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01

Upland Landscape Management for Drinking Water Provision - Biang Loe Catchment, Bantaeng, South Sulawesi

AgFor Livelihood-Conservation Strategy - 01

Agroforestry and Forestry in Sulawesi (AgFor Sulawesi) - Environment Team

Atiek Widayati, Ni'matul Khasanah, Pandam Nugroho Prasetyo and Sonya Dewi

November – 2014

World Agroforestry Centre

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1. INTRODUCTION

1.1. LIVELIHOOD AND CONSERVATION STRATEGIES (LCS)

Rural livelihoods are normally agriculture based and highly connected to the utilisation of natural resources and ecosystem services, including those from forest. Utilisation of natural resources requires conservation measures in order to ensure sustainability. The two aspects of utilisation and conservation need to be addressed comprehensively and strategies that encompass both aspects should be developed.

As part of the Agroforestry and Forestry (AgFor) programme in Sulawesi, livelihood and conservation issues receive substantial attention and need to be addressed well to contribute to the sustainability of forest and agroforest landscapes.

This strategy has been developed as the foundation for AgFor and its partners to address specific livelihood and conservation issues in its sites in Sulawesi. The overall AgFor approach to address livelihood and conservation issues follows diagnostic-to-action steps as described in Figure 1. The strategy development process should ensure 'participatory' and 'inclusive' principles, in which partnership, with relevant actors and stakeholders in the work area, is key.

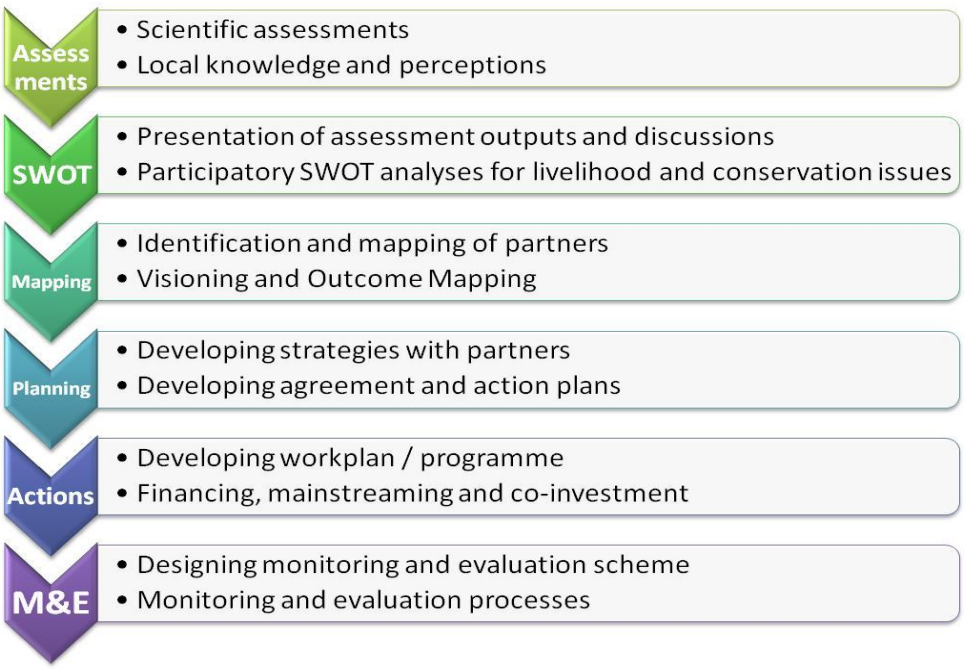


Figure 1. Overall approach for addressing livelihood and conservation issues in AgFor

1.2. WORK COVERAGE: BIANG LOE CATCHMENT AND THE VILLAGE CLUSTER

Bantaeng District is located in the southern part of South Sulawesi Province, bordering Jeneponto on the west and Bulukumba on the east and northeast (Figure 2). The geographic extent for this strategy is Biang Loe Catchment, which is located right in the middle of Bantaeng District, with the focus on a village cluster located in the mid-to-upper part of the catchment (see Figure 2). Biang Loe Catchment covers an area of approximately 5,600 ha and drains into Biang Loe River, which flows through the town of Bantaeng.

The village cluster consists of four villages namely Pa'bumbungan, Kampala, Parang Loe and Campaga The village cluster, at approximately 500 m asl, covers approximately 22 km2, with Kampala having the largest village area (7.21 km2), followed by Pa'bumbungan (6.5 km2), Campaga (5 km2) and Parang Loe, the smallest (3.8 km2). In these villages there are abundant water sources, including good quality springs, utilised not only by the villagers in the area, but also by users downstream, especially Bantaeng Town.

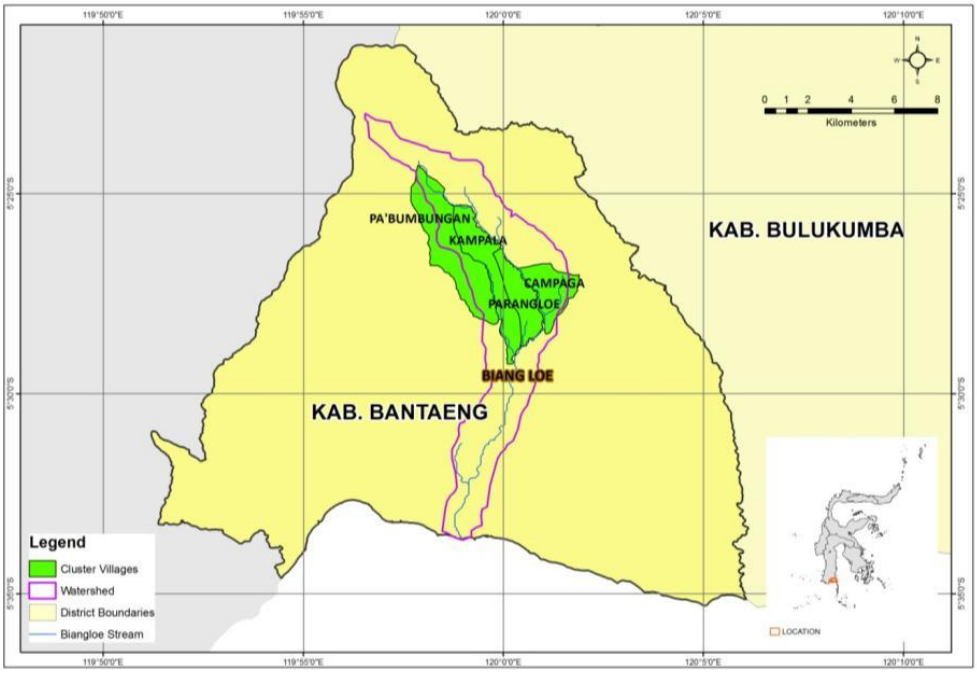


Figure 2. Biang Loe Catchment and village cluster, Bantaeng District

2. CURRENT LIVELIHOODS AND ECOSYSTEM SERVICES

2.1. LIVELIHOODS AND LOCAL ECONOMY

Livelihood sources in the four villages depend on cash crops, primarily cacao, coffee and clove. Clove production in Campaga is high, but in the other three villages it is lower. Land use and land cover studies in this village cluster revealed that throughout the three periods of analyses (1990, 2000, 2010), clove gardens were the dominant type and changes to other types of gardens or plantations were very small (<=10%). Within the areas that have changed, increases in clove and cacao gardens were the most common. Conversion to these two commodities was due to the good price and most villagers chose to grow them to increase their incomes.

