

The Tibawa Village Cluster, Gorontalo District, Gorontalo Province

This profile of the Tibawa Cluster is intended to provide a comprehensive overview of a group of villages consisting of Buhu, Iloponu, Labanu and Motilango, in Gorontalo District, Gorontalo Province, Indonesia. This profile was formulated on the basis of participatory research conducted with members of local communities and with representatives of local government institutions through separate focus-group discussions consisting of male and female informants respectively. 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 the 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 Tibawa Cluster consists of the villages of Buhu (eight hamlets, 1,962 ha), Iloponu (five hamlets, 2,162 ha), Labanu (five hamlets, 3,533 ha) and Motilango (six hamlets, 3,050 ha). Most of this area is located at altitudes between 100 to 250 meters above sea level (asl). A small proportion of the area, in the south, is located at altitudes below 100 asl, while another small proportion, in the north-west and north-east, is located at altitudes of between 250 to 500 asl (Figure 1).

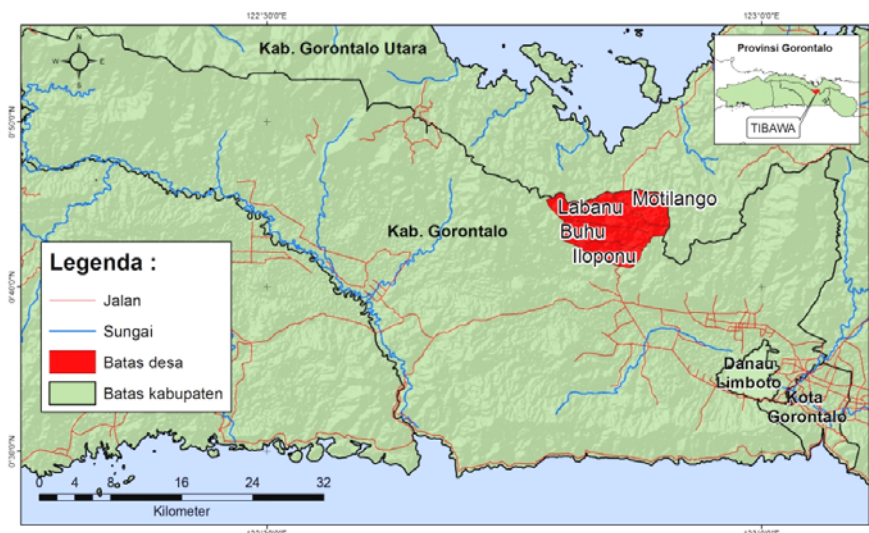


Figure 1. Map of the Tibawa Cluster region

The cluster is located in the Limboto Bone Bolango Watershed, which is intersected by two primary rivers, these being: (1) the Alo River, which intersects the villages of Iloponu and Buhu; and (2) the Biyabo River, which intersects the villages of Labanu and Motilango. According to a Forest Designation map, land within the cluster is classified as either Production Forest (HP), Limited Production Forest (HPT), or Nature Reserve (the Tangle Nature Reserve). The cluster is located at a distance of 10 to 17 km from the subdistrict capital, while distances to the district capital range from 30 to 37 km. The villages within the cluster are connected by permanent roads (asphalt surfaces), although most secondary village roads in the cluster have semi-permanent surfaces (stone and sand).

Educational facilities located within the cluster range in level from early childhood education (PAUD) facilities to junior high schools (SMP). The nearest senior high schools (SMA) are located at distances of 6 to 15 km from

the villages. The primary health care facility in the cluster is a community health centre (Puskesmas) located in the village of Buhu. The three other villages also have some access to health facilities, with community health centre sub-branches (Puskesmas Pembantu / Pustu) located in each village.

The population consists of 11,533 individuals, with this population consisting of 3,181 households. The proportion of males and females is approximately equivalent (Figure 2a). The proportion of households eligible for a Certificate of Economic Disadvantage (SKTM) stands at 18.5%, while the proportion of households eligible for the Health Insurance for the Poor (ASKESKIN) program stands at 34.5% (Figure 2b).

