, the services include not only those produced through interactions between humans and ecosystems, but also through cultural and social processes in the spatial context (Hermann et al 2011; Vallés-Planells et al 2014), and hence the term 'landscape services'. Landscape also refers to a scale where interactions happen across the elements, which encompass three categories: functional interactions, negotiated space and multifunctionality (Minang et al 2015). In reality, landscape may be an area with natural topographical boundaries such as a watershed or a subcatchment as a hydrological entity, while in other cases, landscape can be a proximity containing a combination or interactions of ecological functions, such as flora-fauna habitats, with man-made land uses. Landscape may also be an area with man-made boundaries where interactions between land and humans exist.

Due to the wide range and types of interactions, the approaches and ways through which landscape is managed sustainably are crucial. The 'landscape approach' provides concepts and tools for allocating and managing lands to achieve social, economic and environmental objectives where productive land uses compete with environmental and biodiversity goals (Sayer et al 2013). The approach shows promise in addressing the issues of climate change along with biodiversity management and improved livelihood (Minang et al 2015). Sayer et al (2013) defined the 10 elements required for landscape approach as: common entry point, adaptive management, landscape multifunctionality, multiple scales, multistakeholder participation, negotiated and transparent actions, rights and responsibilities, capacity strengthening of the actors, participatory monitoring and resilience.

As suggested by van Noordwijk et al (2011), addressing options within landscape multifunctionality by considering the trade-offs should take into account negotiation approaches across multistakeholders and multi institutions (Figure 1). Further, the landscape framework should become part of planning including community-based planning on land uses (Vallés-Planells et al 2014). Despite the multistakeholders' acceptance of certain planning and sets of options, the approach should not be considered as a prescriptive approach but rather as part of the changes and interactions under multiple drivers (Sayer et al 2015) as well as a feedback loop from drivers to consequences to response options (van Noordwijk et al 2011) (Figure 1).

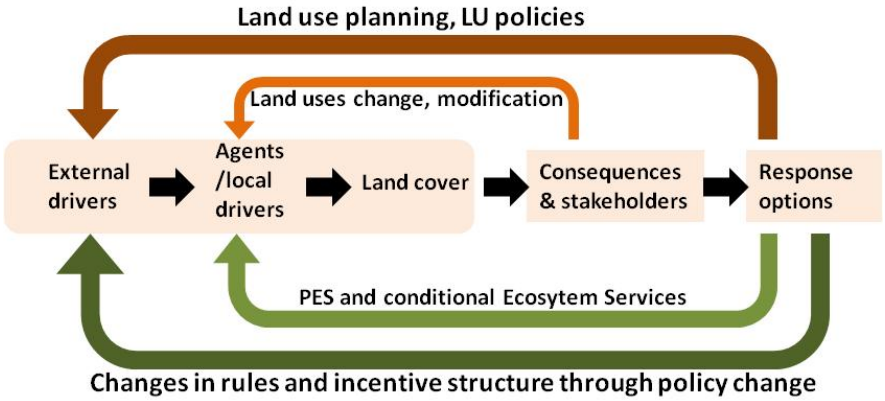

Figure 1. Intervention options as part of landscape multifunctionality, multistakeholders and multi institutions (modified from van Noordwijk et al 2011) Note: PES – payment for environmental services; LU - landuse

Recognition of the landscape functions and services brings about concepts of payment and reward for ecosystem services (Wunder 2007; van Noordwijk and Beria 2010; van Noordwijk et al 2012), which entail discussions on further instruments and mechanisms. Aside from the principles of rewarding the services, options for interventions and providing incentives can also be in the realm of policy and institutional changes or improvements (van Noordwijk et al 2011). The latter may range from land rights and financial assistance to social and human resource-related incentives.

1.2 Land tenure and livelihoods

Land tenure is an important aspect to be incorporated in landscape management strategies, as it relates to who owns or governs the land and what can/cannot be part of the strategies. For Indonesia, two major categories of land status are state forest land status (*kawasan hutan*) and private land (*Area Penggunaan Lain – APL*). The state forest land is designated to serve three main functions: production, protection and conservation. Production Forest status (*Hutan Produksi*) cover three types of productive management: Permanent Production Forest (*Hutan Produksi Tetap-HP*), Limited Production Forest (*Hutan Produksi Terbatas-HPT*) and Convertible Production Forest (*Hutan Produksi Konversi –HPK*). Protection Forest (*Hutan Lindung - HL*) is defined as an area that has relevant properties to regulate water and hydrological functions, to prevent flooding and erosion, and to maintain soil fertility. Conservation Forest is defined as forest areas that preserve flora and fauna diversity and ecosystems and encompasses Nature Reserve (*Cagar Alam – CA*), Wildlife Reserve (*Suaka Margasatwa – SM*) and Forest Park (*Taman Hutan Raya - Tahura*). Nature Reserve is defined as a nature conservation area with endemic flora and/or fauna and the ecosystem that need to be protected to be sustainable, and Forest Park is defined as a nature conservation area for the purpose of flora and fauna collection to be utilized for research, science and education and to support cultivation, culture, ecotourism and recreation.

As is commonly found in Indonesia, utilization of land does not necessarily reflect the function or the status, although the background and the reasons may be more complicated than just comparing status versus existing uses. Land conflicts or simply misperceptions of the status and functions are normally found in the context of state forest lands. Included in the conflict or misperception issues are utilization by communities and other smallholder actors mainly in the form of forest extraction or land conversion for agricultural production. Land utilization and the uses of ecosystem services are highly

linked to livelihoods, including those that disregard land tenure or protection status (Suyanto et al 2007; Khususiyah et al 2012). Land conflicts affect many lives especially around forest margins, and as reported by ARD Inc. (2006), the number of people affected by land conflicts in Indonesia in 1990-2000 was between 6.6 to 19.6 million.

Conflict resolution and collaborative management efforts have long been attempted in many parts of the country, most especially considering the urgency of the issues for local livelihoods. Recognition of use rights has been incorporated into social forestry and customary forest (*Hutan Adat*). Various schemes have been established and operationalized, including Village Forest (*Hutan Desa-HD*), Community Forest (*Hutan Kemasyarakatan-HKm*) and Small-scale Forest Plantation (*Hutan Tanaman Rakyat – HTR*). Recently, social forestry has received even higher attention through the government targeting the establishment of 12.7 M ha of social forestry throughout the country. To date, social forestry schemes are eligible only in Production and Protection Forests. However, due to the needs on the ground, especially in responding to land conflicts, similar approaches have also been proposed and are being widely discussed for Conservation Forest areas such as Forest Park.

1.3 Landscape management strategy development

Situations where livelihoods are in conflict with conservation of ecosystem services are seen in cases of, among others, communities living in forest margins and engaged in practices of unsustainable forest product extraction and forest conversion for agriculture, or communities living in the upstream catchment and practicing agriculture on sloping land. In such situations, conservation efforts should bear the principles of livelihood support in order to be sustainable and well-participated in by the local actors.

Addressing multiple interests is a key for successful planning and implementation since various actors will have their voices heard. The processes should be initiated with diagnostic steps and followed up with multistakeholder discussions. Each of the processes may require different dynamics leading to different rates of progress, outcomes and even shifts from original designs. Some factors are crucial in reaching the final stages of each process. However, in many instances, challenges, or even threats, occur that hamper progress or create bottlenecks in the process.