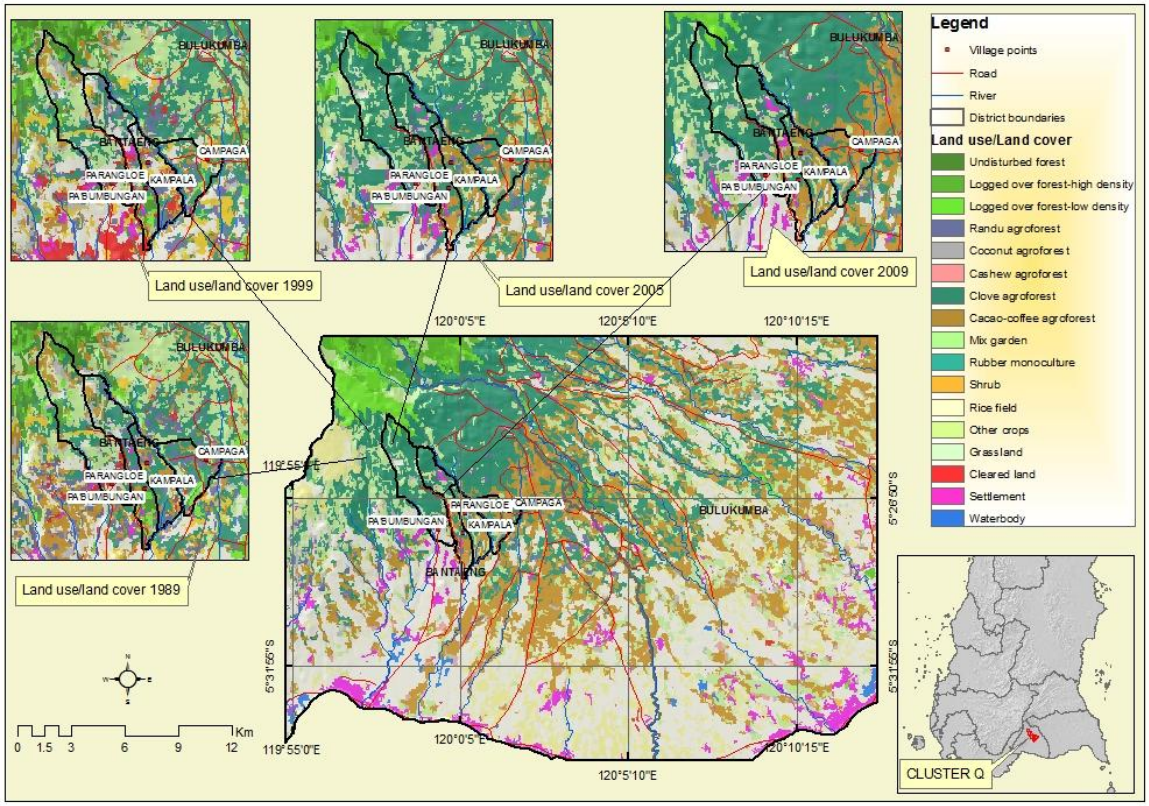


Figure 3. Land cover in the village cluster for 1990-2010 showing local livelihood strategies

As part of the livelihood strategies at the household level, clove usually becomes a means of family savings, while coffee and cacao are sold to fulfil daily needs. It is uncommon to find farmers storing cacao for saving purposes, as cacao is sold immediately after harvesting. Food crops such as maize are planted for both own consumption (60%) and income purposes (40%).

Other than the three major cash crops and maize mentioned above, farmers were also growing rubber, tangerine, palawija, cashew and candlenut. Farmers in this village cluster apply mixed farming or agroforestry practices across different cash crops and, at times, include understorey crops whenever suitable. Farmers perceive that the mixed-crop practice is a perfect strategy when faced with uncertainties of price and season. Their confidence in this strategy has grown as it has been working well for the last 15 years with seasonal uncertainties and fluctuating prices.

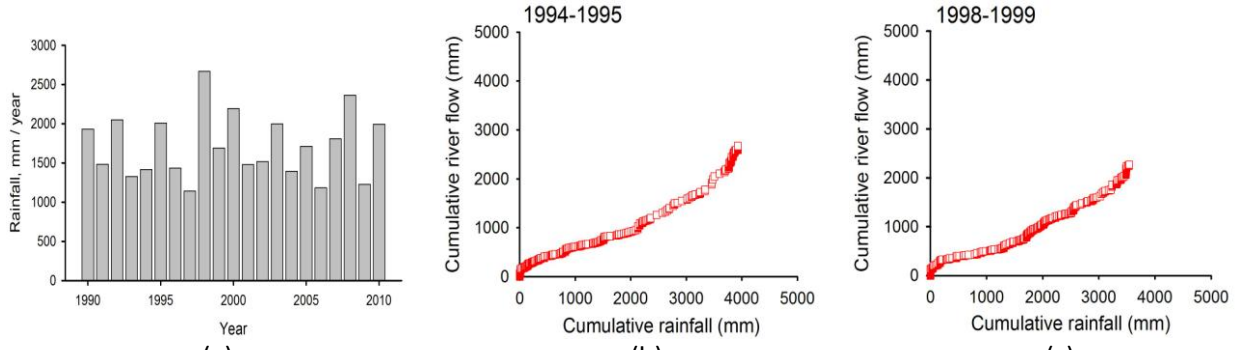
Most roads in this cluster are asphalt, although some village roads are in bad condition. There is only limited public transportation in the area, mostly minibus (locally called *pete pete*), motorcycle taxi (*ojek*) and small trucks for transporting farm produce.

Major factors that define the welfare of the population may comprise, but are not limited to, areas and types of crops planted, level of education, condition of house/dwelling, type of employment/work, vehicle owned and savings in the form of cash or harvested produce. Based on PODES data, in this village cluster, most of the population is at a relatively good level of wealth with only a small number below the poverty line. Most of the population below the poverty line (Surat Keterangan Miskin1) live in Campaga (146 households – 7.8 % of the village population), while in the other villages the figure is much lower (< 30 households).

1 Surat Keterangan Miskin is a letter that is released by the village head, which states that the person identified in the letter is on a low income and is entitled to certain government facilities such as free medical treatment.

2.2. WATERSHED CONDITIONS

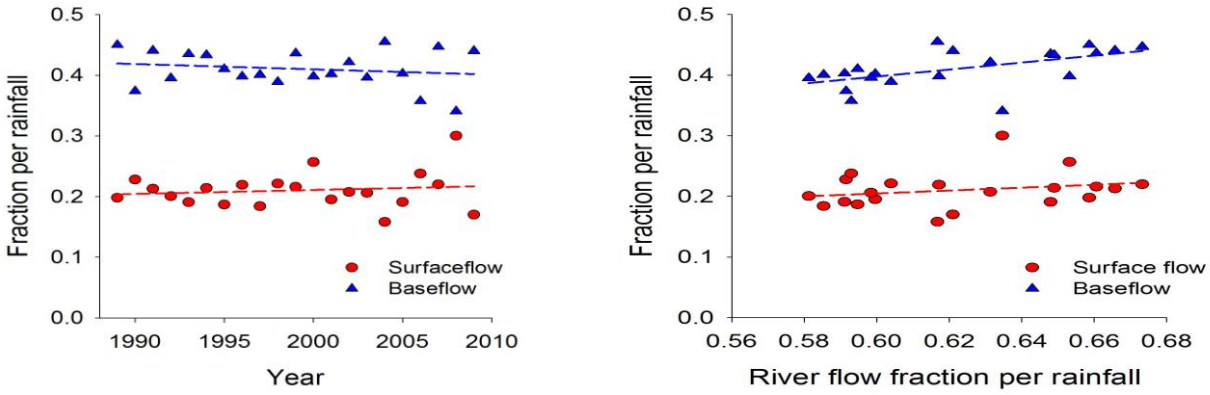
The climate and hydrology analyses were based on the data obtained from the Water Resources Management Office (Dinas Pengelolaan Sumber Daya Air/PSDA) in South Sulawesi, for the period 1990–2010. During the 20 years of observations (1990–2010), the rainfall ranged between 1140 – 2670 mm/year with an average of 1715 mm/year (Figure 4(a)). The river flow rates for the periods 1994–1995 and 1998–1999 were consistent with rainfall data (Figure 4(b) and 4(c)).



(a) (b) (c)

Figure 4. Annual rainfall for 1990-2010 (a); River flow rate against cumulative rainfall for 1994-1995(b) and for 1998-1999 (c)

Hydrological performance of Biang Loe subcatchment was analysed using a GenRiver model with climate and hydrology, soil and land cover data. The main indicators used to evaluate the hydrological performance are the surface flow, river flow or discharge and baseflow rates. Simulation results of the impacts of land cover changes on water balance in Biang Loe watershed for the last 20 years (1990–2010) shows that baseflow rate is relatively higher than the surface flow rate, with no substantial increase or decrease in either (Figure 5(a)). This demonstrates the stable hydrological performance of the catchment during the 20 years of observation.