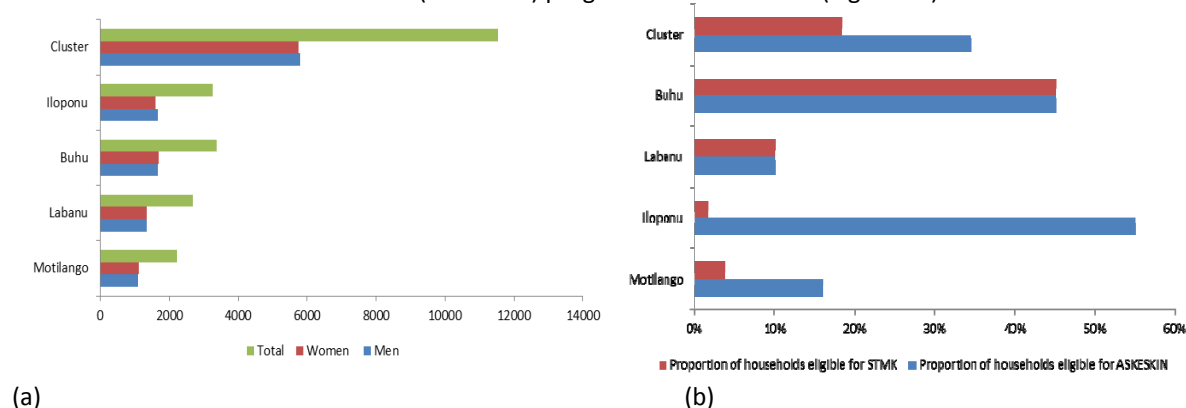


Table 2(a) Population distribution; (b) proportion of households eligible for STMK and ASKESKIN programs

The majority of community members derive their livelihoods as farmers, with the primary commodities being corn, paddy, crops, and other horticultural products. In addition, some villagers in Buhu, Motilango and Iloponu also derive a livelihood as traders. The economic activities of community are supported by the presence of loans and savings cooperatives, markets of agricultural commodities in the villages of Iloponu and Labanu, and a number of small industries, including food and wood processing, handicrafts, and metalwork industries.

Land uses, changes and driving factors

The Tibawa Cluster consists primarily of forest and complex agroforest, with the latter involving the cultivation of coconut, cloves and sugar palm. Together, forest and complex agroforest cover 40 to 45% of the entire area.

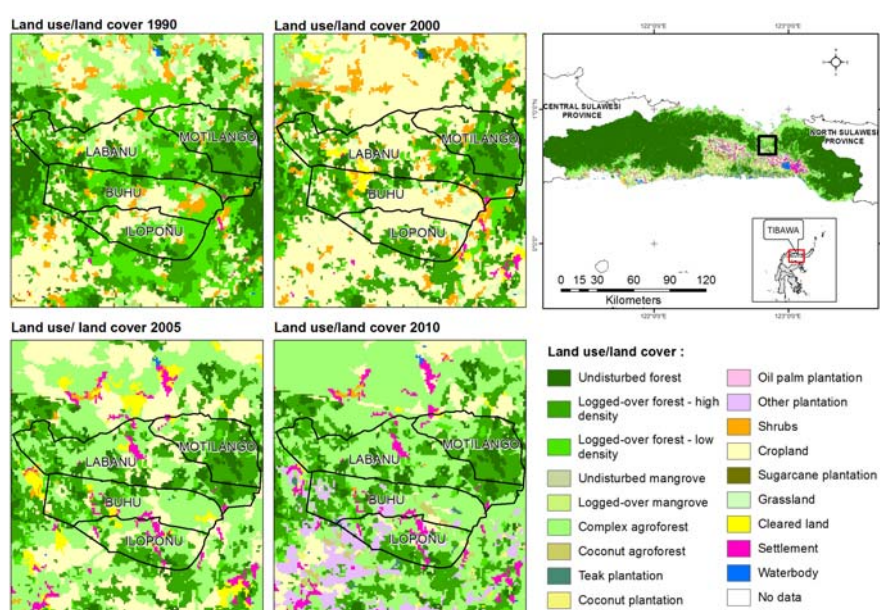


Figure 3. Land use and land cover map of the Tibawa Cluster (1990–2010)

The extent of complex agroforest has increased significantly in the period from 1990 to 2010, covering 37% of the entire area at the end of this period (Figure 3 and 4).

