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Sustainable Livelihood Framework: The Case of Lante Rural Village, Gamo Gofa Zone, Southern Ethiopia

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Abstract
The study mainly focused on sustainable livelihood applied to the livelihood strategies, assets, transforming structures and processes, livelihood outcomes and vulnerability context in Lante village, Gamo Gofa Zone, southern Ethiopia. The main research questions tried to find an answer to in this paper were: 1. what are the main livelihood strategies in study area? 2. What is the influence of being a member of the cooperative on the livelihood outcomes of the households? 3. What is the role of irrigation and what opportunities does it provide to the people? Interviews were held with a group of village leaders, old and well educated inhabitant of the village, managers of the irrigation system and the leaders of the local cooperative for banana and mango. More detailed information was acquired at household level, using a questionnaire. The sample size for this interview was 20. The main livelihood strategies in study area are cropping (such as banana, mango and maize) and livestock agriculture, off-farm employment and non-farm activities. The livelihood asset endowments observed in the area are consists of five capital indicators: human capitals (health and education centers), physical capitals (transportation, irrigation system, housing standards and farming equipments), natural capitals (freely access and use of land), social capitals (community relationship and membership of community group) and financial capitals. Transforming Structures and Processes that support developments of people's livelihoods are: government, cooperatives and extension programs. Climate, hydrology, pathogen, market fluctuation, economic and population growth are dynamic vulnerabilities that determine the achievements of sustainable livelihood outcomes.
Keywords: livelihood strategies, vulnerability, poverty, cooperative, irrigation

1. INTRODUCTION

The livelihoods framework is a tool to improve understanding of livelihoods, particularly the livelihoods of the poor. It was developed over a period of several months by the Sustainable Rural Livelihoods Advisory Committee, building on earlier work by the Institute of Development Studies (amongst others). The sustainable livelihoods framework presents the main factors that affect people's livelihoods, and typical relationships between these. It can be used in both planning new development activities and assessing the contribution to livelihood sustainability made by existing activities (DFID, 1999).
In particular, the framework:
• provides a checklist of important issues and sketches out the way these link to each other;
• draws attention to core influences and processes; and
• emphasizes the multiple interactions between the various factors which affect livelihoods.

2. Materials and methods

2.1 Interviews and questionnaire

In order to gather information on demography, economic activities, and social structures , several structured interviews with key informants were organized. Interviews were held with a group of village leaders, old and well educated inhabitant of the village, managers of the irrigation system and the leaders of the local cooperative for banana and mango (*Ocholo Lante Tenkir Fruit and Vegetables Cooperative and Mango Processor Cooperative*).

More detailed information was acquired at household level, using a questionnaire. The full survey contains modules concerning social capital, farm activities, off farm activities, assets and food security. The sample size for this interview was 20. Two strata were selected, namely households that sell their produce to the agricultural cooperative and households that don't. It was tried to sample as randomly as possible, using several transects going from the main road to the edge of the village, because it was observed that an increasing poverty from the village center to the edge of the village.

The data of the survey was used to summarize in some descriptive statistics throughout the sustainable livelihood framework and to compare members of the cooperative and non-cooperative members.

3. Results and discussions

In the results section, the observations are presented and discussed according to the Sustainable Livelihood Framework. A summary is presented in Figure 2.

