The Lalembuu Village Cluster, Konawe Selatan District, Southeast Sulawesi Province

This profile of the Lalembuu cluster is intended to provide a comprehensive overview of a group of villages/wards (kelurahan*) consisting of the villages of Atari Indah, Lambodi Jaya and Padaleuu and the wardof Atari Jaya, in Konawe Selatan District, Southeast Sulawesi Province, Indonesia. This profile was formulated from participatory research conducted with members of local communities and representatives of local government institutions through separate focus-group discussions consisting of male and female informants, respectively. In addition, a desk-based analysis of secondary data was conducted. This profile includes a demographic profile and a description of general conditions; of land use and changes to land use; of biodiversity; of sources of water and issues affecting these sources; and of farming systems. It also includes a Strengths, Weaknesses, Opportunities and Threats analysis. This information is intended to serve as input for planning measures to achieve environmental conservation and to improve community livelihoods on the basis of the sustainable use of forest resources and agroforestry systems.*

General conditions and demographic profile

The Lalembuu Cluster covers a total area of 48.6 km² (Figure 1). Of the wards and villages that constitute the cluster, the ward of Atari Indah is the largest, covering an area of 20.60 km² (42%). This is followed by the village of Lambodi Jaya, which covers an area of 13.03 km² (27%), next by Atari Jaya, with an area of 7.66 km² (16%), and then by Padaleuu, which covers 7.31 km² (15%). The Lalembuu Cluster borders the village of Mokupa Jaya to the north, Tinanggeato the south, the RawaAopaNational Park to the east, and the ward of Andooloto the west.The Lalembuu Cluster is located in the upstream area of the Roraya Watershed in the district of KolakaTimur.

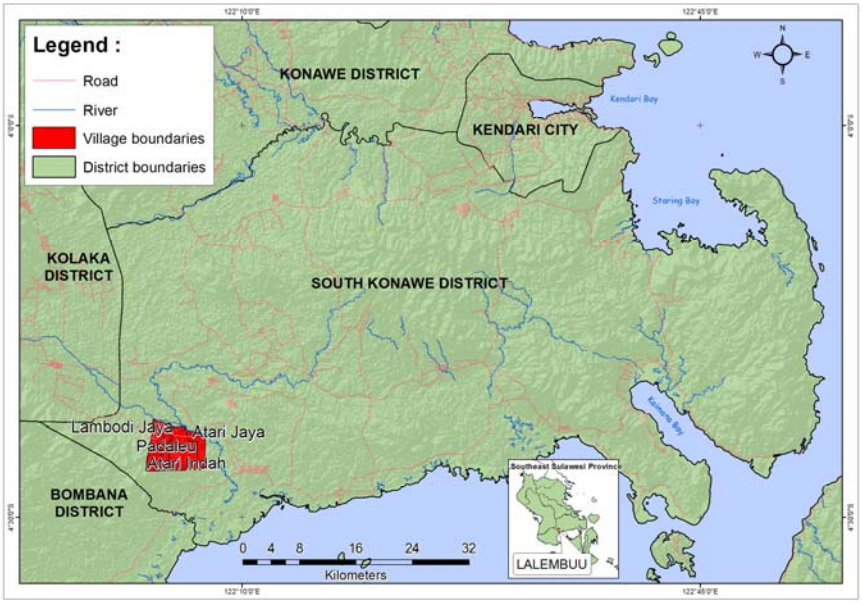

Figure 1. Location of villages within the Lalembuu Cluster

The majority of the inhabitants of the cluster are of Javanese, Balinese, Bugis and Sundanese ethnicity. The population consists of 5038 individuals (Figure 2), with a male-to-female ratio of 103:100 and an annual population growth rate of 1.83% in 2012. Inhabitants of the area have adequate access to health and educational facilities, with facilities ranging from primary (SD) through to senior high schools (SMA) located within the cluster. They also have access to health facilities in the form of community health centres (Puskesmas). Most roads still have dirt surfaces. In terms of socio-economic status, the majority of members of the community are classified as economically disadvantaged or middle

income earners, with the vast majority (98%) deriving a livelihood as farmers,with the principal crops being cocoa and citrus fruits. The remaining 2% of the labour force consists mostly of construction workers and civil servants (PNS).