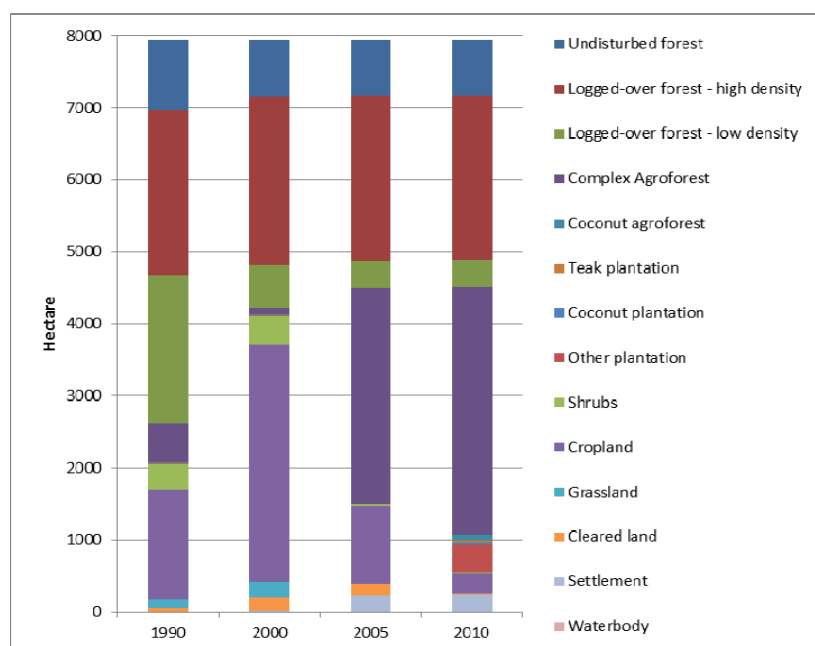


Figure 4. Extent of land usage and land covered in the Tibawa Cluster (1990–2010)

In the period from 1990 to 2010, 52% of the total area of the cluster experienced changes to its land use and land cover, with most of these changes involving conversion to complex agroforest. Over this time period, the land converted to complex agroforest consisted of secondary forest (18%) and land used for the cultivation of seasonal crops (12%) (Figure 5). In the period from 2000 to 2005, the majority of land use changes involved the conversion of land used for the cultivation of seasonal crops (26%).