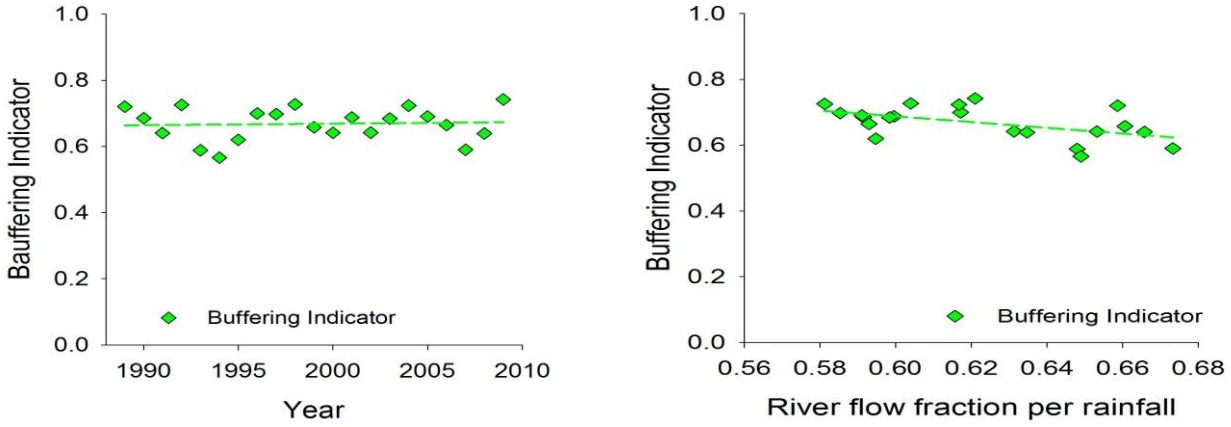


(a) (b)

Figure 5. Fraction of surface flow and base flow rates against the rainfall during the 20 years of observation (a) against the river flow fraction (river discharge) per rainfall (b)

Along with the increase in water discharge in the net fraction of rainfall, the contribution from surface runoff remained in a similar fraction while the contribution from baseflow slightly increased (Figure 5(b)). The increasing contribution of the baseflow to the river discharge, compared to that from the surface flow, demonstrates that the baseflow performed well in retaining water and hence its supply to the stream discharge.

The buffering indicator refers to the catchment capacity to 'buffer' the hydrological function of the catchment during extreme conditions, e.g. with a period of extreme rainfall. Figure 6(a) shows that the buffering capacity was stable during the twenty years of observation. In relation to the river flow rate (discharge), Figure 6(b) demonstrates that along the increase of discharge, the buffering capacity decreases only slightly, thus demonstrating the relatively good capacity of the catchment.



(a) (b)

Figure 6. Buffering indicator of Biang Loe Catchment throughout 1990-2010 (a); against the river flow fraction per rainfall (b)

From the above analyses we can see that for the period 1990-2010, Biang Loe Catchment was able to maintain its hydrological functions well.

2.3. UTILISATION OF ECOSYSTEM SERVICES IN THE VICINITY

Ecosystem services are the services provided by the ecosystem processes and functions, which may encompass three types of services: provision, regulation and support. The human population can utilise these services directly from where they are produced or indirectly through various natural and man-made processes. Categorisation of ecosystem services may encompass five types: 1) water, 2) biodiversity, 3) biomass/carbon storage, 4) soil and 5) landscape beauty, although different studies might propose fewer or more categories. For Biang Loe Catchment, water is the most prominent ecosystem service, widely utilised inside and outside the catchment area.

In the village cluster, there are several springs and tributaries flowing across the landscape. The springs are located in several places as shown on the map (see Figure 7). Tributaries that flow into Biang Loe River start from the headwater springs located in the upstream parts also shown on the map (Figure 7 and Appendix 2).

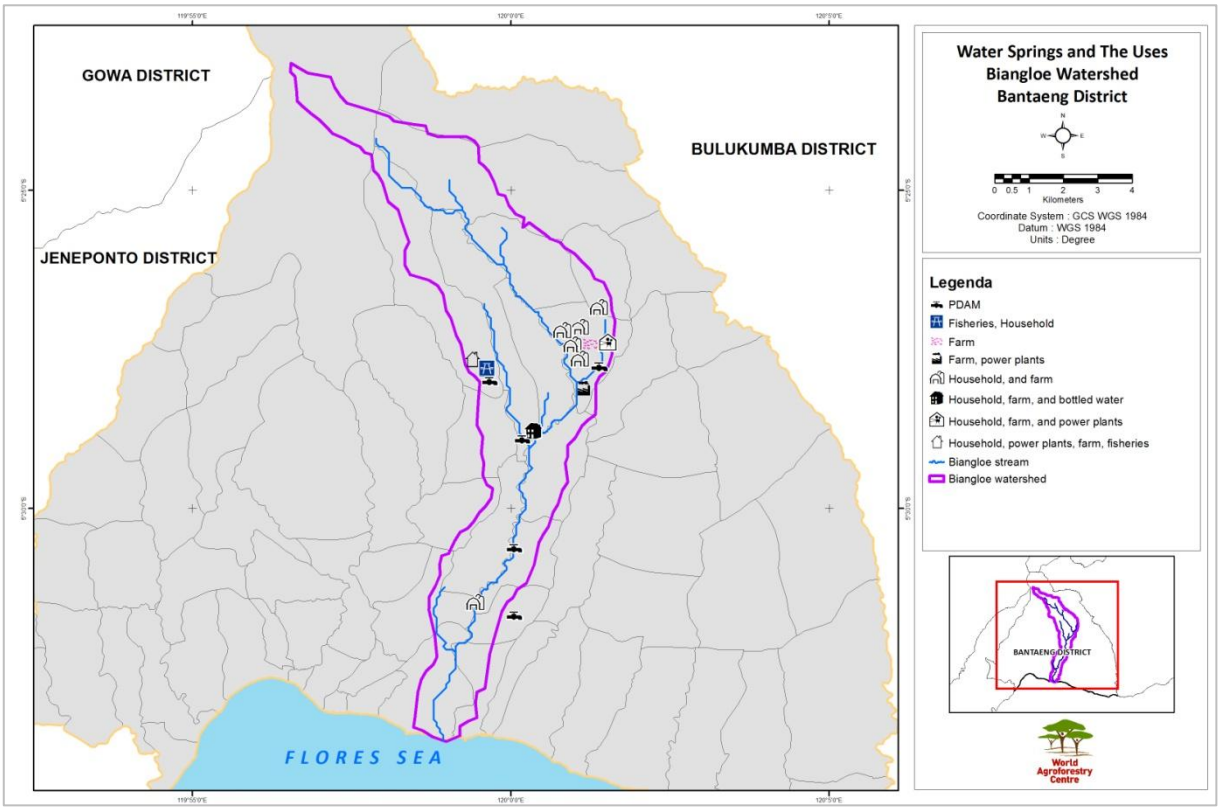


Figure 7. Map of springs and their utilisation in Biang Loe Catchment

2.3.1. THE USE OF WATER AT THE VILLAGE LEVEL

The primary water source for household use such as cooking, washing and bathing, is spring water. The spring water is channelled to the individual houses through pipes installed in the springs. The use of stream water is mainly for agricultural uses, e.g. for irrigation and other farming activities.

In some areas in the cluster, water is also used to generate electricity. Small-scale hydropower electricity plants can be found in Parang Loe, Kampala and Campaga. The power plants were a contribution from different programs such as National Program on Community Empowerment (Program Nasional Pemberdayaan Masyarakat – PNPM).

Problems with water, as expressed by the community, were to do with water quality such as turbidity that emerges during the rainy season and decreased quantity during the dry season.

2.3.2. THE USE OF WATER BY WATER COMPANIES

Within the village cluster, there are three water sources that are utilised by the Regional Drinking Water Company (Perusahaan Daerah Air Minum – PDAM) (Figure 7), located in the villages of Pa'bumbungan, Kampala and Campaga. The discharge from the three sources ranges from 20 litre/sec to 450litre/sec, while PDAM utilises between 10 litre/sec and 39 litre/sec. From the three sources, PDAM established pipes and constructed several installations as seen in Figure 8.