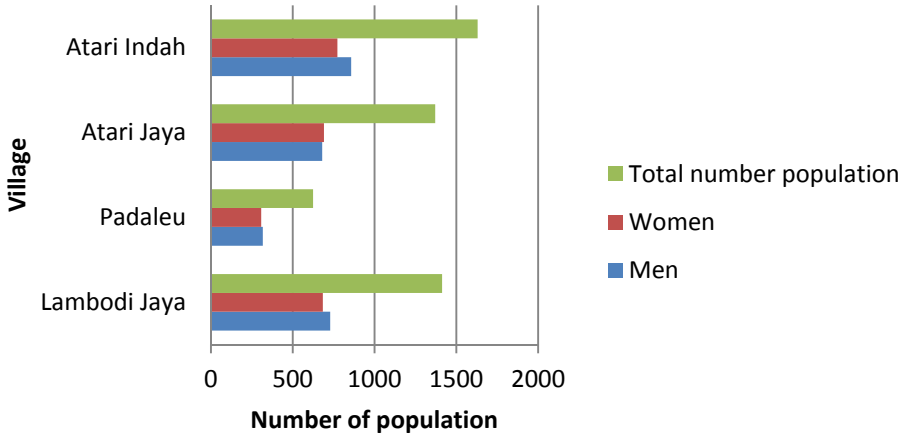

Figure 2. Total number of male and female inhabitants in each village within the Lalembuu Cluster

Land uses, changes and driving factors

In 2010, secondary forest constituted 33% of the total area of the cluster while residential areas constituted 20% (Figure 3). From 1990 to 2010, the extent of high-density secondary forest declined slightly, from 40% in 1990 to 32% in 2010. Over the same period, the extent of community gardens remained roughly stable at around 20% (Figure 4).