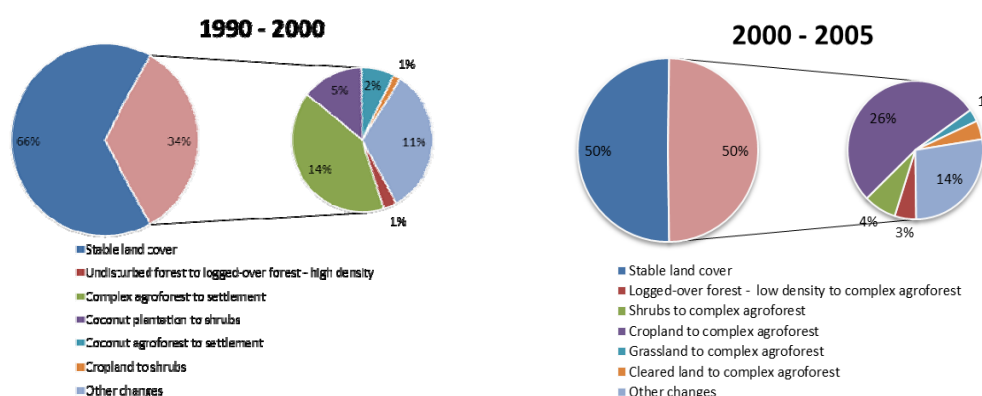


Figure 5. Changes to land use and land cover

Based on the findings from discussions with separate groups consisting of male and female community members respectively, the male informants identified the three main factors driving the changes in land use and land cover as the need for community members to provide for their families; increases in the price of agricultural commodities; and an increase in the population of the area. On the other hand, the female informants identified the main driving factor as the increased tendency to cultivate corn rather than teak, with this crop being cultivated because of the relatively short time taken for this crop to produce yields and therefore to contribute to community members' livelihoods. Community members also showed a tendency to cultivate crops according to a multicrop (agroforest) system, rather than to cultivate seasonal and monoculture crops. This tendency was further confirmed through the findings of an analysis of changes to land

use and land cover, which showed that the proportion of land utilized for the cultivation of agroforest has increased significantly over the past 20 years. Informants stated it was likely that the current trends in changes in land use and land cover involving agroforest system would continue at least for the next 10 years.

Water sources and related issues

Water Sources

The Tibawa Cluster has a number of sources of water to meet the needs of members of the community, including for daily domestic uses (drinking, cooking, clothes washing, bathing, house cleaning, and watering plants); and for other activities such as agriculture (irrigation and diluting pesticides), fisheries, and motor cycle washing. The main sources of water for these uses are spring water, well water, and river water (Figure 6). According to male participants of discussion, the primary source of water for these uses is spring water; while according to the female participants of discussion, the primary source is well water.

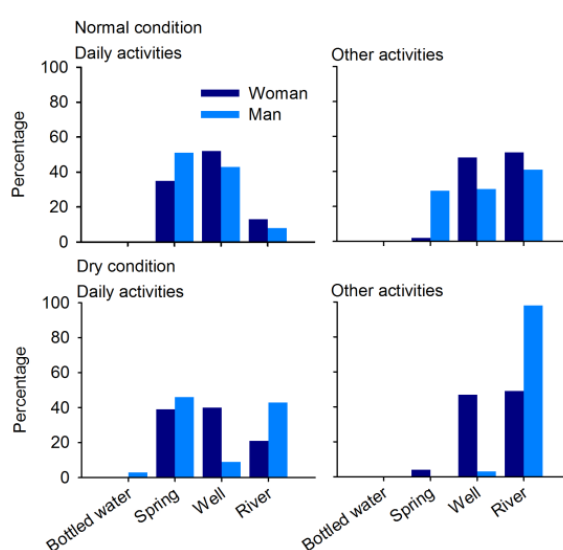


Figure 6: Sources of water for domestic and other purposes according to male and female participants

Male and female participants of discussion all stated that in the dry season, community members were still able to utilize spring water, well water and river water as sources for their daily domestic activities. However, male participants of discussion stated that under these conditions, river water was the primary source, while female participants stated that spring water, well water, and river water were all utilized in the same manner as under normal conditions.

Issues affecting water sources and their causes

According to male participants of discussion, the most significant water-related issue was the occasional lack of available water, particularly when wells ran dry during the dry season, with the cause for this being low levels of rainfall, illegal logging, and a consequent decline in the extent of water catchment areas (Table 1). Thus, male participants of discussion considered that to reduce the impact of water-related issues would include the conservation of trees and increasing the depth of wells. At variance with the male participants of discussion, female participants of discussion regarded the poor quality of well water and river water as being the most significant water-related issue, with this issue being driven by the extent of cleared land and occurring with high levels of rainfall. Female participants of discussion considered that the issue of the poor quality of water could be addressed through the adequate plaster surfacing of household yards.

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

Issues		Rank	
		Female	Male
Quality	Cloudy water	2	
	Smell		2
	Lime content of water	3	3
Quantity	Shortage		1
	Lack of water availability	1	4
Technical issues	Pipe ruptures		5

Consequences of water-related issues

Water-related issues, including water quality, quantity and technical issues, have an impact on daily domestic activities, including the lack of availability of water for cooking and drinking. This lack has the potential to disrupt domestic activities and creates the risk of disease. In addition, it also has an impact on agricultural activities, causing both material and non-material losses (Table 2).