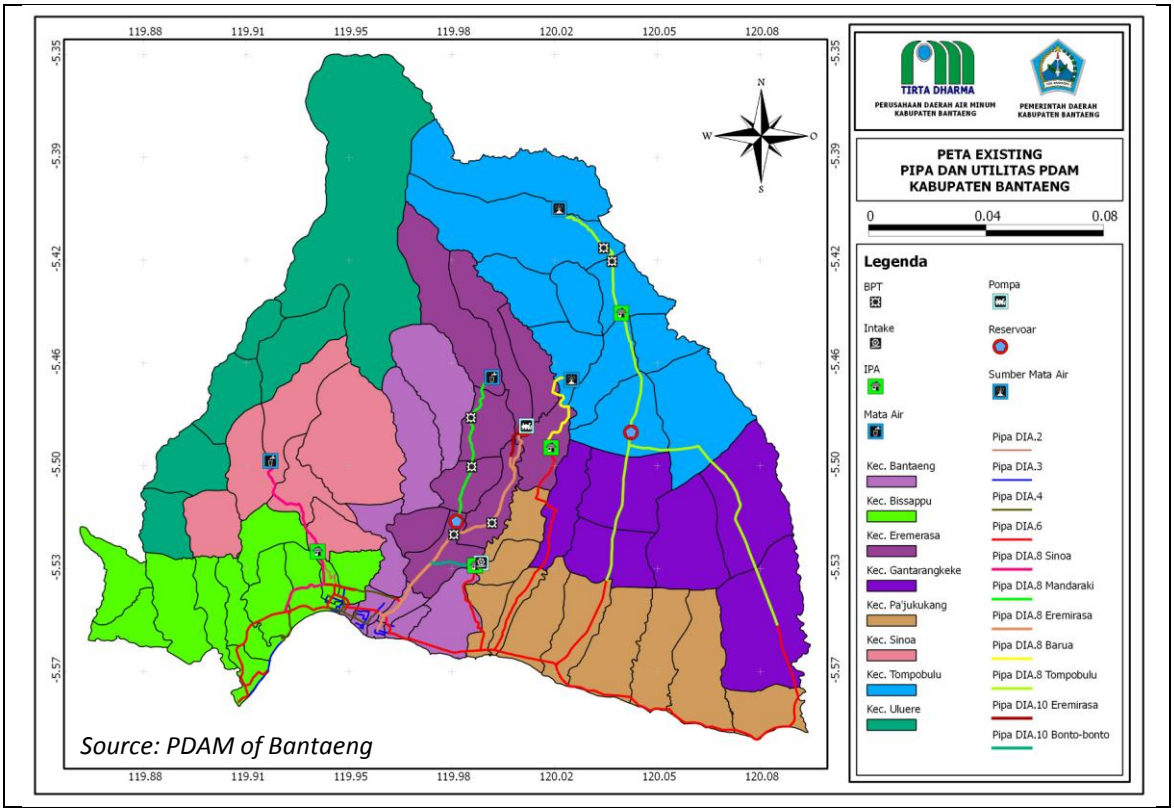


Figure 8. PDAM water pipes in Bantaeng

The spring in Kampala (Eremerasa Spring) is also a major source for bottled drinking water companies operating in South Sulawesi. At least three companies use this spring: Airqita, Air Vita and AAN. Water utilisation comes under district level regulations. Any levies due are paid to the district revenue through PDAM.

2.4. COMMUNITY BASED FOREST CONSERVATION

Despite the small area of forest cover in the cluster, forest protection does take place such as through the Village Forest (Hutan Desa) scheme in Campaga. This forest is said to be in relatively pristine condition because it has been preserved locally and there are no substantial human activities in the area. In this area there are several timber species, like pangi (*Pangium edule*), songka (*Parkia roxburghii*), ficus and some endemic wildlife species such as the moor macaque (*Macaca maura* – kera hitam) and Sulawesi dwarf cuscus (*Strigocuscus celebensis* – kuskus mini). A major function of this forest area is to protect water sources for downstream areas including for clean water for the PDAM, microhydro power plant and rice field irrigation.

The Village Forest status in Campaga, covering 23 ha, was officially granted in 2010, through the Decree of Minister of Forestry (SK Menhut, No. 55/Menhut-II/2010) and is currently managed by BUMAS Babang Tangganyya of Campaga Village. This Village Forest is one of three in Bantaeng District covering 704 ha altogether, while the other two are in Labbo and Pattaneteang villages.

2.5. SWOT (STRENGTH, WEAKNESS, OPPORTUNITIES AND THREATS)

SWOT analysis is applied to identify the positives and negatives of a certain organization, institution or community, from the internal parts (S-W) and externally (O-T). Developing a full awareness of the situation can help with both strategic planning and decision-making.

BOX 1. SWOT Analysis (http://ctb.ku.edu/en/tablecontents/sub_section_main_1049.aspx)

A SWOT analysis can offer helpful perspectives at any stage of an effort, which can be used to:

- Explore possibilities for new efforts or solutions to problems.
- Make decisions about the best path for your initiative. Identifying opportunities for success in context of threats to success can clarify directions and choices.
- Determine where change is possible. For example if an organization is at a juncture or turning point, an inventory of strengths and weaknesses can reveal priorities as well as possibilities.
- Adjust and refine plans mid-course. A new opportunity might open wider avenues, while a new threat could close a path that once existed.

SWOT analysis was conducted in the village cluster to tap villagers' perspectives on the S-W-O-T of their landscape. Five categories, i.e. natural resources, human, physical/infrastructure, financial and social, were used to obtain the Strengths and Weaknesses of the landscape. For Opportunities and Threats, no categories were provided. The outputs from the SWOT exercise served as entry points to define key issues and to develop pathways to address the issues. The results of the SWOT identification for the landscapes in this village cluster are summarized in Table 1.

Table 1. Summary of SWOT results for Biang Loe village cluster

Strength	Weakness
Good forest	Undulating topography creating difficult access
Good land suitability and fertility for highly commercial cash crops	Frequent pest and disease
Ecotourism object(s)	Low skills in agriculture
Abundant good quality spring water	High unemployment
Farmers have good assets in livestock and fisheries	Poor public facilities
Good farming management in shared management (*bagi hasil*)	Low income and low capital (e.g. land)
Good infrastructure for ecotourism, industry and markets	Inactive youth organisation and farmer groups
Clean water and sanitation facilities are good	
High portion of productive age	
Good working spirit in the village	
Good local knowledge of managing natural resources	
Active extension and extension workers	
Opportunity	**Threat**
Contribution/rewards from water company and downstream villages for water from the upstream area	Illegal logging
Development of ecotourism	Agricultural expansion threatening the forest
Development of bottled water enterprise	Landslide threatening agricultural lands
As a research site for forest and agroforest	Modernisation threatening local culture
Market opportunity for good cash crop produce	Spatial planning regulation hampering land expansion for agriculture
Development of agricultural products made from fruit	

3. LIVELIHOOD AND CONSERVATION ISSUES

For Biang Loe, key issues common to all four villages were discussed with key stakeholders from the villages, subdistrict and district levels who are familiar with the issues in the area. Conditions that were ideal for the cluster were also explored in a participatory manner. Table 2 presents extracts of key issues as well as ideal conditions.

Table 2. Issues and ideal conditions for livelihoods and natural resources identified by villagers and district and sub-district stakeholders

No	Issues	Ideal conditions
1	Problems in farm management, e.g. pest and disease, excessive use of pesticides	Improved knowledge in handling pest and disease problems and in the use of pesticides so as to be environmentally friendly
2	Low skills in farming practices including how to make use of sloping land for economically viable commodities	Improved skills in farming practices including ability to select suitable commodities for growing on sloping land
3	Poor infrastructure	Improved infrastructure such as water drainage and increased capacity to maintain the facilities
4	Issues about water management, uneven distribution/access to clean water and lack of recognition of upstream-downstream relationships	More efficient use of water, improved management of water distribution and implementation of a reward mechanism for upstream providers from the downstream users

Three out of the four issues identified (numbers 1, 2 and 3 in Table 2) reflect weaknesses in the village cluster from their SWOT identification (see also Table 1). However, the issues about water (No. 4) touch upon strengths in natural capital, e.g. abundant water resources, although clearly there are still gaps in the villages' internal management as well as relationships between upstream landscape managers and downstream users. The ideal condition identified for the water management issues reflects the opportunity that was identified in the SWOT exercise, i.e. opportunity of contribution/rewards for the clean water upstream villages provide water companies and downstream users.