1.3.1 Diagnostics steps for assessing the landscape

Prior to developing landscape management strategies and plans, the actors involved need to have ample understanding of the conditions of the ecosystem services with regard to utilization by humans. Diagnostic steps are necessary and, as proposed by Dewi et al (2013), can be operationalized into two major approaches: 1) scientific-based knowledge and 2) local knowledge. A framework of Capacity Strengthening on Vulnerability Assessments (CaSAVA) (Dewi et al 2013; Widayati et al 2017) encompasses both types of knowledge and is one source of tools for diagnostic steps prior to landscape management strategy development.

1.3.2 Strategy development and landscape contexts

Landscape management strategies and plans are developed with the aim of achieving outcomes at the levels of actors and partners. Outcome Mapping is an approach to plan, monitor and evaluate social change initiatives developed by the International Development Research Centre (IDRC) in Canada. On a practical level, Outcome Mapping is a set of tools and guidelines that steer projects or program teams through an iterative process to identify their desired change and to work collaboratively to

bring it about (Earl et al 2001). Outcomes are measured by the changes in behavior, actions and relationships of those individuals, groups or organizations with whom the initiative is working directly and seeking to influence.

The formation of multistakeholder working groups is an initial key process in strategy development and planning which is designed to develop strong partnership as the foundation of landscape approach. This working group may be composed of partners (strategic and boundary) from government, NGOs and farmers, including academics and the private sector if applicable. The entire strategy development and planning approach is in the hands of the working group and Outcome Mapping is applied which could be in combination with different planning processes. Once the strategy is developed and agreed on by all partners within the working group, a roadmap for action planning can be initiated.

1.3.3 Commitments and agreements across partners

The entry point for conducting actions collectively lies in the common visions among stakeholders to develop partnerships, which serve as a basis to build commitments or agreements by relevant partners for collaboration or partnership. The types of commitment or agreement vary depending on the objectives and inputs by the stakeholders as well as the relevant parties within the working group. Preconditions for agreement are also variable depending on the nature of the agreement and the institutions involved.

Agreements for collaborative land management involve actors or stakeholders engaged with the authority and/or management of the landscapes directly or indirectly. The types of agreements can range from government-community agreement to public-private partnership. Agreements between government institutions and communities normally take place on state-owned lands. As previously mentioned, schemes that give management rights to communities are recognized and supported by national policies under social forestry. Other types of schemes may also be developed in state forest lands in the form of agreements or partnerships.

The overall aim of this review is to present lessons learnt from landscape management strategies developed with various actors and stakeholders in Sulawesi, Indonesia, with specific objectives:

1. To summarize strategy development and planning processes on landscape management to fulfill livelihood enhancement and ecosystem protection
2. To review the success factors and challenges experienced when implementing the strategies and to identify the opportunities and threats aligned with sustainable livelihood capitals
3. To provide lessons learnt and recommendations for implementation and upscaling to areas with similar contexts

2. Materials and Methods

2.1 Study sites and landscape contexts

The materials for this review are strategies and plans for landscape management that were developed to address issues pertinent to livelihoods and ecosystem services under the ‘Agroforestry and Forestry in Sulawesi’ (AgFor) Project in Indonesia. The AgFor project’s ultimate outcome was enhanced

agroforestry and forestry livelihoods systems of rural communities in Sulawesi, and the strategy development processes assessed in this study were part of its goal to achieve a greater number of landscapes and ecosystems with improved integrated management.

Six landscapes were incorporated for this review located in three provinces in Sulawesi Island, Indonesia: South Sulawesi, Southeast Sulawesi and Gorontalo (Figure 2 and maps in Appendix 1). Each landscape contains a cluster of villages and is part of a larger catchment area or has a Forest Park in the proximity.

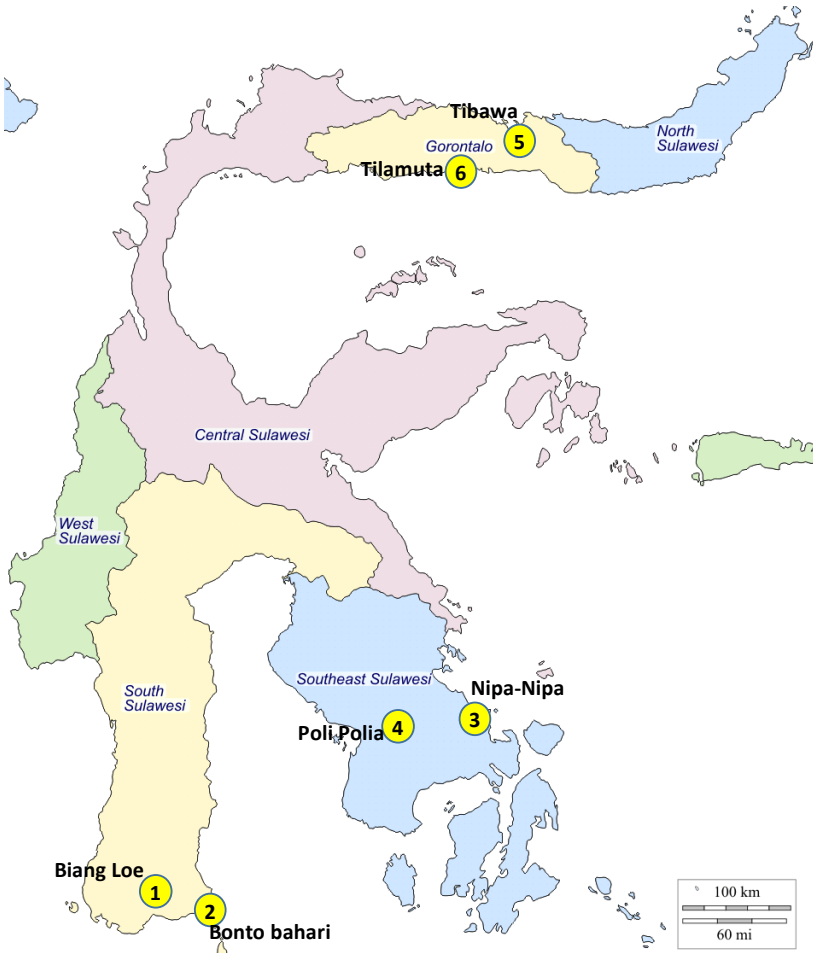

Figure 2. Six village clusters in Sulawesi island where landscape management options were explored and planned (1: Biang Loe Catchment, 2: Bonto Bahari Forest Park, 3: Nipa-Nipa Forest Park, 4: Poli-Polia upland catchment, 5: Tibawa upland catchment and 6: Tilamuta upland catchment.)

Boundaries of the landscapes were not strictly defined throughout the strategy development and planning processes. However, ultimately, when commitment or agreement on a specific management option was reached, the management area would be defined and accurately mapped for further actions and implementation. Nevertheless, the impacts of the strategies developed and actions planned were projected to reach beyond these mapped boundaries and to be relevant for the remaining parts of the landscapes.

The processes for strategy development and planning were documented as Livelihood-Conservation Strategy Documents (Widayati et al 2014a; Widayati et al 2014b; Khasanah et al 2016a, Khasanah et a, 2016b, Sirait et al 2016; Prasetyo et al 2016). Summaries of the study areas and the issues are presented in Table 1.