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

Consequences	Score ¹⁾	
	Female	Male
Lack of availability of water for cooking and drinking	5	4
Disease	1	1
Disturbances to domestic activities		5
Non-material losses		4
Material losses	3	3
Disturbances to agricultural activities	3	5

1) 1=very light, 2=light, 3=medium, 4=heavy, 5=very heavy

Efforts to address water-related issues and their causes and to manage the consequences of these issues

Efforts to address water-related issues include efforts to improve economic capital through the identification of alternative sources of livelihood. Another necessary effort is to improve water infrastructure by building dams to enable the irrigation of rice fields (Table 3). In addition, improvements to the quality of natural resources through the implementation of a tree planting program and by identifying and utilizing alternative sources of water would have a beneficial impact. Finally, it is necessary to improve social capital through the enforcement of regulations related to logging and through the establishment of systems to manage clean water resources (Table 3).

Table 3. Necessary efforts to address water-related issues and their causes and to manage their consequences

Capital	Necessary Efforts	Female	Male
Financial	Identification of alternative sources of income	√	
Infrastructure	Improvements to freshwater facilities and infrastructure	√	√
	Construction of dams/reservoirs for the irrigation of rice fields		√
Natural Resources	Reforestation	√	√
	Identification and utilization of alternative sources of water	√	√
Social	Enforcement of prohibitions on logging with the involvement of local communities and district government agencies	√	
	Establishment of institutions to manage water resources		√

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). Natural biodiversity refers to biodiversity in the context of protected forests and nature reserves, while agro-biodiversity refers to biodiversity in the context of areas cultivated by members of local communities, particularly teak plantations, multi-crop gardens and on land used for annual crops, with the predominant annual crop being corn.

The focus-group discussions were guided to determine the role of agro-biodiversity and natural biodiversity in terms of community livelihoods, with separate groups consisting of male informants, engaged in a range of different types of employment, and female informants, of whom all were primarily housewives.

On the basis of these discussions, it was found that some members of the communities utilize the products of natural biodiversity derived from the protected forests and nature reserves, with these products including sugar palm, bamboo and honey. Community members in Iloponu use bamboo as a raw material for the production of plaited sheets used for ceilings and walls in housing. In terms of the use of products of agro-biodiversity, many members of the community utilize products from teak forests, with the most significant of these products being teak wood and a number of herbal plants, including ginger and turmeric. A number of timber and perennial crops are derived from multi-crop gardens, including teak, mahogany, walnut, cashew, coffee and cocoa.

In general, members of the community tend to rely predominantly upon the products of agro-biodiversity as a source of livelihood, utilizing a simple form of agroforestry to manage land. For example, multi-crop gardens involve the cultivation of a range of different types of fruit (mangoes, jackfruit, rambutan, kedondong, betel nut, cashew, candle nut), timber trees (mahogany and teak), and annual food crops (pumpkin, papaya, spinach, peppers, tomatoes, ginger, turmeric, eggplant, basil and cucumbers).

Over the past 10 years, communities have been increasingly impacted by floods and landslides, with these natural disasters resulting in the loss of life and having a serious negative impact on livelihoods and food security. These losses are due to the fact that the annual crops cultivated by communities, such as rice, corn, and vegetables, are particularly vulnerable to the impact of flooding and landslides. When floods and landslides occur, members of communities tend to seek alternative employment in the mining sector (gold, rock and sand) and through the cultivation of sugar palm. Both of these forms of employment play a major role as strategic adaption measures in the context of natural disasters.

Community members stated that floods and landslides occurred as a result of deforestation in upstream areas and the conversion of protected forest land to production forests. Thus, as a measure to mitigate against the impact of floods, community members stated that it was necessary to enforce a prohibition on the clearing of land and logging and to engage in reforestation activities in upstream areas. In addition, members of the community stated that another necessary measure was to conduct a socialization campaign to promote effective environmental management, with measures to prevent the disposal of rubbish into rivers and with other measures specifically intended to reduce the impact of floods and landslides.