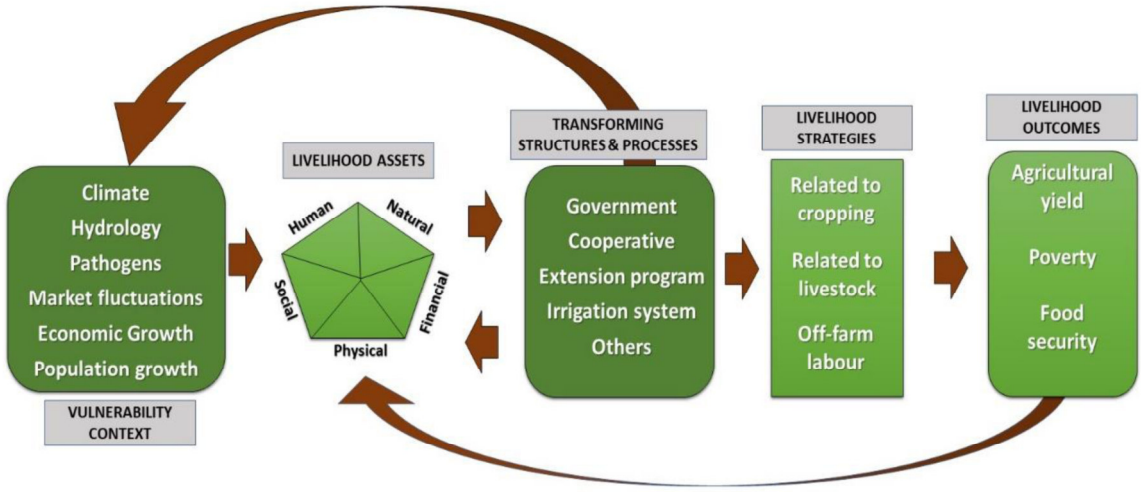

Figure 1: The sustainable livelihood applied to the vulnerability context, assets, transforming structures and processes, livelihood strategies and livelihood outcomes observed in Lante.

3.1. Vulnerability Context

3.1.1. Climate

The study area is characterised by two rainy periods, resulting in two growing periods. These rainy seasons are extended using irrigation. The first rainy season, also called the *Belg* season spans the period from the middle of March to the end of June and has more rainfall than the second rainy season. This second season, or *Meher* season spans the period from the middle of August to the end of November. Without irrigation, crops do not grow well in the other months.

3.1.2. Hydrology

In the North, the village is bordered by river Baso. The river clearly shows the characteristics of a braided river, which has a course that is highly dynamic and unpredictable. When rain is abundant, the river must transport more water to the lake. This bigger flow can cause flooding. About ten years ago, the river broke its banks and changed its course to that of an irrigation canal, leading to a major flood. The result of this event is that an area of about 104 ha of cultivated land that became a dry river beds which is now only useable for grazing and some marginal cropping. Flooding is one of the major concerns for the agricultural production in Lante.

3.1.3. Pests and diseases

Pests and diseases can ruin the production of a crop and can decimate a herd if not treated correctly and on time. Some diseases have always been present. This has not changed in recent years but nonetheless a lot of farmers loose a large portion of their flock to these diseases. However, the occurrence of some pests and diseases is increasing. An example of this is the maize stalk borer (*Spodoptera sp.)*.

3.1.4. Economy

3.1.4.1. Fluctuations of the input and output market

Most farmers buy their agricultural inputs, such as fertilizers and seeds, from the government through Omo Micro Finance. Fertilizers are very important in the cultivation of teff and maize. However, over the past years the prices of these inputs have increased a lot and many farmers no longer have the capacity to buy the inputs.
Furthermore, there are also price fluctuations on the output market. This is especially important for the cash crops cultivated in Lante, namely banana and mango. Farmers are dependent on the prices of the market in Addis Ababa and price insecurity can lead to suboptimal production levels.

3.1.4.2. Economic growth

Another trend that can be observed in Lante is economic growth. More and more people are cultivating cash crops and more people start working in the business sector which is good for economic productivity.

3.1.4.3. Population growth

Since its establishment in 1967, the population of Lante increased from 180 inhabitants to 7479. Population has thus increased a lot in the past 50 years. The main reasons for the population increase are the migration from people of the highlands in search for more farmland or other employment opportunities and increase in child birth. The increase in population has led to a decrease in farm size.

3.2 Livelihood Assets

3.2.1. Human Capital

Table 1 summarizes some results from the questionnaire concerning human capital. They are discussed below.

Table 1: Summary of the obtained data on human capital

HUMAN CAPITAL	Total Sample	Cooperative members	Other farmers
Average education level of HH head	6.4 (±4.7)	6.9 (±3.7)	6 (±5.7)
Share of the children that are in school (%)	100	100	100
Share of farmers participating in the extension program (%)	57.1	62.5	42.9
Share of people that are unable to work due to illness (%)	17.9	19.5	16.2

3.2.1.1. Knowledge

According to the village leader more than 90% of the population gets formal education. In this sample all the children were in school. The average level of education of the sampled household heads is 6.4 years (±4.69). There is only little difference between members of the cooperative and other farmers. In most households the household head was not the person with the highest level of education. It was found that at least one member that had at least ten years of education in every household in the sample. According to the village leader there are no differences between education of men and women.