Table 1. Summary of the six landscapes

No	Name/ area (ha)	Location	Villages	Types of landscape & Ecosystem Services (ES)	Land status	Issue domains
1	Biang Loe/ 2200 ha	Bantaeng district, South Sulawesi	Campaga, Kampala, Pa'bumbungan and Parang Loe	Catchment area; source water provision	Private lands	Ecosystem services of source water provision are well maintained, and recognition and rewards mechanism became the central issues to be addressed.
2	Tahura Bonto Bahari/ 3000 ha	Bulukumba district, South Sulawesi	Ara and Tanah Lemo	Forest Park; coastal-karst biodiversity richness	State forest land (Forest Park status)	The Forest Park is rich with endemic fauna and flora but has been occupied by communities and planted with agricultural crops. Misperceptions on land status have been ongoing for decades and land conflicts are latent.
3	Tahura Nipa-Nipa/ 1000 ha	Southeast Sulawesi	Alolama, Watu-Watu, Tipulu and Mangga Dua	Forest park; biodiversity of endemic species	State forest land (Forest Park status)	The Forest Park is highly diverse with flora and fauna endemic of Sulawesi. Southern fringes are occupied by dwellers and agricultural activities mainly involving cash crops. Facilitation and mediation have been actively conducted for land conflict resolution.
4	Poli-Polia/ 8000 ha	Kolaka Timur district, Southeast Sulawesi	Andowengga, Taosu, Hakambololi and Puundokulo	Upper catchment sloping lands; soils and surface water	State forest land (Production Forest status)	Upstream catchment of a watershed with state Production Forest status has been planted with agricultural crops, is thought to cause flooding in downstream villages during heavy rain.
5	Tibawa/ 10,000 ha	Gorontalo district, Gorontalo	Buhu, Iloponu, Labanu and Motilango	Upper catchment sloping lands; soils and surface water	Private lands surroundding a Nature Reserve	Sloping lands in upstream catchment are planted with maize and have experienced degradation, resulting in erosion and river sedimentation. The neighboring Nature Reserve experienced illegal extraction.
6	Tilamuta/ 11,000 ha	Boalemo district, Gorontalo	Ayuhulalo, Limbato, Mohungo and Piloliyanga	Upper catchment sloping lands; soils and surface water	Private lands and Production Forest land	Sloping lands in upstream catchment with state Production Forest status are mostly planted with maize. Degraded lands were expanding and affecting the upstream area which is the source of drinking water for downstream population.

2.2 Methods for review

The review started with a review of the processes and options for livelihood-conservation in each of the six landscapes. Strategy development processes and documentation reviewed over the course of 2013-2016 and were published for each of the landscapes, i.e. Biang Loe (Widayati et al 2014a), Tahura Nipa-Nipa (Widayati et al 2014b), Tahura Bonto Bahari (Prasetyo et al 2016), Poli-Polia (Sirait et al 2016), Tibawa (Khasanah et al 2016a) and Tilamuta (Khasanah et al 2016b).

The six case studies were then categorized into broad topics of landscape management strategies, and the strategies were further characterized based on the following attributes:

1. Issues in landscape context
2. Intervention options
3. Enabling conditions (for options)
4. Options of scheme/agreements/partnership

Further in-depth review utilized the SWOT methods (Kansas University, 2017) with some adjustments as described here. SWOT stands for: **S**trengths, **W**eaknesses, **O**pportunities, **T**hreats. A SWOT analysis guides the identification of strengths and weakness (S-W), as well as opportunities and threats (O-T) (Kansas University 2017). Commonly, strengths and weaknesses are identified as internal factors while opportunities and threats are external factors. In this review, assessing the opportunities and threats was slightly adjusted, i.e. by taking into account any factor, external or internal, that was identified as potentially occurring in the future.

Specifically, for the topics and domains under review, the following were applied for the modified SWOT identification:

- **Strengths** were analyzed based on the existing conditions during the strategy development that contribute to the progress and positive outcomes
- **Weaknesses** or limiting factors were analyzed based on the existing conditions during the strategy development process and became bottlenecks or obstacles to progress or outcomes
- **Opportunities** demonstrated promising and positive aspects that could potentially occur in the future from the option(s) assessed and identified at the final point of the strategy and planning processes.
- **Threats** may stem from unresolved existing conditions, internally or externally, which will likely continue as problems in the future or as potentially a condition that hampers the continued efforts.

The review was aligned to five assets or capitals important for rural livelihoods as framed under the Sustainable Livelihood Framework (Scoones 1998). As defined by Chambers and Conway (1992) a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is considered sustainable when it can cope with stresses and shocks and maintain or enhance its capabilities and assets, while not undermining the natural resource base. In pursuing livelihood strategies, rural communities depend on the key assets or capitals, namely: natural capital, human capital, financial capital, social capital and physical capital (Scoones 1998; DFID 1999).

The alignment with livelihood capitals demonstrates the availability and the functioning, or the lack of them, of certain capitals as affecting factors in the strategy development and in achieving the

agreements. In addition, assessing the opportunities and risks/threats were also connected to livelihood capitals.

3. Results

3.1 Background characterization of the landscape management strategies

The landscape management strategies developed in the six landscapes represent three domains of intervention: a) rewarding well-maintained upstream landscape for source water provision, b) community management rights in forest with conservation status and c) collaborative land rehabilitation in upstream catchments.

Each of the strategies developed is characterized on the basis of four attributes and the summary is shown in Table 2.

3.2 Highlights of issues and strategies developed

The highlights of the three strategies under review are presented in the following sections.

3.2.1 Rewarding well-maintained upstream landscape for source water provision

The first issue, represented by Biang Loe catchment, was regarding the lack of recognition for villages that had maintained upland areas for source water provision in the downstream area. The strategy developed aimed to find a suitable mechanism that would provide rewards or recognition to upland communities. During the process, service providers and service beneficiaries were identified. Service providers were the land managers represented by village institutions and the beneficiary of the services was the district drinking water company (*Perusahaan Daerah Air Minum – PDAM*) operating in the district capital. A reward mechanism was designed involving two options which can be regarded as a combined mechanism. The first part involved a contract with PDAM, through which financial assistance to the village institutions would be provided for village development. Secondly, rewarding was mainstreamed into the development planning process, facilitated by a multistakeholder forum with inputs from PDAM. Through this process, villages that have been recognized for their good practices in upland management will receive assistance or other form of reward.

The strategy development processes included identifying the enabling conditions and other prerequisite conditions that needed to be in place prior to any mechanism (Widayati et al 2014a). A key enabling condition is a regulation at the district level that would become a reference for the rewarding mechanism to take place within the district. A multistakeholder forum facilitated the regulation development, and eventually a District Head Regulation (locally known as PerBup) on Rewarding Source Water Providers was enacted by the Bantaeng District Head.

Table 2. Background characterization of the landscape management strategies developed

No	Ecosystem Services (ES) and governance issues in landscape context	Intervention options	Enabling policies and institutions	Strategies and options of partnership/scheme	Case studies
1	Upper catchment areas as source water areas utilised by downstream users. Lack of recognition/support to upstream communities in managing upland area for source water provision	• Recognition to upland villages in maintaining the upper catchment for water provision and maintaining/improving the ES-friendly land management • Collaborative approach in negotiating rewards, instead of top-down assistance/support program to the villages • Recognising the conditionalities but not necessarily translating them into a valuation mechanism	o Subnational regulations o Multistakeholder working group/ forum as the facilitator o Local institution at the village level for agreement and facilitating the implementation	Rewarding healthy watershed as source of water. Scheme options: • Upstream-downstream agreements for running the scheme • Recognition and support for upland villages mainstreamed in government's program(s)	Biang Loe
2	State forest land under conservation status of Forest Park (*Taman Hutan Rakyat – Tahura*), with encroachments and agricultural land practices by communities living in the vicinity, resulting in conflict over tenure/land rights	• Zonation of the forest park by recognizing past and current utilization to be endorsed in certain zones, while enforcing conservation in the core forest areas • Giving management rights in a collaborative approach for land management combining conservation and livelihoods functions • A way to resolve prolonged land tenure conflict is needed by recognizing the interests of both parties	o Umbrella regulation to allow collaborative approach o Strategic planning that endorses collaborative management o Local institutions to partner with government authority o Knowledge on species and practices for designated areas	Securing community management/use rights within conservation forest lands Scheme options: Community-based management rights for particular zone(s) in the forest parks	Tahura Nipa-Nipa Tahura Bonto Bahari
3	Sloping lands in upper catchment planted with agricultural crops, resulting in degraded lands contributing to stream and downstream sedimentation, including lake siltation, and flooding	• Recognizing the needs for commercial commodities (that provide income for local communities) as part of rehabilitation of degraded lands under private ownership • Connecting communities and government bodies responsible for rehabilitating degraded lands and developing win-win partnerships • For state forest land areas: Proposing community-based land management as conditional land tenure with replanting for timber production	o Farmer group institutional readiness for partnership o Market chain access for planted commodities o Capacity building for tree and seedling management o Farmer group institutional readiness for partnership	Collaborative sloping land rehabilitation for sustainable agriculture in upstream catchments Scheme options: • Community-government agreement supporting the rehabilitation program and slope conservation practices • Community-based forest management with licence for conditional land tenure	Poli-Polia Tibawa Tilamuta