The stable landscape dynamics over the past 20 years (see section 2.1 and Figure 3), predominantly mixed farming or agroforest areas planted with different cash crops, reflects farmers' commitment to maintaining trees and crops in the landscape to maintain the stable hydrological performance of the catchment (see section 2.2). Despite the small area of forest, forest protection efforts have been reinforced such as through the Village Forest scheme (see section 2.4).

The landscape in this part of Biang Loe Catchment has been managed well by the landscape managers, but issues of water and water-catchment management need to be addressed comprehensively. This Livelihood and Conservation Strategies (LCS) document has been produced to address this particular livelihood-cum-conservation issue in Biang Loe Catchment.

4. STRATEGIES TO ADDRESS KEY ISSUES

This strategy has been developed to see changes in the relevant actors in order to perform better in managing their landscape through actions that ensure that livelihoods are maintained as well as to conserve relevant natural resources and the ecosystems. Overall development of the strategy utilises the Outcome Mapping approach.

BOX 2. Outcome Mapping (Earl et al, 2001)

Outcome Mapping (OM) is an approach to planning, monitoring, and evaluating social change initiatives developed by the International Development Research Centre (IDRC) in Canada. At a practical level, OM is a set of tools and guidelines that steer project or programme teams through an iterative process to identify their desired change and to work collaboratively to bring it about. Results are measured by the changes in behaviour, actions and relationships of those individuals, groups or organisations with whom the initiative is working directly and seeking to influence.

4.1. VISION AND MISSION

The vision of Biang Loe area is to make the villages in the upper Biang Loe Catchment, prosper based on sustainable agricultural practices.

The mission has two points:

- To develop commitment and collaboration between upstream and downstream actors in Biang Loe Catchment in order to conserve the upstream catchment for clean water while safeguarding local livelihoods through agroforest and forestry practices.
- To develop district regulations for Rewarding Ecosystem Services (RES) and to contribute to the spatial planning that supports environmental conservation.

4.2. BOUNDARY AND STRATEGIC PARTNERS

When developing strategies the identification of partners, both boundary and strategic, is key to achieving outcomes in the work area. Boundary partners consist of those individuals, groups and organisations with whom the programme interacts directly to create changes, anticipate opportunities for influence and engage in mutual learning. The role of strategic partners is mainly to assist in achieving the outcomes; the implemented programme(s) is not expected to influence these partners.

The boundary partners for the LCS in Biang Loe comprise individuals representing organisations and institutions that 1) have the authority over catchment management, 2) contribute to the management of the catchment, and 3) utilize the catchment ecosystem services. The boundary partners include: District Forestry and Plantation Office (Dinas Kehutanan dan Perkebunan – Dishutbun), District Agriculture and Livestock Office (Dinas Pertanian dan Peternakan), Regional Environment Office (Bapedalda), Regional Drinking Water Company (PDAM), village authorities (Pemdes/Lurah), Village-based Enterprise (BUMDES), Community-based Enterprise (BUMAS). The strategic partners that provide advice and feedback to the strategy development and assist in facilitating the process across the boundary partners are: the University of Hasanudin, sub-district (Kecamatan) office and a local NGO (Balang).

The identified partners have formed a working group (WG), the Bantaeng Working Group for Ecosystem Services Management (Tim Kerja Pengelolaan Jasa Lingkungan Bantaeng) (see Appendix 1). The WG aims to ensure partners' participation and inclusiveness in developing the strategy, and in the relevant subsequent processes to implement the strategy on the ground.

4.3. OUTCOME CHALLENGES

Outcome challenges describe the contribution of each boundary partner to the vision and reflect the changes that are expected from each partner. Outcome challenges also serve to set out the ideal actions.

From specific issues and missions to address in Biang Loe, the working group mapped the outcome challenges as targets to achieve. A summary of these targeted challenges is presented in Table 3 and Figure 9.

Table 3: Outcome challenges for each boundary partner

Boundary Partner	Outcome challenges
District Forestry and Plantation Office (Dinas Kehutanan dan Perkebunan – Dishutbun)	• At the district level, the challenge is for Dishutbun to facilitate the process of enactment of an ecosystem reward regulation (as PerBup), while at the village level Dishutbun needs to lead capacity building to strengthen the forest management programme for the purpose of providing clean water.
Regional Drinking Water Company (PDAM)	• PDAM needs to realise and implement the RES mechanism in the villages that provide water services. PDAM to also socialise the most up-to-date data and information on clean water K3 (*kuantitas, kualitas* and *kontinyuitas* – quantity, quality and continuity) and the condition of the pipes in the respective villages. As part of the collaboration on RES, PDAM needs to direct the 'go green' initiatives in collaboration with the village BUMAS/BUMDES and support village authorities and institutions to develop a small-scale/home industry for bottled drinking water as an incentive for clean water provision for PDAM.
District Agriculture and Livestock Office (Dinas Pertanian dan Peternakan - Dispertan)	• Dispertan needs to develop the MPTS planting programme in the upstream villages as part of integrated upstream landscape management and to construct water storage (embung) in upstream and downstream villages to ensure water is available for the villages.
Village-based Enterprise / Community-based Enterprise (BUMDES BUMAS)	• BUMDES/BUMAS needs to ensure that water sources in the upstream areas are well maintained, and to maintain and guarantee that PDAM pipes are well protected.
Village authorities (Pemdes)	• Village authorities need to establish an RES regulation at the village level including developing a monitoring and evaluation mechanism and to legalize the BUMAS institution (for Campaga Village). Village authorities need to ensure the continuity of clean water sources, water pipes and maintenance of the forest. For local water provision, the village authorities need to also develop a village-based water mechanism and regulation.

Figure 9 helps to summarise the outcome challenges and shows the connections across the boundary partners.

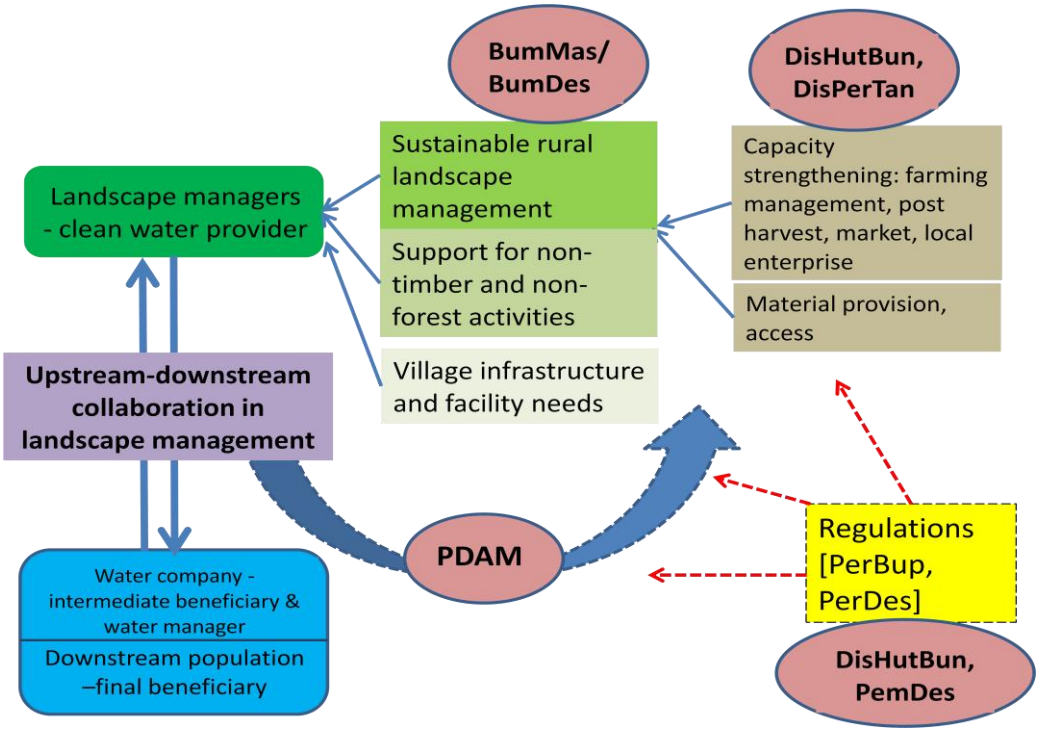


Figure 9. Mapping of the outcome challenges and the boundary partners (ellipses)

4.4. PROGRESS MARKERS

'Progress markers' are measures of the progress of each boundary partner in expected changes and improvements. The markers are divided into three stages: early positive response (expect to see) as a short-term marker, active engagement (like to see) as a mid-term marker, and the transformation targeted (love to see) as a long-term marker. Table 4 shows the outcome challenges for each boundary partner followed by the progress markers (Table 4).