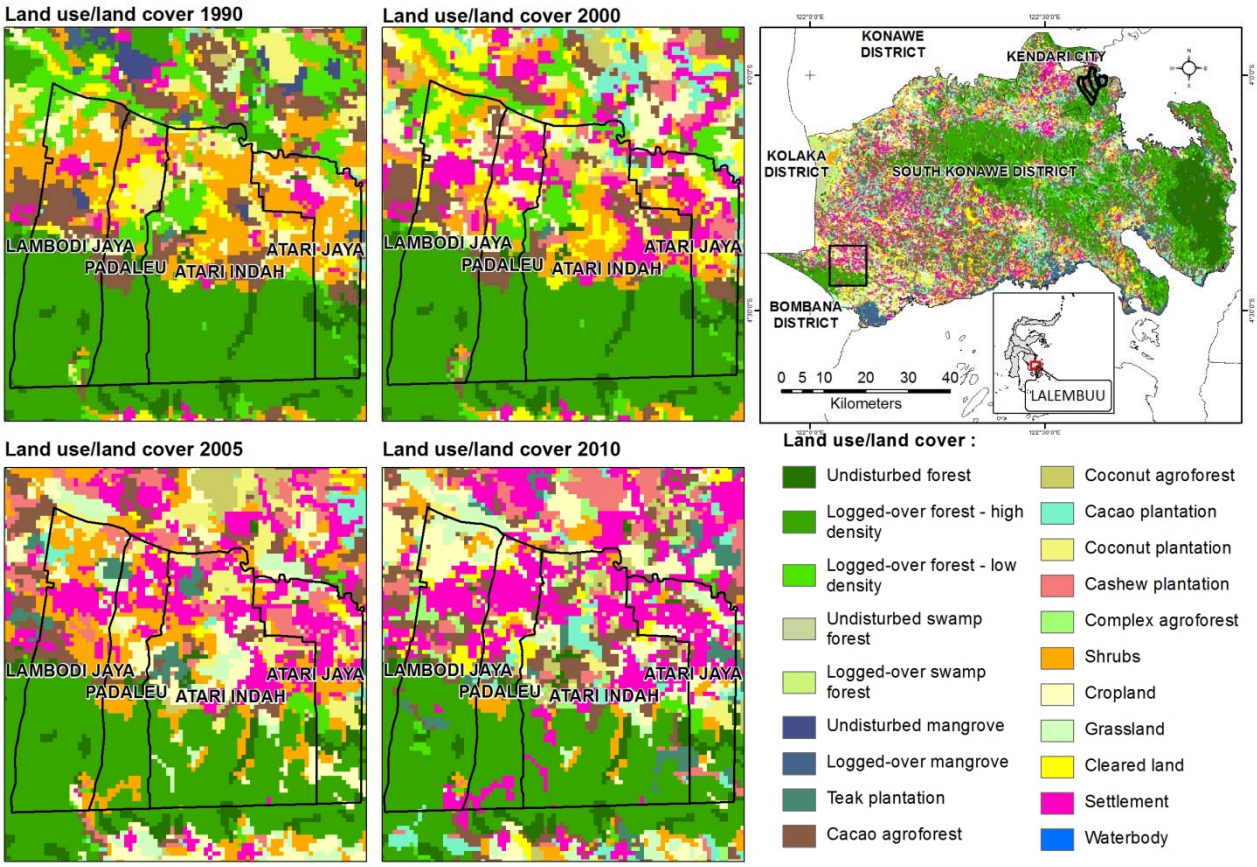

Figure 3. Map of changes to land cover (1990–2010)

From 1990 to 2000,the area covered by residential areas grew to6%,with this growth involving the conversion of land from monoculture coconut plantation, shrublandand areas usedfor the cultivation of seasonal crops.From 2000 to 2005, a large area (approximately 7%) of secondary forest and land previously used for cocoa agroforestthat had not been maintained by the communities became shrubland(Figure5).

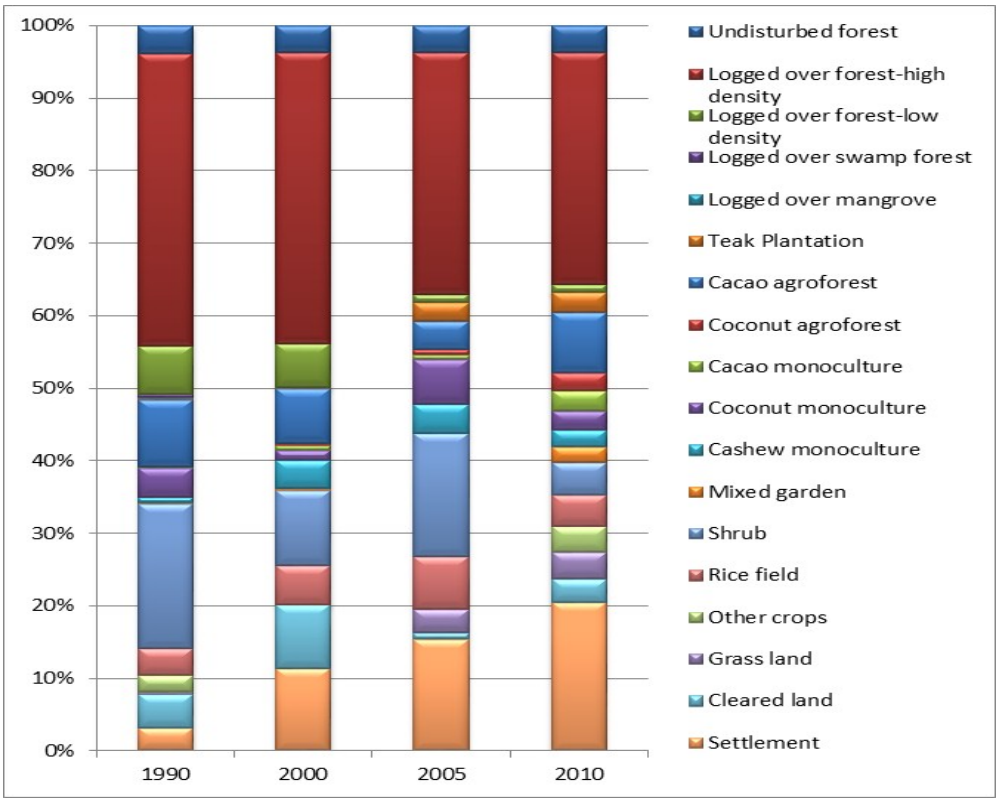

Figure 4. Changes in land cover (1990–2010)

The changes in land use and land cover from 1990 to 2000involved a substantialproportion of land conversion for settlements(6%). From 2000 to 2005, a substantialproportion of land was transformed into shrubland(11%), with most of this land consisting of secondary forests and cleared land but also including cocoaagroforest(Figure 5).