3.2.2 Community management rights in forest with conservation status

The second issue concerned land tenure conflicts in Forest Parks triggered by encroachments and agricultural land practices inside the Parks. These were represented by cases involving two Forest Parks: Tahura Nipa-Nipa and Tahura Bonto Bahari. Strategies were developed aiming to achieve collaborative land management between local government and communities through which the communities would get access to land while complying with conservation-based management guidelines developed by the authorities (Widayati et al 2014b; Prasetyo et al 2016).

Enabling policy was a prerequisite to the development of collaborative land management or other potential partnerships in the Forest Park. During the process for Tahura Nipa-Nipa, regulation on a partnership in Forest Park was developed and was enacted as a Governor Regulation (locally known as PerGub). Agreement for collaboration that was eventually signed between village farmer groups and the Tahura authority which marked the start of community-based land management within the Forest Park. In the post strategy development, one key process was the discussion and negotiation on species and agroforestry practices to be planned and implemented in the lands under collaborative management.

In Tahura Bonto Bahari, Bulukumba, a similar strategy of development was initiated. Tension regarding land tenure and status was still high, although latent, and misconceptions over land tenure issues and the establishment of the Forest Park had not been resolved. The ongoing dynamics and changes in local policies added to the heightened situation and hampered the process of developing a government-community agreement or scheme. Illegal practices such as issuance of land ownership certificates to some individuals and other informal promises for land ownership recognition also became major hurdles for the processes. The strategy developed required adjustment, in which approaches and roadmaps to develop common perceptions and understanding towards conflict resolution were included (Prasetyo et al 2016).

3.2.3 Collaborative land rehabilitation in upstream catchments

The third issue in this review was regarding unsustainable utilization and cultivation in the upstream catchments causing erosion that contributed to stream sedimentation and lake siltation, resulting in high water discharge that in turn contributed to flooding in the downstream areas. The three cases (Poli-Polia in Southeast Sulawesi, Tibawa and Tilamuta in Gorontalo) involved similar issues while having different land tenure situations.

In Tibawa, farmers managed lands under private ownership in close proximity to or in border areas of a Cagar Alam (Nature Reserve) Tangale with some encroachment inside the reserve. Aside from that, communities also illegally harvested forest products in the Nature Reserve, mainly bamboo. Strategies were developed aiming to achieve agreements between partners (farmer institutions and relevant government bodies) to plan rehabilitation actions. The Watershed Management Agency (*Badan Pengelola Daerah Aliran Sungai - BPDAS*) became the main engine in the forum for collaboration with farmers and farmer groups, with support and contributions from other offices. After a series of technical processes and discussions, including site selection for rehabilitation, the strategy was developed (Khasanah et al 2016a) and a multistakeholder agreement was signed. A series of training sessions were conducted including one-on-one bamboo planting and farming management, since bamboo was chosen as one rehabilitation species to be planted and managed outside the Nature Reserve. With private land ownership in the area, not all owners were willing to participate in the

rehabilitation efforts. Despite the minimum number of participants, the efforts have served as a model for the other land owners to learn from and to potentially participate in future activities.

In Tilamuta, the problem areas include state forest lands as well as private lands, and communities have largely planted maize for their main livelihoods, regardless of the land status. The major issue was land degradation which has gradually affected the source water provision from the upstream parts. Similarly, strategy developed aimed for collaborative rehabilitation efforts through multistakeholders' discussions and commitments to achieve the target outcomes (Khasanah et al 2016b).

For Poli-Polia, the entire landscape is state forest land with Production Forest status that is managed and planted with agricultural crops by farmers from the surrounding villages. The strategy was developed to achieve agreements and commitments between communities and the government authority to collaboratively manage the lands more sustainably (Sirait et al 2016). In 2015 a new National Law was established which affected the shifts and changes of forest authoritative bodies and arrangements at the subnational level. Consequently, the processes and activities with a multistakeholders forum at the district level stagnated and delays in progressing were experienced. At the village level, efforts to build trust also had to handle the human dynamics resulting from the influence of village elites.

4 Discussion

4.1 Review on affecting factors, opportunities and challenges

4.1.1 Rewarding well-maintained upstream landscape for source water provision

Well-maintained upstream areas with agroforestry practices contributed to good hydrological conditions in the water catchment for source water provision and this created an opportunity for downstream-upstream rewarding mechanism with a broader definition. The main strength of this case was the natural capital within the landscapes with well-maintained agroforestry practices and forest patches, good hydrological conditions and the sustained provision of source water in various water springs and streams (Widayati et al 2014a).

Options for rewarding mechanisms (see section 3.2.1) provided opportunities for both parties to gain mutual benefits. In addition, environmental protection would be ensured with the maintenance of the upland landscape to prevent degradation and other hazards. Opportunities also arose for village-based enterprises (*Badan Usaha Milik Desa - BUMDes*) to accommodate possible business opportunities that could help various aspects of village development.

However, this being said, challenges do occur and have became bottlenecks in progressing planning and scheme development, such as:

- *Mainstreaming the incentives.* A rewarding mechanism or development assistance on the basis of providing rewards had never been used within the governmental system nor in state owned companies such as PDAM. Therefore, innovation was required from the institutions, especially by the leaders, to endorse such ideas and to incorporate them into the formal processes. Additionally, mainstreaming the incentive into district development planning processes also

needed innovation to break through, since environmental protection rewards had not been in the system.

- *Village institutions.* At the village level, the relevant institutions, such as the village authority office, village based enterprise (BUMDes) and human resources lacked the capacity to be able to deal with external parties as well as to manage additional mechanisms. Therefore, capacity and institutional strengthening approaches posed another challenge.

4.1.2 Community management rights in forest with conservation status

A collaborative land management objective was shown to serve as a win-win resolution for land tenure conflicts in and around conservation forest areas. Farmer groups and communities had reached the point where they realized that they were managing lands under state ownership which had conservation values, and they could not continue to demand land ownership. On the other side, the authorities also realized that strict law enforcement and prohibition of the land management practices that had long been practiced by communities was not sustainable and only created prolonged resistance and conflicts.

The challenges lay in the capacities of individuals and institutions in preparing for the agreements, including defining management areas, identifying conditionality and negotiating on species. Therefore, approaches addressing capacity and institutional strengthening were needed. The lack of legal and regulatory references for the two institutions to develop collaboration or partnership in a conservation forest area became another challenge, and therefore development of regulations became a prerequisite. Consequently, these factors created delays in proceeding to reach an agreement and to move to action planning.