Another form in which households can educate themselves is through the agricultural extension program offered by the local government, where they get technical advice on farming techniques. The extension programme will be discussed in the section on 'Transforming structures and Processes'. Out of the people that have farmland, 57.1% of the farmers regularly attend the sessions organized by the extension programme. Most people attend a session two times per year. Out of the cooperative members and the other farmers there are respectively 62.5% and 42.9% of farmers that regularly attend the sessions. The cooperative members in this sample thus educate themselves more on farming techniques.

3.2.1.2 Health

The last important aspect for human capital is health. If people are unhealthy, they cannot perform their daily work as they are supposed to. Lante has one rural health centre but for more serious problems people are referred to the hospital in Arba Minch. Almost all of the households that were interviewed had at least one member that was ill or that had serious health issues. Health problems occurred in 73.3% of the households.

3.2.2 Physical Capital

3.2.2.1 Transport

Lante is well connected to the highway between Arba Minch and Addis Ababa. The highway is in a good state. This allows the village to have a good access to markets in Arba Minch. The roads in the town are not of a good quality. Crops are mainly transported by foot and by animals. The main animal transportation is a donkey drawn carriage. Motorized vehicles are sparsely used to transport crops, mainly by the cooperative.

3.2.2.2 Irrigation

The irrigation system as such will be discussed in the section concerning 'transforming structures and processes'. The system is however an important infrastructure that can be an asset to those who have access to it. 93% of the farmland in Lante is irrigated and all the farmers that were interviewed use the irrigation system. According to the village leader, even every farmer in the village uses irrigation.

3.2.2.3 Farming equipment and input use

The results concerning the farming equipment are summarized in table 2. To ease discussion we divided farming equipment into three categories. The handheld thresher, the Maresha, the Kenber and the Mofer and the small cart pulled by people were counted as simple tools, because they are all operated by hand. The animal pulled plough and the animal pulled cart were counted as animal based tools. Finally, the machine pulled plough and the motorized thresher were counted as motorized tools.

Table 2: Summary of the results on farm equipment and input use

FARM EQUIPMENT	Total sample	Cooperative members	Other farmers
Share of farmers owning at least one simple (person operated) tool (%) *(Hand thresher, kenber, mofer, maresha, kart pulled by person)*	80.0	100	57
Share of farmers owning at least one animal operated tool (%) *(Animal pulled plough, ox cart)*	53.3	75	29
Share of farmers owning a motorized tool (%) *(machine pulled plough, motorized thresher)*	0	0	0
Share of farmers using fertiliser (%)	53.3	62.5	42.9
Share of farmers using pesticides (%)	26.6	25.0	28.6

80% of the interviewed people owned at least one simple tool, while 40% percent owned at least one animal based tool. No household owned a motorized tool. There was a difference in farming equipment between households that are a member of the cooperative and households that were not. Of the members, 100% owned at least one simple tool and 75% owned at least one animal based tool. For the non-members only 57% of the people owned at least one simple tool and only 29% owned at least one animal based tool.
53.3% of the interviewed households use fertilizer, 13.3% buys manure and 26.6% uses pesticides. None of the interviewed households uses herbicides or fungicides.

3.2.2.4 Housing standards

The kebele Lante has rather good housing infrastructure which could be observed when walking through the streets. The interviewed households in Lante all had access to piped water, either private or communal. Their piped water wasn't always operational. They also all had access to electricity. Like in Arba Minch, some blackouts occur.

3.2.3. Natural Capital

3.2.3.1. Access to natural capital

All the farming land in the lowlands of Lante is privately owned, which is a consequence of the distribution of land by the government in the past. Data on land access are summarized in table 3.

Table 3: Access to natural capital

LAND ACCESS	Total sample	Cooperative Members	Other farmers
Share of farmers with access to farming land (%)	93.3	100	85.7
Average land size (ha)	0.73	0.75	0.71

Only one of the farmers in the sample had no access to land, apart from the land for her house and garden. The average land size of the sampled households is 0.73 ha. On the escarpments there is still communal land used for grazing and forests. This communal grazing land is meant to be really large in area so no apparent overgrazing has happened so far. It is supposed to be quite far from the village so not everyone brings their livestock there. The forests on the escarpments are conserved by the government and shouldn't be used for fuel wood.