Farming systems and preferences in alternative crops

During the focus-group discussions, both male and female participants expressed a preference for the cultivation of crops with a short harvest cycle. Thus, the cultivation of corn on cleared fields was the primary source of community incomes, with the cultivation of coconut forming a secondary source of income, with coconut being cultivated in agro-forestry plantations and as a monoculture crop. Other agricultural commodities that also provided a significant source of income included chilies and vegetables.

For the long term, male informants stated that coconut was the most significant source of income, followed by cocoa, durian and banana. Female informants stated that teak was the most significant source of income, followed by coconut, candle nut, mango and mahogany. At variance with the commonly held point of view, female participants considered timber trees to have greater income generating potential than other crops.

Looking to the future, female informants stated that their priority crop was teak, with white teak (Gmelina) being their second priority, followed by coconut, candle nut, and nutmeg (Figure 7). Male informants stated that their priority crop was nutmeg, with cloves being their second priority, followed by coconut, candle nut, and cocoa. Male informants expressed a stronger preference for the cultivation of plantation crops in agroforest, while female participants expressed a stronger preference for the cultivation of forest crops in agroforest.

Based on farmers' experience over the past 15 years, their prioritization of crop plants involves the selection of crops with varying levels of resistance to the impacts of climate change. It is essential that farmers have a good understanding of the degree of resistance of these plants to the impacts of climate change and market volatility in order to facilitate the development of a agroforest system that has a high degree of resilience to these impacts. Through an understanding of the varying degrees of resistance to these plants, farmers can select a range of different crops with varying characteristics to achieve a degree of stability in the face of fluctuations to climatic and market conditions.

The level of awareness and knowledge of farmers regarding the degree of resistance of their various crops to the impact of climate change can be increased through informational programs to improve their knowledge regarding the risks associated with the selection of particular forms of agricultural production and of their principal commodities. This should form the basis for a risk mitigation strategy to address the impacts of climate change. In addition, informational campaigns and facilitation, either in the form of mentoring or other interventions, are also necessary to enable farmers to adapt to adverse events resulting from climate change, including crop failures, drought, and other natural disasters (Table 4).

Table 4. Recommended forms of facilitation and/or intervention to cope with the risk of crop failure impact of climate change to local livelihood

Extraordinary events resulting from climate change	Recommended forms of intervention or facilitation
Landslides (as occurred in Labanu in 1999–2000)	<ul style="list-style-type: none"> • Reforestation programs with the provision of seedlings for wood bearing trees for plantation on unused land; • informational programs to raise community awareness regarding the importance of tree plantation.
Flash floods (as occurred in Labanu in 2010)	<ul style="list-style-type: none"> • The construction or restoration of culverts to prevent floods; • Reforestation programs and/or tree for wood bearing plant plantation on barren land; • Informational programs to raise community awareness regarding the importance of environmental conservation; • The establishment of cooperatives to provide low-interest loans.
Pest infestations affecting corn and chilies (as occurred in 2012)	<ul style="list-style-type: none"> • The optimization of farmers groups and other institutions capable of developing solutions to manage pest infestation; • Agricultural informational programs regarding the management of pest infestations using modern farming methods; • The establishment of farming cooperatives to provide low-interest loans to finance productive agricultural activities.

Strengths, weaknesses, opportunities and threats

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 capitals that form the basis of livelihoods in

the area, these being natural resources, infrastructure, economic resources, human resources, and social capital (Table 5).

The results of the discussions show that in terms of natural resources, the principal strengths are: (1) the wide extent of the forest and its good condition; (2) the availability of land suitable for the cultivation of high-value agricultural commodities.