Nevertheless, under the agroforestry practices designed for the collaborative lands, there were opportunities for developing various agroforestry commodities useful for local livelihoods.

While the above factors could be managed well in some areas, in other areas they remained unresolved and continued as challenges. In situations where tension was still high and compromise to resolve conflicts was not in place, the actors involved would be unlikely to reach a settlement within the strategy development process. A conflict resolution approach was required to precede any planning for collaboration or partnership in this type of situation. Considering the intensity of the issue and the possible involvement of external factors and actors in the area, the challenges would persist and would even pose threats to the ongoing process.

4.3.1 Collaborative land rehabilitation in upstream catchments

Overall, in the rehabilitation planning processes, inclusive and participatory approaches provided good opportunities to fit with what the communities wanted, and was especially pertinent to the priority areas for rehabilitation and tree and crop species useful for their livelihoods.

The land status as state forest land or private land became an important starting point. Single state ownership made the process easier compared to cases involving multiple private land ownership. A community-managed scheme for state forest lands became the win-win solution with management rights given to the communities. In many instances, the challenges remain, with bureaucracy and formal procedure compliance creating delays in many stages of the process. In the current case studies, with the ongoing shift of authorities in the forestry sector, the process and also activities experienced even further delays.

Terms such as ‘land rehabilitation’ or ‘replanting’ for state forest land need to be used and communicated with caution due to the perceptions by local communities based on past government reforestation programs that included the eviction of forest dwellers. This might be due to the farmers’ own past experiences or via the grapevine from fellow farmers from various places. Trust and mutual understanding were key and, in many cases, presented as challenges which required a huge effort to achieve.

Where there was private land status, the challenges were different. In order to develop land rehabilitation efforts, permission from and endorsement by the land owners were necessary, and to deal with multiple land owners in the landscape took more time and effort. Participation and inclusiveness of the processes and negotiation towards collective agreement were key. This was the opposite to that regarding state forest land, as once the strategy was in place with the owners involved and agreeing to participate, there was practically no need for bureaucracy and regulation of the programs to be implemented, and hence there was more rapid action planning.

In summary, the highlights of the three landscape management strategies in the six landscapes are presented in Figure 3.

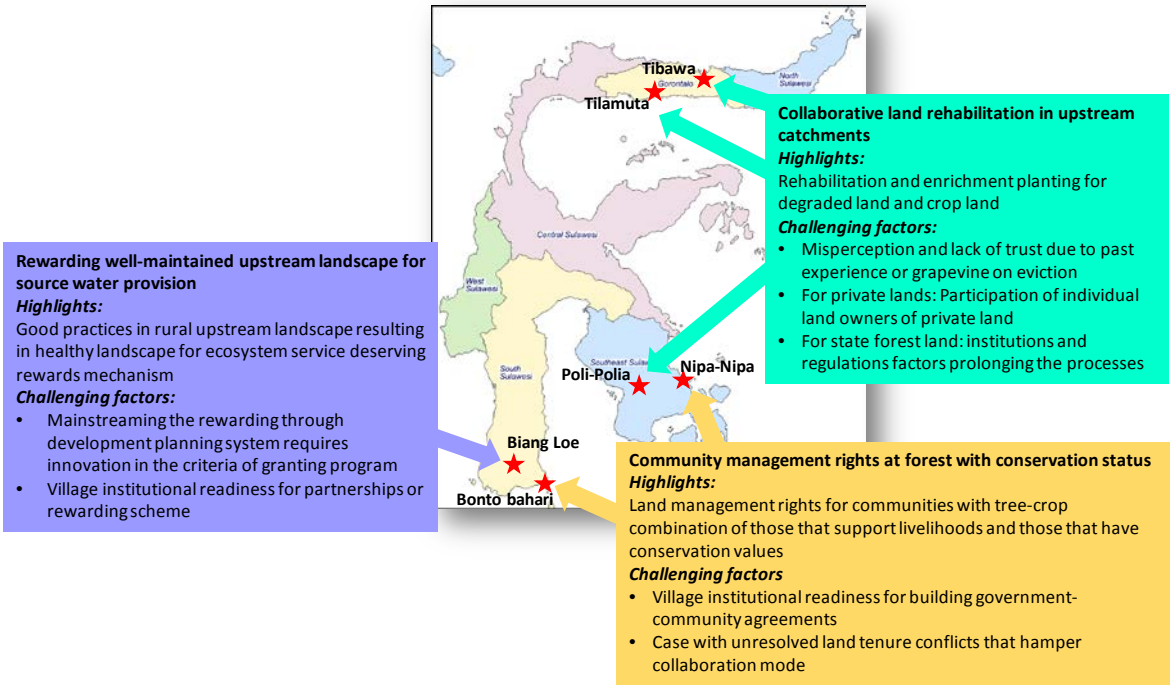

Figure 3. Highlights of the landscape management strategies in connection with the six landscapes in Sulawesi

4.2 Synthesis: which livelihood capitals are key?

The discussions touch upon key success and limiting factors and the opportunities and threats for landscape management strategies developed. Across the three types of strategies in the six landscapes, some key factors might be relevant to all cases, while there are also factors that are typical only in certain cases. There are similar strategies being developed in different local contexts, thus resulting in different dynamics. For example, the different intensities and stages of conflict in Tahura Nipa-Nipa and Tahura Bonto Bahari resulted in separate directions for their strategies, and the different types of land status for land rehabilitation in Poli-Polia and in Tibawa required different methods of

stakeholders' involvement and commitment. What are the key success factors and challenges in strategy development and the anticipated opportunities and threats? And what types of livelihood capital do they represent? A summary addressing these questions is presented in Table 3.

Table 3. SWOT (adjusted) and capital identification from the three landscape management strategies under review

No	Factor	Type(s) of capital	Relevance/application to the strategy/ies
Strengths			
1	Commitments by multistakeholder forums as part of inclusive and participatory processes in the strategy development and action planning are a strong foundation in the process.	Social/ Institutional capital	In the ES rewards strategy, the multistakeholder forum encompasses potentially co-managing stakeholders for the landscape in question, and in the community-rights strategy the forum represents a government-community forum.
2	Good practices in rural landscape management especially in the upstream catchment areas resulting in healthy landscape for ES provision serve as an asset and investment for the local communities.	Natural capital	Good practice is a key to the ES reward strategy, in which the evidence (of good source water) becomes the starting point for ES rewards.
3	Individuals who have commitments to the common objectives and targets and/or are innovative in thinking of a solution-based approach normally play a key role in the multistakeholder forums.	Human capital	This success factor is a key to any strategy development and the key individuals in question may be from the government or the village institution side.
Weaknesses			
1	Lack of legal reference and regulation required for agreement, entailing the need for a new formulation which suggested it could be a prolonged process.	Social/ Institutional capital	Strategies that involve state lands and/or government bodies require official regulation or policy formation as the bases of further agreements and action plans; applied for all three strategies in the review.
2	Low capacity of farmers and other partners to engage in collaboration or partnership; need capacity strengthening approaches and activities.	Human and social capital	Engagement of actors in strategies related to state forest land can only take place with institutions (not individuals), e.g. farmer groups; such challenges were found in all strategies under review
3	Complexities emerging from private land ownership that require individual owner's involvements and agreement for establishing intervention, posing longer negotiation processes	Social/institutional capital	This is common for a collaborative land rehabilitation strategy, in which the farmlands belong to individual farmers.
4	Misperception and mistrust present latent issues, which take place to various degrees on the state forest lands with conservation status as well as with production status.	Social/institutional capital	This is challenging for strategies that take place on state forest-land, i.e. community land rights for collaborative land management.
5	Incentive- or reward-based approaches have not been part of the criteria in granting a development program for rural villages, and hence a breakthrough is required to include them in the formal development planning process.	Social/institutional capital	This challenge was found to be in the ES reward strategy, in which the "rewarding for good-deed" approach has not been a part of the development planning process.