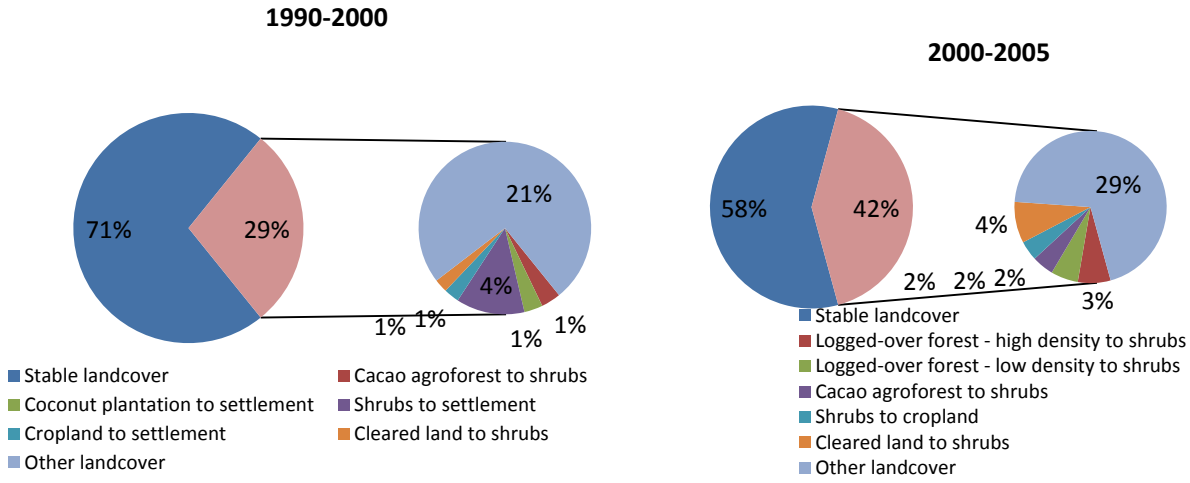

Figure 5. Changes to land use and land cover for 1990–2010 and 2000-2005

Maleinformants in focus-group discussions stated that changes to land use were largely driven by a desire to achieve higher levels of income and to improve livelihoods through the replacement of unproductive crops with more productive crops. According to female informants, the most importantfactors driving changes to land use were increased population density and the increased competition for land, with these two factors resulting in a lack of available land. There was also a tendency amongst the community towards the increased use of land for agroforestry, for the cultivation of seasonal crops (rice) and teak, and for settlements. This tendency has been driven by a perception amongst a large proportion of trans-migrant farmers that the sale prices for the produce of agroforestsarefairly stable while the cultivation of rice fields enables them to meet their basic needs, the cultivation of teak is an investment in the future, and the increased population results in an increased need for land for settlements. Informantsin the discussion groups expressed the opinion that within the next 10 years, the tendency for the increased use of land for agroforests, rice fields, the cultivation of teak, and for settlements would continue.

Water sources and related issues

Water sources

Under normal conditions, the primary sources of water for daily activities, such as cooking and drinking, laundering, bathing, and house cleaning, werespringsand wells. For other uses, such as watering gardens, rice milling, irrigation, fisheries, and household industries, the main sources wererivers, springs and wells (Figure 6). In dry conditions, the same sources of water wereusedin roughly the same proportions as under normal conditions.