3.2.4 Social Capital

Some results concerning the social capital of the sampled households are summarized in Table 4. The results are discussed below.

Table 4: Summary of the results on social capital

SOCIAL CAPITAL	Total sample	Cooperative Members	Other farmers
Share of farmers indicating that the community members are always helpful (%)	33.3	12.5	57.1
Average number of social gatherings in the last month	6 (±4.1)	8 (±4.5)	4 (± 2.5)
Share of cooperative members (%)	53.3	100	0
Share of households affiliated with IDIR or EQUB (%)	87	87.5	85.7

3.2.4.1 Community relations

During the household interviews, several questions were asked about the relations within the community. An important part of people's social capital is their network of friends and neighbors, people with whom they have social relations and who can help them when they are in need. In this sample, 33.3% of the respondents stated that people in Lante are always helping each other. The others said that people only helped sometimes or rarely. Farmers that are not member of the cooperative seem to have the feeling that people are more willing to help than people that are not in the cooperative. 57.1% of the farmers that are not a member indicated that people are always helping, while this was only 12.5% for the cooperative members. On the other hand, farmers that are affiliated with the cooperative seem to have a richer social live. On average, they have met up with 8 (±4.5) people, either in a public place, in their own home or in the other person's home, in the last month, while other farmers met only 4 (±2.5) people, on average.

3.2.4.2 Membership of community groups

Besides their social relations, membership of social and/or economic groups is also an important aspect of the people's social capital. A first important group in the community is formed by the members of the cooperative. Members have better access to markets for their produce and they get a share of the profits. In order to become a member of the cooperative, farmers must cultivate banana, mango or both, and pay a one-time membership fee. According to the information provided by one of the leaders of the cooperative, approximately 300 households are affiliated with the cooperative.

Another important social structure is IDIR. Most of the households that were interviewed (87%) are affiliated with IDIR, because it provides assistance when someone in the household dies.

Some other small social groups, like religious groups, are also present in Lante.

3.2.5. Financial Capital

Omo Microfinance is the nationalized institution present in the village office where people usually save money and ask for credits because there is no other bank institution. The condition for credits is to have saved more than ten percent of the whole amount of the credit and to have an ID card. There is no other microfinance NGO, but the cooperative can also give credits to its members in exceptional cases (*e.g.* wedding or graduation). When conducting the interviewers, no households were encountered that had asked for credit during the past 12 months.

3.3 Transforming structures and processes

3.3.1 Government

The government is the main structure responsible for transforming processes like legislation, policy and institutions. Government is the only sovereign entity that can redistribute and transfer lands from one household to another. It gives farmland certificates for individual households. The owners of land have the right to use, possess and receive income from it. Farming plot, residential land plots and buildings are owned privately. There are no rules that limit the owner of land to do whatever he/she needs to do (farming, building..). The main ways of gaining land are inheritance, gift from family and contract outside family.

The government has introduced new agricultural technologies like fertilizers and pesticides. However, the supply of these inputs does not satisfy the needs of the farmers. There is a shortage of improved varieties and inadequate supply of seeds of good quality. The government also gives credits for the smallholders farmers through the nationalized Omo Microfinance institution.

3.3.2 Cooperative

Another important transforming structure from the private sector is the cooperative. It helps people to access the market of the big cities to sell their cash crops. The cooperative in Lante has around 300 members, who have paid a participation fee to become members. Then share the benefits of the profits once a year. They are basically obliged to sell all their production to the cooperative but are assured of constant prices. The cooperative works only with fruits like mango and banana. The cooperative buys banana from the farmer at 7.5 ETB per kilogram and sells it in the cities for 10.5 ETB per kilogram. Mangos are sold for 2 ETB per kilogram by the farmer to the cooperative, which sell it at a price between 10 and 15 ETB after transportation in big cities.

3.3.3 Extension program

There is an extension program in the village. The program is led by development agents who are working as animal, plant, and natural resource management experts. However, they visit farmers only twice a year. The kebele has plots called 'farmer training centers' on which extension workers demonstrate techniques to the farmers during *Belg* and *Meher* seasons. This could be considered as a transforming structure from the public sector.