Table 4. Outcome challenges for each boundary partner and the progress markers

No	Boundary Partners	Outcome Challenges	Progress Markers		
			Early positive response ***(Expect to see...)***	**Active engagement** ***(Like to see…)***	**Transformation target** ***(Love to see…)***
1	**Dishutbun**	Dishutbun to facilitate the process of enactment of the ecosystem reward regulation (as PerBup)	DisHutBun identify the RES components to be elaborated in the PerBup draft	Dishutbun lead the team to develop RES regulations and produce the PerBup draft	Dishutbun make the final PerBup draft and give it to Bupati to finalise
		Dishutbun to lead the capacity building programme for forest management at the village level for the purpose of providing clean water	Dishutbun identify villages suitable for the programme and the objectives	Dishutbun implement the training on forest management for water ES	Dishutbun continue to collaborate with villages to implement sustainable forest management to ensure water provision

2	**PDAM**	PDAM to realise and implement the RES mechanism in the villages that provide water services	PDAM prepare the resources and infrastructure for the RES scheme	PDAM initiate the process, develop the agreement and contract for RES with the respective villages (represented by BUMAS/BUMDES)	PDAM implement the RES scheme with the respective villages according to the agreement and contract
		PDAM to socialise the most up-to-date data and information on clean water K3 and condition of pipes to the respective villages	PDAM prepare the K3 materials and coordinate them with subdistrict authorities	PDAM implement the K3 socialisation activity at the beginning of every dry season	PDAM coordinate with village authorities to make sure the villagers fully comprehend K3
		PDAM to facilitate the 'go green' initiatives with the village BUMAS/BUMDES as relevant to the clean water provided by upstream villages	PDAM collaborate with BUMAS/BUMDES to develop the agenda for tree planting activities in the villages	PDAM collaborate with BUMAS/BUMDES to identify the areas for tree planting activities that are suitable and appropriate for clean water provision	PDAM implement tree planting and maintenance activities with BUMAS/BUMDES as a biannual programme
		PDAM to support village authorities and institutions to develop small-scale/home industry for bottled drinking water as an incentive for clean water provision for PDAM	PDAM identify the BUMAS/BUMDES that have fulfilled the requirements to start the industry	PDAM facilitate the permit request process to be delivered to the Ministry of Health	PDAM provide continued assistance and support for BUMAS/BUMDES until the village(s) can establish the industry
3	**Dispertan**	Dispertan to develop the MPTS planting programme in the upstream villages as part of integrated upstream landscape management	Dispertan identify the farmer groups that provide clean water to get MPTS seedlings from Dispertan	Dispertan collaborate with farmer groups to plant MPTS as part of their upstream landscape management	Dispertan establish and continue a programme to provide technical assistance so that upstream farmers can grow quality fruit
		Dispertan to construct water storage tanks (embung) in upstream and downstream villages to ensure water availability	Dispertan identify the right locations for water tanks that will provide clean water services	Dispertan construct water tanks in the identified locations	Dispertan construct water tanks that fulfil PDAM's K3 criteria
4	**BUMDES/ BUMAS**	BUMDES/BUMAS to ensure that water sources in the upstream areas are well maintained	BUMDES collaborate with PDAM to identify water source locations for the RES scheme	BUMDES collaborate with Dishutbun to develop a rehabilitation and maintenance programme for clean water	BUMDES establish a programme to maintain the springs and make sure there is no land use conversion
		BUMDES/BUMAS to maintain and guarantee that PDAM pipes are well protected	BUMDES update PDAM pipe maps	BUMDES socialise and communicate the pipe locations to the villagers	BUMDES develop a programme for PDAM pipe maintenance and protection to be implemented in the villages

5	**Village authorities (Pemdes)**	Pemdes to establish RES regulation at the village level	Pemdes form a team to develop the RES regulation in the villages	Pemdes conduct public consultation for the PerDes draft	Pemdes release the RES PerDes
		Pemdes to monitor and evaluate the implementation of RES at the village level	Pemdes collaborate with BUMAS/BUMDES to initiate the monitoring and evaluation programme for RES	Pemdes establish the criteria and indicators for monitoring and evaluation	Pemdes implement monitoring and evaluation programme periodically
		Lurah to legalise the BUMAS Institution especially for Campaga	Kelurahan produce a draft on BUMAS related to SK Bupati	Kelurahan consult the draft for BUMAS legal paper to be sent to the district authorities	Kelurahan facilitate the process for the legal status the Bupati has requested

5. ROADMAP FOR ACTION PLANNING

A roadmap for action planning consists of activities to serve as the bases for the programme/scheme to be developed by the working group. Elements of the roadmap are summarised in Table 5 and the timeline is presented in Figure 10.

Table 5. Components of the roadmap for action planning

No	Components	Description
1	Field verification	Field verification is needed to provide an update of the catchment's most recent condition as well as to elaborate on specific components in addition to the assessment conducted prior to the strategy development. For this LCS, a survey of springs and other water sources is conducted (Figure 7 and Appendix 2).
2	Capacity building	Capacity building activities are needed to identify areas of skills/knowledge that the boundary partners or the beneficiaries need in order for them to assist in achieving the outcome(s). Biang Loe WG identified a crash programme for RES as part of capacity building for them.
3	Socialisation and consultation	A socialisation process is needed to familiarise the relevant partners about the issues and relevant aspects of the strategies. This process is also for obtaining inputs and to anticipate potential bottlenecks, problematic areas and resistance. Socialisation is mainly conducted in the villages (see Appendix 3).
4	Agreement Development	Agreement between the relevant boundary partners needs to be created to document the extent and level of commitment.
5	Identification or creation of relevant regulations /policy	Support for the policy and/or regulation aspects is needed for the programme implementation. As part of the strategy, the WG identifies the policy and regulation or it proposes a new one to be developed by the authorised office. In this particular case, PerBup (Regent Regulation) for Management and RES is proposed as part of the WG mission.

6	Alignment with the district programme/planning	In order to ensure synergies with programmes at the district level, alignment of the strategy, or parts of the strategy, to the district level planning and/or budgeting process should also be explored. Several programmes on land rehabilitation, nursery and seedling provision at the Dinas level will be synergized with this programme by the relevant offices (Dishutbun and Dispertan) in the WG.

The overall timeline from strategy development up to action planning should be completed in 2015. The implementation of the collaboration is projected for five years, i.e. up to 2020 (Figure 10).