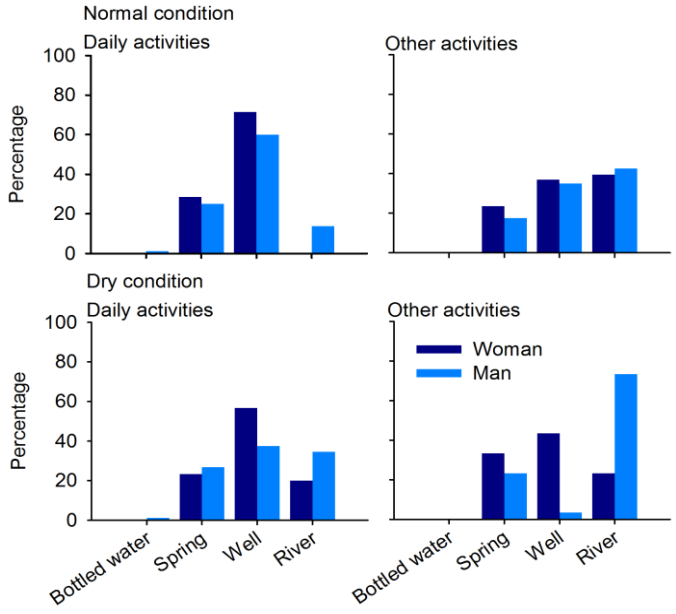

Figure 6. Sources of water for domestic and other purposes according to man and Woman informants

Issues affecting water sources

The most importantissue affecting water sources related to the limited availability of water, particularly during the dry season. The causes of this were low levels of rainfall, deforestation and logging. Other issues related to technical problems (burst, leaking or blocked pipes) and the quality of water. The technical issues weremainly caused by pipes being blocked by mud or garbage and by the poor structuring of dams. Poor water quality wasthe result of the high lime content of the soil in the region.

Table 1. Issues affecting water sources in terms of quality, quantity and technical issues according to male and female informants

Issue		Issue ranking	
		Female	Male
Quality	Cloudy	5	4
	Odiferous	-	5
	Lime content	3	-
Quantity	Dry	-	1
	Limited availability	4	2
	Flood	-	3
Technical issues	Burst dams	1	-
	Blocked, leaking or broken pipes	2	-

Technical issues only affected the villages of Atari Jaya and Atari Indah while issues related to the quality of water affected the villages of Atari Jaya, Atari Indah and Lambodi Jaya. The different composition of the soil and better water infrastructure in other villages were the main reasons why these issues didnot occur in other villages.

Consequences of water-related issues

The main consequence of the water-related issues described above wasalack of water for drinking and cooking and the negative impact on other household activities (Table 2). Other negative impacts included disruptions to agricultural activities, which resulted in material losses (crop failures), and disruptions to household industries.

Table 2. Consequences of water-related issues (quality, quantity and technical) according to female and male informants

Consequences	Score[1)]	
	Female	Male
Lack of availability of water for cooking and drinking	√	-
Disruptions to domestic activities	4	4
Disturbanceofagricultural activities	5	3
Crop failure	-	4
Disruption of industrial activities	3	
Damage to community infrastructure	-	4
Material losses	5	-
Non-material losses	4	4

Note:1): 1= very mild; 2=-mild; 3= average; 4= important; 5= very important

Efforts to address water-related issues

A long-term strategyto address water-related issues and to reduce their impact could beto improve clean water infrastructure and facilities (Table 3). In addition, other necessary efforts would beto conduct a reforestation program, to implement efforts to improve community awareness regarding the importance of the conservation of water sources, and to enforce regulations preventing illegal logging.

Table 3. Efforts needed to address water-related issues and their causes and to manage their consequences

Capital	Necessary effort	Female	Male
Human	Raising community awareness regarding the importance of conserving water sources	√	
Infrastructure	Improvements to water infrastructure and facilities		√
	Installation of filtration tanks and reservoirs	√	
	Measures to strengthen riverbanks		√
	Improvements to infrastructure (dams, roads)	√	√
	Measures to improve the management of clean water resources	√	
Natural	Tree planting		√
	Identification and useof alternative sources of water	√	√
Social	Enforcement of regulations forbidding logging and involvement of communities and district government agencies	√	
	Provision of social assistance		√

Biodiversity and its impact on livelihoods

For the purposes of this analysis, when using the term 'biodiversity', a distinction is drawn between biodiversity in the context of community-cultivated land (agro-biodiversity) and biodiversity in the context of the natural ecosystem (natural biodiversity).