No	Factor	Type(s) of capital	Relevance/application to the strategy/ies
Opportunities			
1	The enforcement of an incentive-based mechanism serves as a good example of rewarding the 'good deeds' in landscape management by individuals and/or collective actions.	Physical and social capital	An opportunity emerging in the ES reward strategy, in which the "rewarding for good-deed" approach has not been a part of the development planning process.
2	Mutual benefits and cooperation between upland villages and downstream water users will motivate sustainable practices by farmers to maintain and improve current practices.	Social and human capital	An opportunity that becomes promising for strategies that involve upstream-downstream relationships such as ES reward or collaborative land rehabilitation
3	Village-based enterprise could thrive and be sustained by utilizing development assistance to improve villages' economies.	Financial capital	Emerging opportunity for the ES reward strategies, where development program and assistance can potentially support the village-based enterprises.
4	Collaboration in implementing good practices as part of upland rehabilitation may subsequently lead to the potential of a rewarding mechanism for well-maintained upstream areas.	Natural and social capital	This can be an opportunity in the future after the success of rehabilitation efforts for upland/upstream watershed areas.
Threats			
1	Sustainability of the program development to be incorporated in the development planning and budgetary system requires strong commitment, and is normally represented by a local champion(s) in the forum. This poses risks with changes in the functions or positions of individuals.	Institutional capital	This risk occurs in any strategy that involves strengthened social capital that is heavily dependent on the presence of a local/individual champion(s).
2	Political or individual power, or even simply an emerging change of directions related to land use policies can easily be a 'deal breaker' for an ongoing and mature process.	Institutional capital	This threat, e.g. proposal for releasing the lands from state status, is imminent for a strategy involving state forest land, especially conservation area.

5. Summary and Conclusion

Three types of landscape management strategies were developed to address issues that are important for livelihood sustainability as well as for ecosystem service maintenance/improvement. The strategies cover topics of rewarding well-maintained upstream landscape for source water provision, community management rights in forest with conservation status and collaborative land rehabilitation in upstream catchments. This review revealed that within the processes, success and limiting factors affecting the strategy development and action planning vary across different types of livelihood assets/capital.

To start with, the type of natural capital in question was an important factor and provided entry points for intervention options and thus strategy development. Extreme cases are shown by ecosystem service rewards versus land rehabilitation, in which the first refers to rewarding good practices while the latter refers to improving the practices. Good understanding of the conditions and utilization become key and thus proper assessment is necessary. Land tenure (conservation forest, production

forest and private land) as one form of social capital also serves as a determining factor in developing the management strategies and in addressing the success factors or the gaps. The rule of thumb is that the more restricted the status is (e.g. conservation forest), the longer and more stringent the processes are for addressing sustainable practices involving livelihoods or any utilizations. Nevertheless, we found that the case with privately-owned lands is no less complicated, since it involves the need for cooperation and partnership with individual land owners.

Across the three types of strategies under review, natural capital was the key strength for the ecosystem service reward case, since the reward depends greatly on the good provision of the ecosystem services. Another success factor is the social capital developed in the multistakeholder forums, which is applicable in all three strategies. Human capital also plays a major role in some cases, through the local champions who are innovative thinkers or good leaders and are involved in the processes. Weaknesses or limiting factors for strategy development are dominated by the social capital encompassing gaps in regulation, low institutional capacities and prolonged land tenure conflicts. To some extent human capital also poses challenges with the low capacities of the actors involved.

Opportunities identified from the strategies were present in all types of capital. The various strategies are expected to bring opportunities for improving local economies and livelihoods (financial capital), collaboration and mutual benefits (social capital), development assistance in the form of infrastructure and facilities (physical capital) and farmers' capacities in improving land management (human and natural capitals). The threats that need to be anticipated mainly concern on social capital, referring to the reliance on local champions or local leaders who might not be in the same position or function in the future, as well as the potential changes in direction of policies and political situations. These threats are typical in that they concern the commitment and involvement of government agencies and/or state-lands.

With the natural capital and the tenurial issues as the entry points for developing strategies, the review found that in further developing the strategies, other capitals, such as financial and human as well as other forms of social/institutional capital, play major roles to subsequently contribute or to limit successes.

The breadth of the discussions is expected to provide lessons to learn from regarding similar cases in other areas in Sulawesi or other parts of Indonesia. Aside from that, the challenges and limiting factors present as useful hints for other case studies to anticipate and to deal with effectively prior to the entire process.

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Appendix 1. Maps of the landscapes

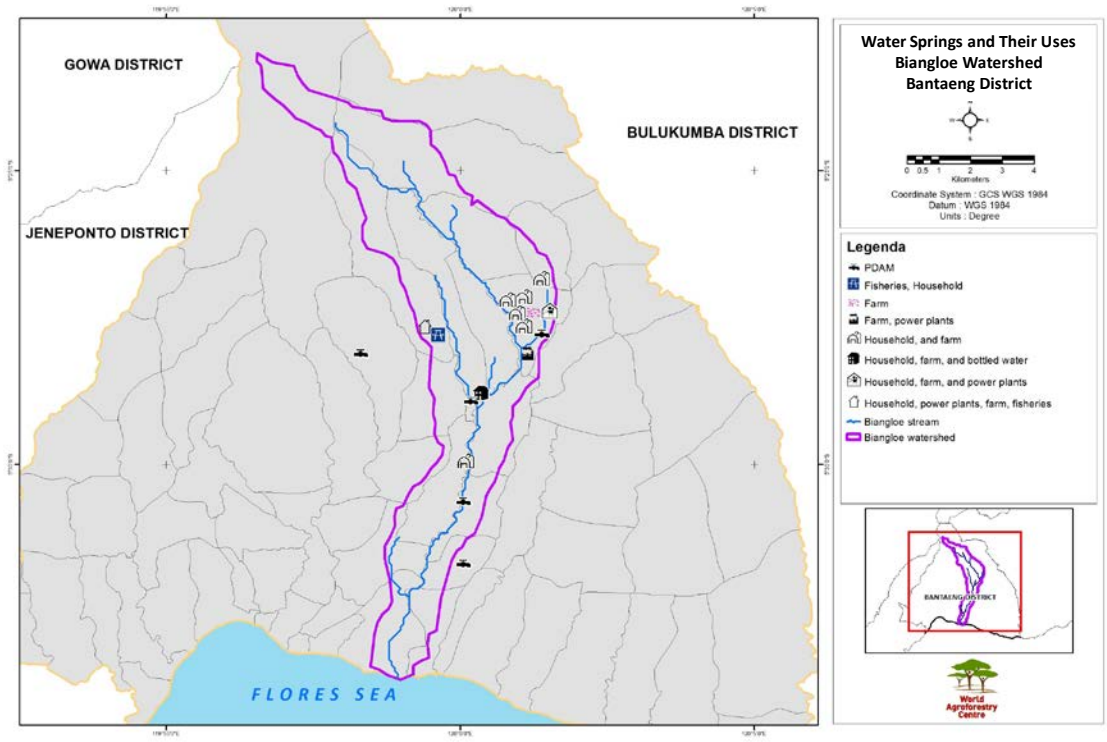

Figure A1. Biang Loe subcatchment and the village cluster in Bantaeng District, South Sulawesi