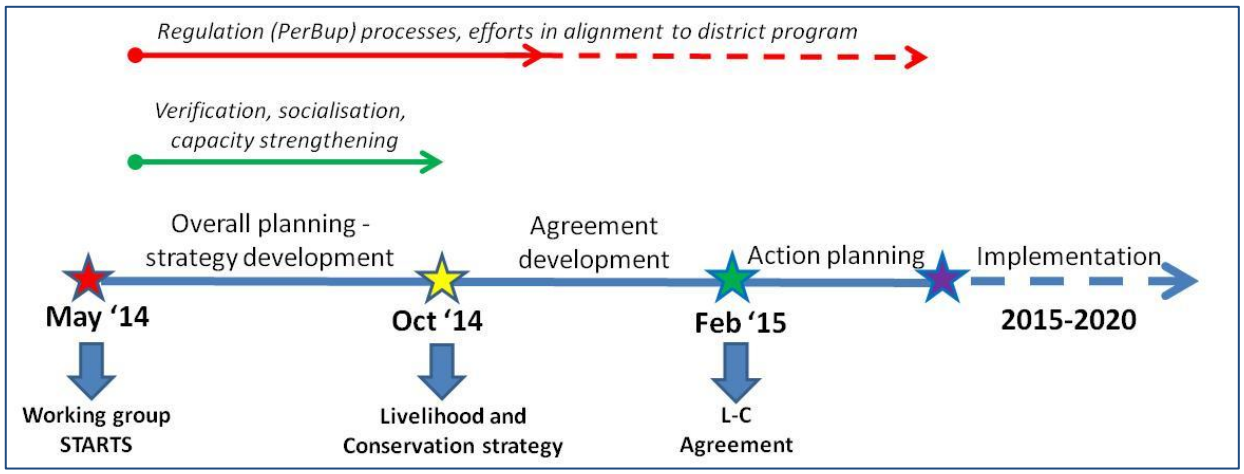


Figure 10. Overall timeline from strategy development to implementation stage

6. OVERVIEW OF ACTIVITIES FOR IMPLEMENTATION

Under the programme design for Biang Loe LCS, the activities have been derived from the outcome challenges (Table 4) for all the boundary partners, and can be categorised as: 1) non-financial or in-kind rewards for villagers to maintain clean water for PDAM, 2) villagers' obligation to PDAM to ensure springs and pipes are well maintained, and 3) support activities in landscape management provided by relevant offices and programmes. The main activities under the programme should include:

1. Sustainable forest management, including capacity building for farmers and farmer groups, led by Dinas Kehutanan dan Perkebunan
2. Routine updates and socialisation of the information on the clean water K3 (*Kuantitas, kualitas dan kontinyuita*s - quantity, quality and continuity) and pipe condition by PDAM sent to the respective villages
3. Go-green planting activities conducted collaboratively between PDAM and Village BUMDES/BUMAS, but also taking into account preferred and suitable species
4. PDAM to give BUMAS/BUMDES capacity building activities for small-scale enterprises for bottled drinking water. Once the BUMAS/BUMDES are ready, PDAM will also provide assistance on developing the bottled drinking water enterprise at the village level
5. MPTS (multi-purpose tree species) planting programme and seed provision by Dinas Pertanian in coordination with BUMAS/BUMDES
6. Water tank (embung) construction in relevant areas designed and implemented by Dinas Pertanian
7. Routine updates from BUMAS/BUMDES to PDAM on the condition of water sources and pipes sent to PDAM and the RES forum if relevant

8. Development of ES forum/team at the village level to guard the water sources and pipes led by BUMAS/BUMDES

The detailed activities and work plan for the implementation were developed in detail during the action planning stage (see the timeline in Figure 10) after all relevant parties had made a commitment to apply the livelihood and conservation strategies in the catchment area. Further inputs from the communities should also be taken into account (Table A2 in Appendix 3).

7. REFERENCES

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APPENDIX 1. BANTAENG WORKING GROUP

The working group for Bantaeng Ecosystem Management is endorsed by Bantaeng Regent and the draft of the endorsement letter, which includes the names of the members, is shown below:

BUPATI BANTAENG

KEPUTUSAN BUPATI BANTAENG
Nomor :

TENTANG

PENETAPAN TIM KERJA PENGELOLAAN JASA LINGKUNGAN KABUPATEN BANTAENG TAHUN 2015 - 2016

BUPATI BANTAENG

Menimbang :

a. bahwa sumber daya alam yang tersebar di daerah merupakan kekayaan yang potensial untuk dikembangkan dan dimanfaatkan secara optimal sebagai penunjang dalam kegiatan pembangunan daerah serta kesejahteraan masyarakat dengan tetap memperhatikan konservasi sumber daya alam hayati dan ekosistemnya serta upaya pelestarianya.

b. bahwa untuk mempertahankan, meningkatkan dan melestarikan potensi sumber daya alam dan kandungannya perlu dilakukan pengelolaan yang berkelanjutan dengan mengembangkan potensi jasa lingkungan secara bijaksana dalam rangka menumbuhkan perekenomian dengan memperhatikan aspek ekologis, ekonomis dan karakteristik sosial budaya masyarakat.

c. bahwa untuk memenuhi maksud huruf a dan b di atas maka dipandang perlu menetapkan Keputusan Bupati tentang Penetapan Tim Kerja Pengelolaan Jasa Lingkungan Kabupaten Bantaeng.

Mengingat :

1. Undang-Undang Nomor 29 Tahun 1959 tentang Pembentukan Daerah-Daerah Tingkat II di Sulawesi;
2. Undang-Undang Nomor 5 Tahun 1990 tentang Konservasi Sumber Daya Alam Hayati dan Ekosistemnya;
3. Undang – undang Nomor 09 Tahun 1990 tentang Kepariwisataan;
4. Undang – undang Nomor 41 Tahun 1999 tentang Kehutanan sebagaimana telah diubah dengan Undang-Undang Nomor 19 Tahun 2004;
5. Undang – undang Nomor 07 Tahun 2004 tentang Sumber Daya Air;
6. Undang – undang Nomor 32 Tahun 2004 tentang Pemerintahan Daerah sebagaimana telah diubah terakhir dengan Undang-Undang Nomor 12 Tahun 2008; ;
7. Undang – undang Nomor 32 Tahun 2009 tentang Pengelolaan Lingkungan Hidup;
8. Peraturan Pemerintah Nomor 45 Tahun 2004 tentang Perlindungan Hutan;
9. Peraturan Pemerintah Nomor 16 Tahun 2005 tentang Pengembangan Sistem Penyedia Air Minum;
10. Peraturan Pemerintah Nomor 38 Tahun 2007 tentang Pembagian Urusan Pemerintahan Antara Pemerintah, Pemerintahan Daerah Provinsi, dan Pemerintahan Daerah/Kota;
11. Peraturan Pemerintah Nomor 6 Tahun 2007 tentang Tata Hutan dan Penyusunan Rencana Pengelolaan Hutan serta Pemanfaatan Hutan sebagaimana telah diubah dengan Peraturan Pemerintah Nomor 3 Tahun 2008;
12. Peraturan Pemerintah Nomor 42 Tahun 2008 tentang Pengelolaan Sumber Daya Air;

13. Peraturan Menteri Kehutanan Nomor P22/Menhut-II/2012 Tahun 2008 tentang Pedoman Kegiatan Usaha Pemanfaatan Jasa Lingkungan Wisata Alam pada Hutan Lindung;
14. Peraturan Daerah Kabupaten Bantaeng Nomor 26 Tahun 2007 tentang Pembentukan Organisasi, Kedudukan, Tugas dan Fungsi Dinas Daerah Kabupaten Bantaeng sebagaimana telah diubah dengan Peraturan Daerah Nomor 2 tahun 2009;
15. Peraturan Bupati Kabupaten Bantaeng Nomor 05 Tahun 2010 tentang Pengelolaan Hutan Desa.

MEMUTUSKAN

Menetapkan :

KESATU : Tim Kerja Pengelolaan Jasa Lingkungan Kabupaten Bantaeng dengan susunan keanggotaan sebagaimana dalam lapiran keputusan ini :

KEDUA : Penetapan Tim Kerja Pengelolaan Jasa Lingkungan bertujuan :
a. Melakukan penguatan untuk menjamin terselenggaranya pengelolaan dan Pemenfaatan Jasa Lingkungan yang efektif.
b. Mensinergikan program terkait pengelolaan jasa lingkungan

KETIGA : Tugas Tim Kerja sebagaimana dimaksud diktum kesatu adalah :
a. Merumuskan Kebijakan Pengelolaan Jasa Lingkungan di tingkat Kabupaten.
b. Membangun kesepahaman bersama pihak terkait tentang pengelolaan Jasa Lingkungan.
c. Menyusun program pengelolaan Jasa Lingkungan.
d. Melakukan koordinasi dengan stakeholder terkait.
e. Melaporkan hasil pelaksanaan kegiatan kepada Bupati.

KEEMPAT : Keputusan ini mulai berlaku sejak tanggal ditetapkan dan berlaku sampai dengan akhir tahun 2016, dengan ketentuan apabila terdapat kekeliruan didalamnya akan diadakan perbaikan sebagaimana mestinya.