Focus-group discussions were conducted to determine community perceptions regarding the roles of agro-biodiversity and natural biodiversity in community livelihoods in order to determine adaption strategies to address the impact of climate change on food security and livelihoods. The male discussion groups included seven participants whose ages ranged from 26 to 40 years, with six participants primarily employed as farmers and one as an entrepreneur. The female discussion group included 10 participants whose ages ranged from 25 to 43 years, with eight participants primarily employed as farmers and two as housewives.

In addition to multi-crop gardens, rice fields formed the basis for the livelihoods of members of the community. Forest areasonthe boundaries of the national park werenot particularly important as sources of livelihoods although the communities cut timber trees for building material and collected various fish species as sources of subsistence food. The level of dependence of communities on natural biodiversity wasrelatively low, however, they cultivated annual crops ofagro-biodiversity as primary sources of livelihoods in the rainy season. During the dry season, members of the community were additionally engaged in the cultivation of seasonal crops. Cocoa, coconut, banana and citrus fruits werethe main perennial crops cultivated in agroforestry systems and werethe most importantsources of livelihoods for members of the community. Rat and swine infestations occurred during the planting season, resulting in a decline in yields, affecting both seasonal crops and annual crops, such as cocoa.

Employment in non-agricultural sectors, including migrant labour in Malaysia or employment as construction workers, quarry workers and sand miners, wasa tertiary adaptation strategy adopted in the case of crop failures. Implementation of the appropriate cultivation techniques would serve as a mitigation measure to reduce the impact of these risks on livelihoods.

Farming systems and preferences foralternative crops

From discussions with the farmers' groups, it was found that rice fields, cleared fields and monoculture plantations used for the cultivation of citrus fruits and for coconut were the primary sources of community livelihoods. Multi-crop gardens usedfor the cultivation of coconut and cocoa were the third and fourth most importantsources of livelihoods. In addition, the collection of forest resources, including honey and bamboo shoots, also contributed to livelihoods, although not to a largedegree.

Overthe long term, male farmers considered that sweet orangewasthe most importantsource of income while female farmers considered cocoa to be more important. In addition to sweet orange, male farmers considered that coconut, cocoa, bananas and petai (*Parkia speciosa*) contributed to family incomes. In addition to cocoa, female farmers considered that coconut, sweet orange, and local and white teak were important contributors to family incomes.

Looking to the future, both male and female farmers principally prioritized coconut as this crop wasconsidered to have the best potential for growth (Figure 7). In addition to coconut, in descending order of preference, female farmers identified cocoa, local teak, sweet orange and white teak as their priority crops. Male farmers identified sweet orangesas their second priority, followed by cocoa, local teak and pepper in descending order of priority.