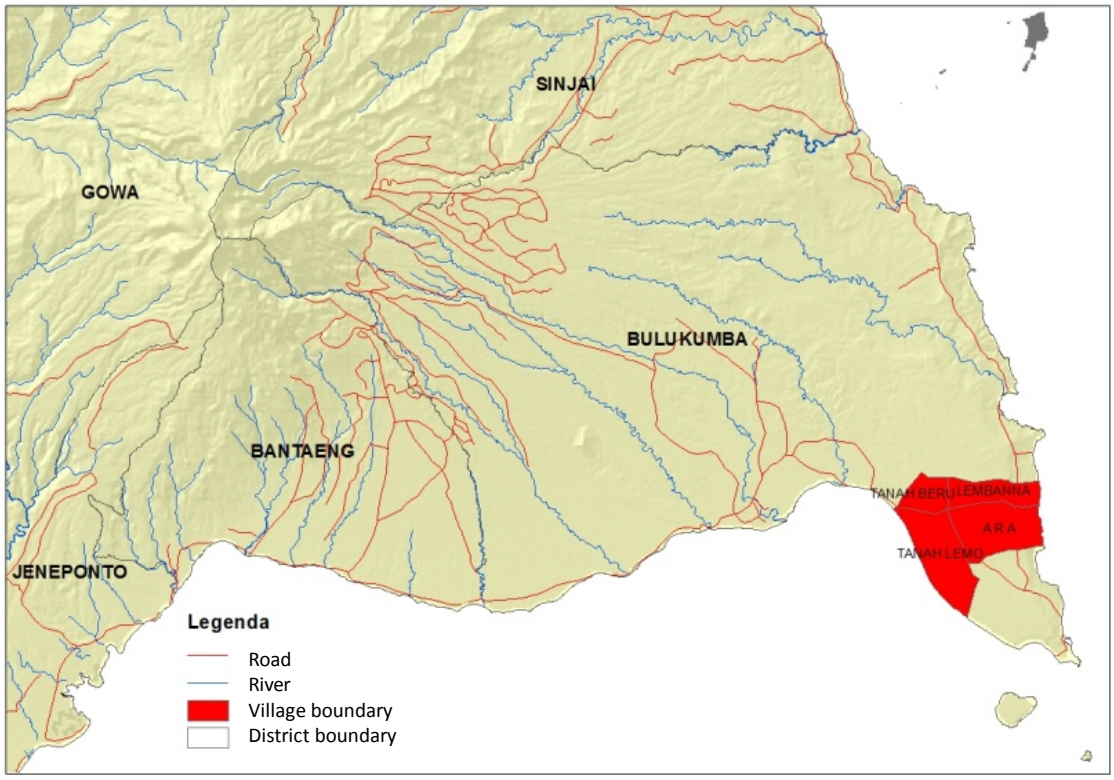

Figure A2. The village cluster around Tahura Bonto Bahari in Bulukumba District, South Sulawesi