KELIMA : Keputusan ini disampaikan kepada yang bersangkutan untuk diketahui dan Dilaksanakan dengan penuh tanggung jawab

Di tetapkan di : Bantaeng
Pada tanggal :

BUPATI BANTAENG,

H.M. NURDIN ABDULAH

Tembusan : Kepada Yth.
1. Menteri Kehutanan Republik Indonesia di Jakarta;
2. Gubernur Sulawesi Selatan di Makassar;
3. Kepala Dinas Kehutanan Provinsi Sulawesi Selatan di Makassar;
4. Ketua DPRD kabupaten Bantaeng di Bantaeng;
5. Kepala Inspektorat Kabupaten Bantaeng di Bantaeng;
6. Arsip

LAMPIRAN : KEPUTUSAN BUPATI BANTAENG

NOMOR :
TANGGAL :
TENTANG : PENETAPAN TIM KERJA PENGELOLAAN DAN IMBAL JASA LINGKUNGAN KABUPATEN BANTAENG.

TIM KERJA PENGELOLAAN DAN IMBAL JASA LINGKUNGAN KABUPATEN BANTAENG TAHUN 2015 - 2016

Pembina : 1. Bupati Bantaeng
2..Wakil Bupati Bantaeng

Pengarah : 1. Sekretaris Daerah Kabupaten Bantaeng
2. Staf ahli Bidang Pertanian dan Kehutanan

Tim Mitra Sinergitas Jasa Lingkungan

1. Koordinator : Kepala Dinas Kehutanan dan Perkebunan
2. Wakil Koordinator : Kepala Bappedalda
3. Anggota : 1. Kepala Dinas Pertanian dan Peternakan
   2. Kepala Bappedda
   3. Kepala Badan PMD
   4. Kepala Dinas Pariwisata
   5. Kepala Dinas Perindustrian dan Perdagangan
   6. Kepala BKP dan Pelaksan Penyuluhan
   7. Camat Tompobulu
   8. Camat Eremerasa
   9. Lurah Campaga
   10. Kepala Desa Pabbumbungan
   11. Kepala Desa Kampala
   12. Direktur Bummas Campaga
   13. Direktur Bumdes Kampala
   14. Direktur Bumdes Pabbumbungan

Tim Kerja Jasa Lingkungan

1. Ketua : Prof. Dr. Ir. H. Syamsu Alam, MS
2. Wakil Ketua : Drs. Ilyas Samsuddin
3. Sekretaris : Mustafa, S. Hut, MP
4. Anggota : 1. Prof. Dr. Ir. Supratman, MP
   2. H. Muh. Fajar, ST, M. Si
   3. Samson Sehu, S. Sos
   4. Pandam Nugroho P, S.Si
   5. Adam Kurniawan
   6. Nasrum, SH
   7. Muhammad Idris, S. Sos
   8. Hj. Iriyanti Mansyur, S. Sos
   9. Muhammad Sabrang, SP
   10. Gassing

BUPATI BANTAENG,

H.M. NURDIN ABDULLAH

APPENDIX 2. SPRINGS AND OTHER WATER SOURCES IN THE FOUR VILLAGES

Table A1. Springs and other water sources in the four villages

ID	Name	Type	Village	GPS Position	Land cover type in the vicinity	Utilisation
1	Batulang	Spring	Campaga	S 05^0 27' 15.2" E 120^0 01' 01.2"	Mixed gardens	**Households and agriculture**
2	Sungai Batulang	Pool - spring	Campaga	S 05^0 27' 15.2" E 120^0 01' 02.2"	Mixed gardens	**Households and agriculture**
3	Batulang 1	Spring	Campaga	S 05^0 27' 14.4 E 120^0 01' 02.2"	Mixed gardens	**Households and agriculture**
4	Salukebo	Spring	Campaga	S 05^0 27' 14.7 E 120^0 01' 03.4"	Mixed gardens	**Households and agriculture**
5	Pumboya	Spring	Campaga	S 05^0 27' 29.9" E 120^0 01' 07.8"	Mixed gardens	**Households and agriculture**
6	Kijang	Spring	Campaga	S 05^0 26' 55.7" E 120^0 01' 19.7"	Mixed gardens	**Households and agriculture**
7	Campaga	Spring	Campaga	S 05^0 27' 40.3" E 120^0 01' 26.0"	Mixed gardens	**Agriculture**
8	Karaengloea/tombolo	Spring	Campaga	S 05^0 27' 40.8" E 120^0 01' 28.1"	Forest	**Households, agriculture and power plant**
9	Boaka lompoa	Spring	Campaga	S 05^0 28' 00.3" E 120^0 01' 11.4"	Forest	**Agriculture and power plant**
10	Embung Pa'bumbungan	Water tank	Pa'bumbungan	S 05^0 27' 43.1" E 119^0 59' 28.0"	Home gardens	**Fisheries, Households**
11	PLTMH	Stream	Pa'bumbungan	S 05^0 27' 43.5" E 119^0 59' 25.4"	Home gardens	**Households, agriculture, power plant and fisheries**
12	Eremerasa	Spring	Kampala	S 05^0 28' 53.5" E 120^0 00' 19.7"	Public facilities (public bathing and pool)	**PDAM, household, agriculture and bottled water industry**
13	Batu doli	Pool - springs	Kampala	S 05^0 31.527' E 119^0 59' 23.94"	Mixed gardens	**Households and agriculture**
14	Mandaraki	Spring	Pa'bumbungan	S 050 27.898' E 119^0 59' 36.8"	Mixed gardens	**PDAM**
15	Siri	Stream	Campaga	S 05^0 27' 56.5" E 120^0 01' 14.5"	Forest – Mixed gardens	**PDAM**
16	Parang Muloroa	Stream	Batu Karaeng	S 05^0 31' 41" E 120^0 00' 04"		**PDAM**
17	Kampong Toa	Stream	Biang Loe	S 05^0 30' 41" E 120^0 00' 04"		**PDAM**

APPENDIX 3. SOCIALISATION IN VILLAGES

1. Socialisation materials

Socialization was conducted in each village involved in this effort (Campaga, Pa'bumbungan and Kampala). Each socialisation was attended by working group members, AgFor representative (Pandam Prasetyo), and farmers and villagers from the hamlets within the village, approximately 25–35 people.

The presentation included:

- Sequence of activities in the development of Livelihood and Conservation Strategies, including SWOT analyses, developing vision and mission by stakeholders at the district level, outcome mapping and formation of the working group.
- Definition and concept of rewarding the ecosystem services (RES)
- Application of RES and a showcase
- Land use changes in Biang Loe village cluster
- Hydrological functions and cycles
- Potential for RES
- Activities to support the maintenance of ES

2. Proposed activities related to RES programme

Each socialization included FGDs in which villagers could directly express their feedback and aspirations for the RES related activities covering: 1) proposed activities for the RES programme, and 2) protection of water sources. The summary of the FGD results is presented in Table A2.

Table A2. Summary of FGD results

Village	Ideas for rewards for ES provision (as rewards)	Proposed activities for water source protection (conditionalities for rewards)
Campaga	• Village forest land use in collaboration with Dishutbun • Timber and fruit tree planting in and in the vicinity of the village forest in collaboration with Dishutbun • Construction of water tanks (embung) in collaboration with Dinas Perikanan and Kelautan • Development of a mushroom farm in collaboration with Dispertan • Explore potential ecotourism objects • Explore bottled water as a home industry	• Protection of the area around springs including replanting in coordination with Dishutbun • Cleaning programme around springs in coordination with PDAM
Kampala	• Provision of garbage bins for the public facility areas in collaboration with Bapedalda or relevant offices • Rearrangement of shops and stalls in the village tourist area in collaboration with PNPM Bantaeng	• Protect the area around the springs including replanting in collaboration with Dishutbun • Cleaning programme around springs and reservoirs in coordination with PDAM
Pa'bumbungan	• Construction of water reservoirs in collaboration with Dinas Perikanan dan Kelautan • Development of livestock programme as an alternative livelihood source in collaboration with Dispertan	• Protect the area around springs including replanting in collaboration with Dishutbun • Cleaning programme around springs and reservoirs in collaboration with PDAM

Agroforestry and Forestry in Sulawesi (AgFor Sulawesi) is a five-year project funded by the Department of Foreign Affairs, Trade and Development Canada. The World Agroforestry Centre is the lead organization of the project, which operates in the provinces of South Sulawesi, Southeast Sulawesi and Gorontalo.

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