Table 5. Strengths, weaknesses, opportunities and threats in terms of the five primary forms of capital forming the basis of livelihoods

Capital	Strengths*)	Weaknesses*)	Opportunities*)	Threats*)
Natural resources	<ul style="list-style-type: none"> • Extensive high-quality forest (2) • Extensive high-quality water resources (river water) (1) • Extensive high-quality water resources (spring water) (2) • Potential for the development of animal husbandry (1) • High-value agricultural commodities (candle nut, coconut, cloves, cocoa) (4) 	<ul style="list-style-type: none"> • Decline in water quality (environmental pollution) (3) • Decline in the availability of water (2) • Increase in the extent of critically affected land (3) 	<ul style="list-style-type: none"> • Development of further processing of agricultural commodities (4) • increased utilization of underutilized /critically affected land (4) 	<ul style="list-style-type: none"> • Illegal logging/forest conversion (4) • High interest rates (4) • Sand mining activities (2)
Human resources	<ul style="list-style-type: none"> • High levels of educational attainment (high school, undergraduate) (2) • Skilled medical personnel (midwife) (2) • High levels of non-agricultural skills (2) 	<ul style="list-style-type: none"> • Low levels of agricultural knowledge (2) • Low levels of educational attainment (2) • High levels of unemployment (2) • Limited proficiency in the Indonesian language (1) 		
Economy	<ul style="list-style-type: none"> • Easy access to PNPM loans and savings facilities (2) • Active revolving funds groups (1) 	<ul style="list-style-type: none"> • Limited access to financial institutions (cooperatives, banks) • Low prices paid by middlemen (4) 		
Infrastructure	<ul style="list-style-type: none"> • High-quality road and bridge infrastructure (4) • Adequate supply of good quality educational facilities (primary schools, junior secondary schools) (3) • Adequate supply of good quality health facilities (Puskesmas, Pustu,) (4) • Adequate supply of lighting facilities (3) 	<ul style="list-style-type: none"> • Poor quality of village and inter-village roads (3) • Inadequate market facilities, distant location of markets (4) • Poor maintenance of facilities (bathing, washing and latrine facilities, dams, community health centers, schools) (2) 		
Social Capital	<ul style="list-style-type: none"> • Active farmers groups (Gapoktan) (4) • Active PKK groups and community health posts (3) • Village institutions (BPD, LPM) function well (4) 	<ul style="list-style-type: none"> • Decline in traditions of mutual assistance (3) 		

*) : Scores within brackets () are average scores derived from the focus discussion groups; 4= highest, 1= lowest.

According to the discussion groups, the good condition of the forest plays a significant role in supporting productivity and in protecting sources of water, while the cultivation of high-value agricultural commodities (candle nut, coconut, cloves and cocoa) provides a significant source of income for members of the

community. In addition, other sources of strength in terms of natural resources include the large number of springs in good condition, and the good condition of the river. Community members' ownership of livestock enabled them to engage in household-level animal husbandry. In terms of infrastructure, identified strengths included ready access to healthcare facilities (Puskesmas and Pustu), while in terms of social capital, the presence of active farmers groups (Gabungan Kelompok Tani/Gapoktan) was considered a significant strength. Informants stated that the health facilities and farmers groups played a significant role in enabling access to agricultural support programs and health programs; in enabling the resolution of issues affecting the community; and in developing a spirit of mutual cooperation and support between farmers. In addition, another source of strength in the area of human resources was community members' skills in woodworking and in construction work, with the reputation of community members in these areas being recognized beyond the subdistrict boundaries.

In the area of natural resources, identified weaknesses included a decline in the quality and quantity of available water and an increase in the extent of land in critical condition. The decline in the quality of water was attributed to the inappropriate disposal of household waste, while the decline in water quantity was attributed to droughts in the dry season. An increase in the extent of land in critical condition was noted in a number of locations within the region. In addition to weaknesses in terms of natural resources, an identified weakness in terms of economic capital was the impact of middlemen in determining the price of agricultural commodities, with farmers often receiving low prices as a result. In terms of infrastructure, the poor quality of roads was identified as a significant constraint on the production and distribution of commodities, while the generally low levels of educational attainment were regarded as the most significant weakness in terms of social capital.

The most significant opportunities identified through the discussion process related to the use of underutilized land and land in critical condition. This land could be utilized to achieve a higher level of productivity through the planting of timber trees and perennials in combination with crops cultivated in community forests and with crops cultivated in degraded areas of forest. Other opportunities related to the further processing of agricultural products, including the production of processed snacks from corn and candle nut.