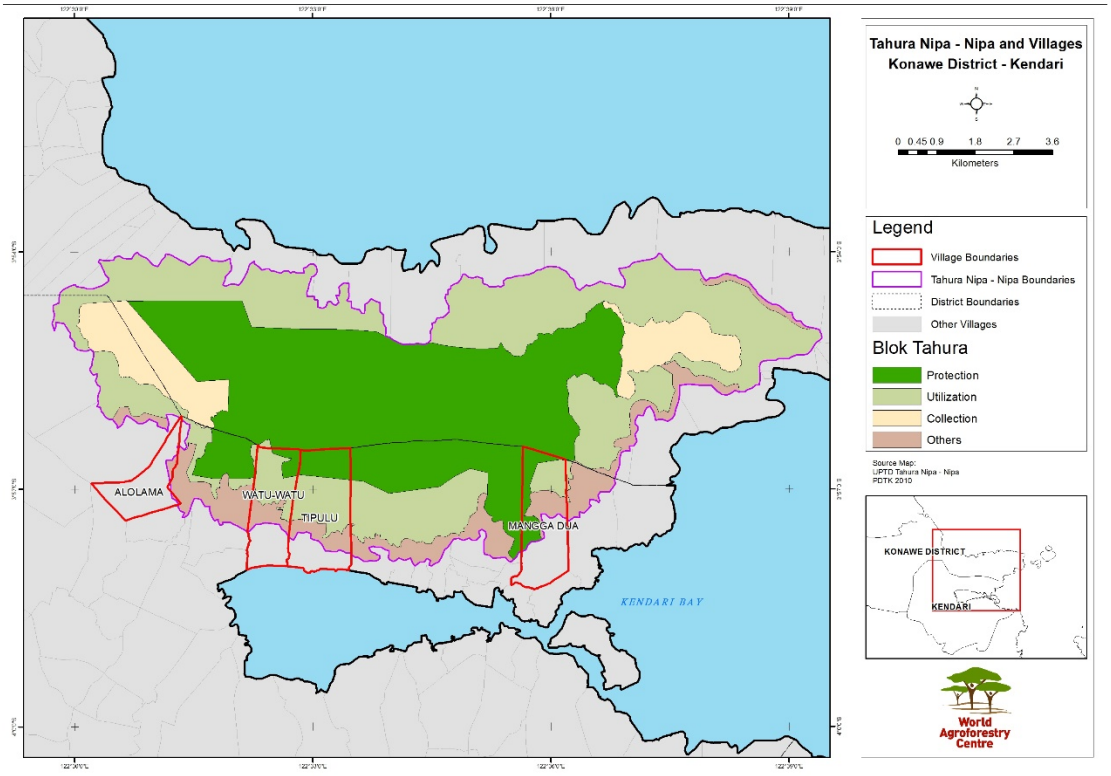

Figure A3. Tahura Nipa-Nipa and the village cluster, Southeast Sulawesi

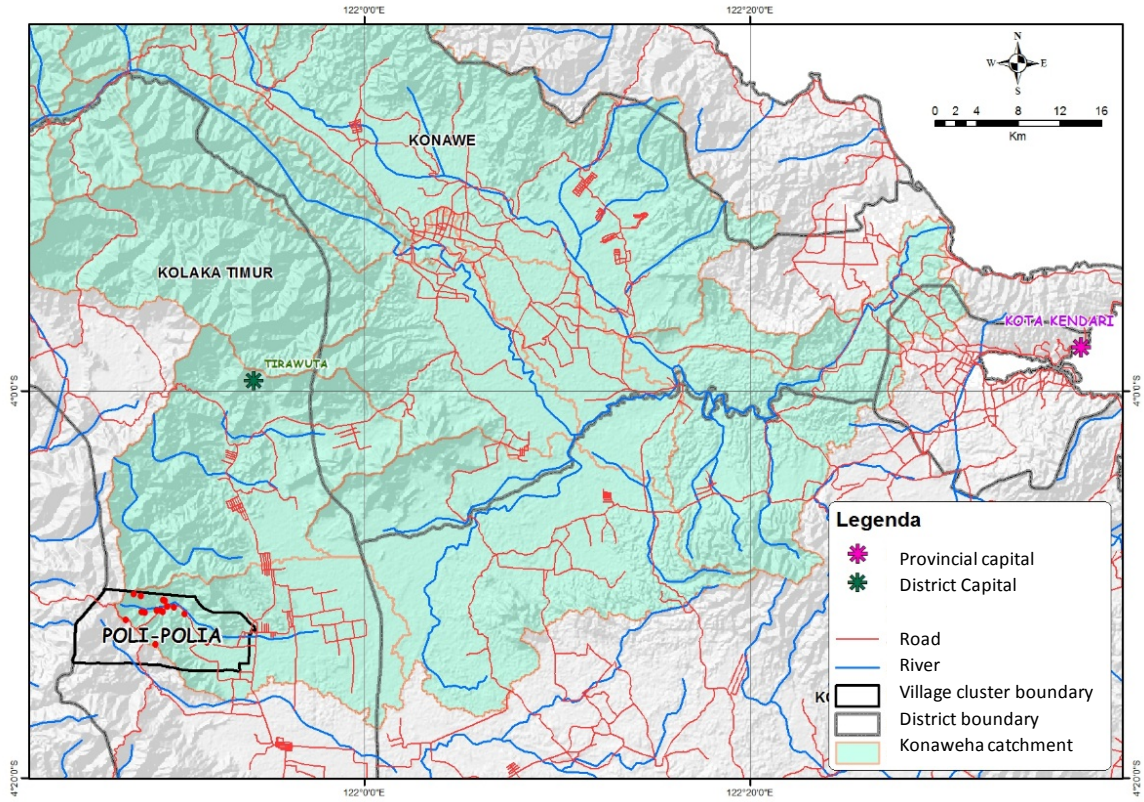

Figure A4. Poli-Polia Landscape in Kolaka Timur District, Southeast Sulawesi

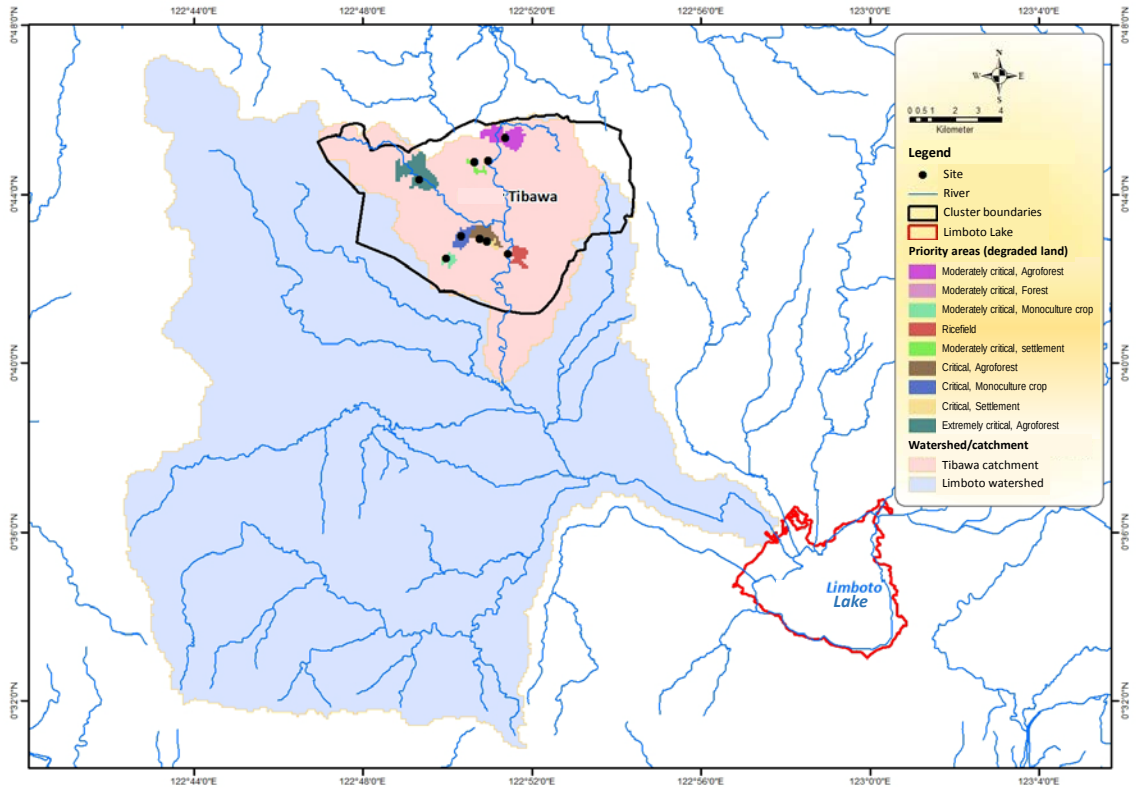

Figure A5. Tibawa Landscape as part of Limboto watershed, in Gorontalo District, Gorontalo

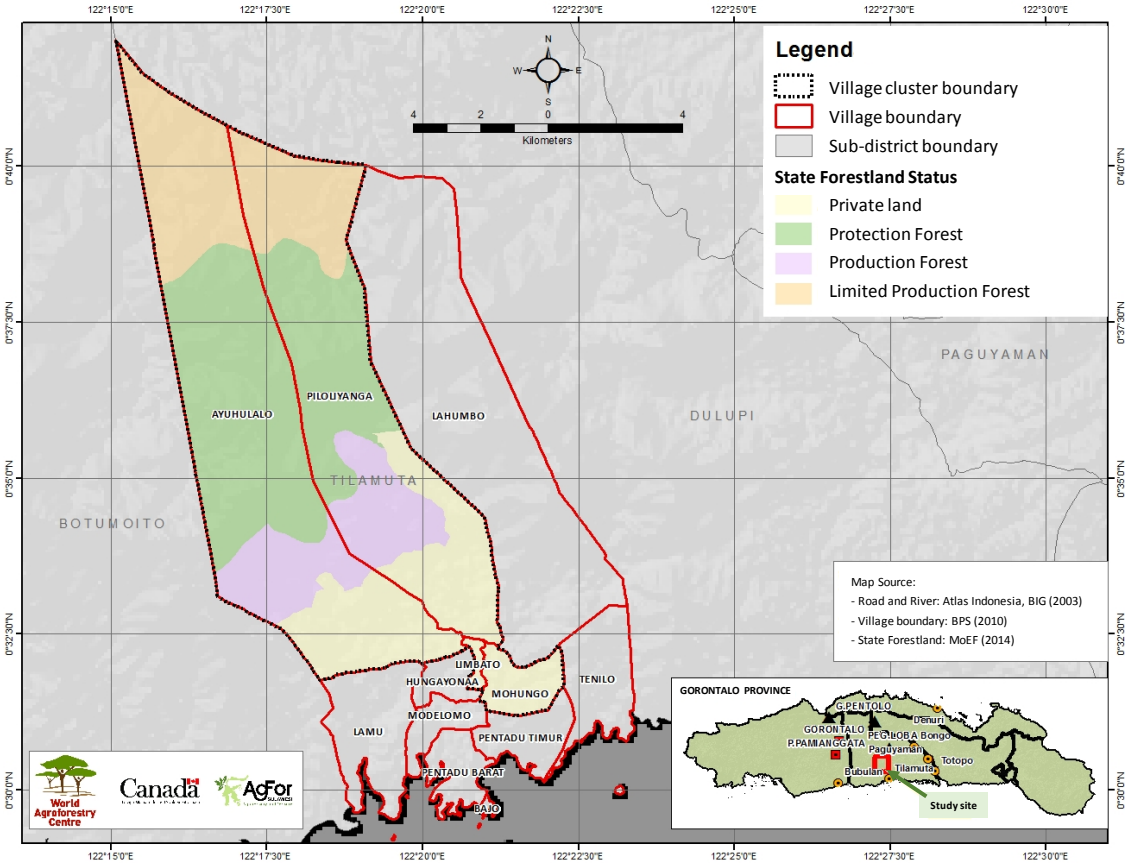

Figure A6. Tilamuta village cluster in Boalemo District, Gorontalo

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