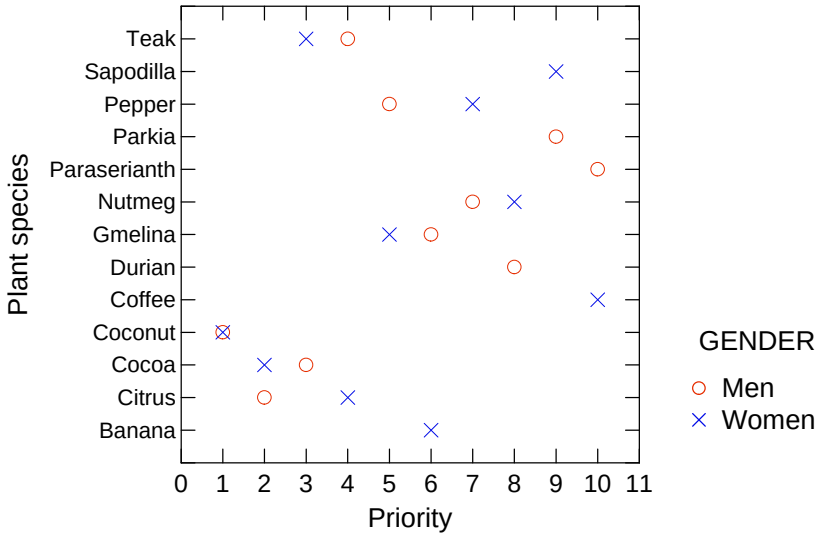

Figure 7. Types of tree crops by farmers

Based on farmers' experience over the past 15 years, their prioritization of tree crops involved the selection of thosewith varying levels of resistance to the impacts of climate change. It is essential that farmers have a good understanding of the degree of individual resilienceof these plant species to the impacts of climate change and market volatility in order to facilitate the development of multi-crop garden systems that have a high degree of resilience. Through an understanding of the varying degrees of resilience of these plants, farmers can select a range of different crops with varying characteristics to achieve a degree of stability in the face of fluctuations in weather conditions and markets.

Farmers' level of knowledge of the varying degrees of resilience of different types of plants couldbe optimized through the implementation of informational programs to raise farmers' awareness of the risks they face in the selection of any particular form of agricultural enterprise and, thereby, to prioritize the crops they cultivate. In addition, farmers could be provided with facilitation and mentoring to address the risks of crop failure as a result of changes in climatic conditions.

Table 4.Recommended facilitation and/or intervention to cope with the risk of crop failure

Extraordinary events resulting from climate change	Recommended intervention or facilitation
Floods (2013)	• Accelerated construction or rehabilitation of burst dams • Improvements to irrigation systems • Establishment of financial institutions to facilitate savings and loans • Establishment of industrial facilities for the further processing of citrus fruit to reduce the risk of spoilage due to inadequate transportation infrastructure
Drought of nine-months duration (2002)	• Construction of water reservoirs close to villages • Identification of new springs close to villages
Grasshopper and black ant infestations in rice fields (2011)	• Informational campaigns related to the management of grasshopper and black ant infestations • Provision of the appropriate pesticides to manage these infestations

Farmers proposed a number of interventions to address risks associated with extraordinary events resulting from climate change, as listed in Table 4. Government and non-government assistance could prioritize the interventions proposed by members of the community. These interventions could reduce risks associated with the negative impacts of extraordinary events on community livelihoods.

Strengths, weaknesses, opportunities and threats (SWOT)

On the basis of the findings of the focus-group discussions, this analysis includes an analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) in terms of the five forms of capital on which livelihoods in the area are based (Table 5). Strengths, weaknesses, opportunities and threats in terms of these forms of capital were identified through this discussion process as the basis for formulating an Environment-based Livelihoods Strategy.

Based on this SWOT analysis, it was found that the primary strength was in the area of natural resources, because of the cultivation of high-value commodities, such as cocoa and citrus fruits, and because of the high level of fertility of the soil. The good condition of the forest and water resources were also principal sources of strength in terms of natural resources.

The identified weakness of disease and pest infestations (such as cocoa pod borer) primarily affected the cultivation of cocoa. Another weakness receiving a high score related to the quality and availability of infrastructure due to the uneven supply of electricity, dirt-surfaced roads, and the limited availability of educational and religious facilities in the area.

On the basis of these are strengths and weaknesses, the opportunity to develop agricultural and plantation industries through the intensified useof underused land in the Lalembuu Cluster was identified.

Identified threats to the implementation of an Environment-based Livelihoods Strategy included uncontrolled logging, pollution ofthe environment, and high levels of criminality, all of which posed significant threats to community life.