The participants in the discussion groups identified three main threats, these being: (1) illegal logging and the conversion of forests by individuals from outside the region; (2) the imposition of high interest rates by private cooperatives from outside the region; and (3) sand mining activities by entities from outside the region, with these activities exacerbating the risk of landslide and resulting in the destruction of agricultural land. On the basis of the SWOT analysis, the first and second of these threats recorded relatively high scores, while the third threat recorded a relatively low score.

Summary of findings

- Over the past 20 years (1990 to 2010), the extent of multi-crop (agroforestry) system has increased significantly (covering 37% of the entire area of the cluster), with 18% of the total resulting from the conversion of secondary forest and 12% resulting from the conversion of land used for seasonal crops. The primary factors driving this change are the need for community members to provide for their families; high agricultural commodity prices; and an increase in the population of the area.
- The primary sources of water for domestic needs and other purposes are springs, wells and river water. The principal issues affecting these water sources is the decline in the availability of water in the dry season and contamination both in the dry season and the wet season.
- Members of local communities make use of non-wood forestry products, including sugar palm, bamboo and honey as a source of income. In addition, community members derive a livelihood principally through the cultivation of crops including fruits (mango, jackfruit, rambutan, kedondong, betel nut, cashew, pecan), coconut, timber (mahogany and teak), seasonal crops (corn, pumpkin, papaya, spinach, peppers, tomatoes, ginger, saffron, eggplant, basil and cucumber) on agroforestry.
- The principal strengths of the region are identified as the cultivation of high-value agricultural commodities (candle nut, coconut, cloves and coconut), high quality road and bridge infrastructure, and active farmers groups. The principal weaknesses are identified as the low prices paid by middlemen for agricultural commodities and limited access to market facilities, with markets located at significant distances. Opportunities for the future in the cluster include the potential for the further processing of agricultural commodities and for the more productive use of underutilized land.

References

- Badan Pusat Statistik Kabupaten Gorontalo (BPS Kab. Gorontalo). 2014. Kecamatan Tibawa dalam angka. URL: <http://gorontalo.kab.bps.go.id/publikasi/2014/09/8/Kecamatan+Tibawa+Dalam+Angka+2014>
- Kementerian Kehutanan. 2009. Peta penunjukan kawasan hutan dan perairan Provinsi Gorontalo. URL: <http://goo.gl/jdpuW2>
- Pemerintah Desa (PEMDES) Motilango. 2012. Saluran informasi geografis, Desa Motilango, Kecamatan Tibawa, Kabupaten Gorontalo. Gorontalo. PEMDES Motilango, Gorontalo.
- PEMDES Iloponu. 2014. Rencana Pembangunan Jangka Menengah 2014 – 2018. Desa Iloponu, Kecamatan Tibawa, Kabupaten Gorontalo. Gorontalo. PEMDES Iloponu, Gorontalo.
- Rahmah, H.H. 2014. Daftar isian potensi desa dan kelurahan. Desa Labanu, Kecamatan Tibawa, Kabupaten Gorontalo. Gorontalo. PEMDES Labanu, Gorontalo.

Acknowledgements

The Agroforestry and Forestry in Sulawesi project's Gorontalo program would like to express its gratitude to members of communities and to officials of village government institutions in Buhu, Iloponu, Labanu and Motilango; to the subdistrict government of Tibawa; and to the Office for Educational Research and Development (BP3K) in the subdistrict of Tibawa. Agroforestry and Forestry in Sulawesi is funded by the Department of Foreign Affairs, Trade and Development, Canada.

Citation

Kow E, Wijaya CI, Khasanah N, Rahayu S, Martini E, Widayati A, Sahabuddin, Tanika L, Hendriatna A, Dwiyantri E, Iqbal M, Megawati, Saad U, Biahimo S. 2016. The Tibawa Village Cluster, Gorontalo District, Gorontalo Province. Bogor, Indonesia. World Agroforestry Centre (ICRAF) Southeast Asia Regional Program.