Table 5. Strengths, weaknesses, opportunities and threats in terms of the implementation of an Environment-based Livelihoods Strategy

Capital	Strengths*)	Weaknesses*)	Opportunities*)	Threats*)
Human	✓ On average, farmers have graduated from SMA (2) ✓ High level of teaching skills (4) ✓ High level of non-agricultural skills (3) ✓ Highly skilled and innovative farmers (4)	✓ Seasonal labour (3) ✓ Limited agricultural information campaigns (2) ✓ Lacking motivation to work (3) ✓ Limited availability of medical personnel (4).	✓ Further processing of agricultural commodities (3) ✓ Intensified cultivation of agricultural commodities through the useof underused land (4)	✓ Uncontrolled logging and forest conversion (2) ✓ Environmental pollution (4) ✓ High level of criminality (3) ✓ High and unstable cost of living (3)
Natural	✓ High-value agricultural commodities such as citrus fruits and cocoa (4) ✓ Fertile soil (3) ✓ Good water quality (2) ✓ Extensive, high-quality forests (2) ✓ Potential for animal husbandry (4).	✓ Some cleared land is less fertile (4) ✓ diseases and pest infestations (2).		
Social	✓ Youth groups (‘karang taruna’) (3) ✓ Customary institutions (3) ✓ Active farmers’ groups (3).	✓ Limited facilitation by NGOs (3) ✓ Inactive community watch groups (2) ✓ Decline in spirit of mutual assistance (3)		
Infrastructure	✓ Complete range of educational facilities (4) ✓ Roads in good condition ✓ Lighting (4) and irrigation (3) facilities in good condition ✓ Communication facilities in good condition (4)	✓ Poor maintenance of infrastructure (3) ✓ Uneven availability of lighting facilities (3) ✓ Dirt-surfaced village roads (3)		
Economy	✓ Access to “Program Nasional Pemberdayaan Masyarakat” (PNPM) loans (3) ✓ Easily accessible co-operatives (2)	✓ Low prices paid by traders(3) ✓ No banking institutions (4) ✓ Non-performing loans (3) ✓ Constraints on access to loans (4)		

**) : Scores within brackets ( ) are average scores derived from the focus-group discussions: 4= highest; 1= lowest.*

The most significant identified weakness in terms of natural resources was the limited ability to control incursions by wild swine that resulted in destruction ofgardens and agricultural land. In terms of infrastructure, identified weaknesses included damage to dams and two principal village roads. In terms of economic capital, identified weaknesses included limited access to agricultural markets. In terms of human resources, identified weaknesses included a lack of continuingguidance and mentoring to develop agricultural and other skills. In terms of social capital, the principal identified weakness related to the impact of modernization, which was seen to bedisplacing local cultures.

The wide availability of land for the development of agroforestry gardens and the high level of fertility of the soil, together with well-maintained forest resources, represented the greatest opportunity for communities within the Tompobulu Cluster. These opportunities couldbe developed through measures to facilitate access to markets for high-value agricultural commodities and to enable the production of packaged coffee. However, communities within the Tompobulu Cluster also faced three significant threats, these being manipulations of coffee prices by traders and middlemen, the tendency for marriage at an early age, and poor security resulting from an ineffective community security system.

Summary of findings

- Over the past 20 years (1990–2010), the area covered by high-density secondary forest has declined from 40% of the total land area in 1990 to 32% in 2010. The area covered by community gardens over the same period has stayed stableat around 20%. A large proportion of shrubland and land used for monoculture coconut plantations and for the cultivation of seasonal crops has been converted tosettlements.The prime factors driving these changes werethe increasing population density and the competition for land, resulting in its limited availability.

- Primary sources of water both for domestic and other purposes included rivers, springs and wells. The primary issue affecting these sources wasthe limited availability of water during the dry season.

- The primary source of livelihoods for members of communities in the area wasderived from rice fields and cleared land used for the cultivation of rice and vegetables, and from agroforests used for the cultivation of coconut, cocoa, banana, local and white teak, and citrus fruits.

- The primary identified strengths in the area werethe high level of skills and creativity of farmers, the potential for animal husbandry, and good communications infrastructure. The primary identified weaknesses included the low level of fertility of some land and constraints on access to credit. Opportunities for future development included the potential for the further processing of agricultural commodities and the intensified useof idle land. Threats to the implementation of an environment-based livelihoods strategy included uncontrolled logging and environmental pollution.

References

Badan Pusat Statistik Konawe Selatan. 2013. *Kecamatan Lalembuu Dalam Angka*. Lalembuu Ward in figures. Konawe Selatan, Indonesia: Badan Pusat Statistik Konawe Selatan.

Acknowledgements

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