3.3.4 Irrigation system

The irrigation system can be seen as a transforming structure, allowing people to cultivate crops that need more water. The irrigation system consists of four main irrigation channels, each regulated by twelve people. These channels are split off from the river Baso by stone dams and the water flows directly on soil. They begin close to where the river Baso meets alluvial plane and run almost parallel to the river. The water from these channels is diverted into different smaller channels leading to the fields by dams made of plant material and mud. The system is set up to provide water to every plot of 0.5 ha. Each plot gets three hours of water in the rainy season and four hours of water in the dry season. These time regulations are strict and if a farmer is more selfish and takes more water than is allowed in the dry season, without giving enough water to the others, the local government will react against this person with a specific fine.

3.3.5 Others

A key process that is transforming the village is the economic market as the main reason for people to change from a subsistence production to a cash crop production. The weekly market in the village is also a key transforming structure allowing exchange of goods.

There are some NGOs in the village, like VITA who promotes the use of beans and the FAO but they only sometimes provide training for the farmers.

The churches could also be a transforming structure due to their power to federate people. There is a Protestant church and an Orthodox church in the village, but most of interviewed people seem to have relations with people from different religious group according to the household survey results.

The societal norms and beliefs, ethnics groups, age groups, gender and class could also be mentioned as transforming processes.

3.4. Livelihood Strategies

3.4.1 Agriculture: cropping

The livelihood strategies for cropping systems in this village have changed a lot during the last years, going from annual cropping to permanent farming. In the past, the main crops in the village were cotton, maize and teff. A lot of banana and mango trees have been planted since then. No more farm is only doing subsistence farming in the sample from Lante. The results of the cultivated crops and other farming strategies are summarized in table 5.

Table 5: Cultivated crops and farming strategies

Livelihood strategy	Total sample (farmers) (%)	Cooperative members (%)	Other farmers (%)	Subsistence farmers (%)
Produce Banana	100	100	100	100
Produce Mango	64	63	66	83
Subsistence farming (in general)	42	50	33	100
Subsistence maize production	28	25	33	66
Subsistence Teff production	21	25	17	50
Strategies against flooding	35	38	33	33
Farmers facing pest and disease problems	71	88	50	83

Every interviewed farmer has banana today, and half of them has also mango. However, there are still more than one third of the interviewed farmers that produce crops for their own subsistence, besides cash cropping. These crops are mainly maize and teff. Nowadays the main focus is clearly on cash crops which are financially more beneficial for the farmers.

Some of the farmers mentioned that one of the reasons for their shift was the increase in the price of fertilizer (Dap, Urea), which needs to be used when cultivating maize and teff. Others also told us that this shift has allowed them to have more money available to do savings for the difficult period of the year which basically increased their food security during this period.

A lot of aspects of the vulnerability context have an impact on the livelihood strategies, regarding to cropping systems. The local climate is very good for the cultivation of bananas, but the amount of rains is just a bit lower than what banana needs so they have implemented a big network of irrigation canals to give every field

access to the amount of water which is necessary for the growth of the plants. There is still an important dry period from December to February where farmers mainly cope with it by adding some mulch from banana and mango leaves to prevent evaporation from the soil in addition to irrigation. Generally, they also try to save food and money for this period to be able to deal with it the reduction of farm income.

Flooding seems to be a recurring problem in this village, either originating from the river or from the lake. Only one third of the interviewed farmer seems to have implemented strategies to cope with it like trenches and drainage. For people who have their farmland close to the lake, there is no other strategy than to leave if the level of the lake increases too much.

Pest and diseases are also important for farmers because two third of them are facing these problems. For banana and mango, some farmers are facing diseases without any use of pesticides because they don't have the information about where this disease comes from and how to deal with it. According to farmers' response, they burn infected plants. On the other hand, for maize, every farmer facing pest problems is using the pesticides proposed by the government even though they were not very efficient for the farmers.

3.4.2 Agriculture: livestock

73.33% of households that were interviewed in the questionnaire owned one or more animals and the results about the amount of livestock and the grazing strategy summarized in table 6. The farmers that are not using zero grazing use a grazing strategy, either on communal lands or on private fields.

Table 6: Summary of the most important results concerning livestock

LIVESTOCK	Total sample	Cooperative members	Other farmers
Average number of livestock units	3.39	4.48	2.14
Share of farmers using zero grazing (%)	63.6	40.0	71.4

The average number of livestock units that households possessed was 3.39 livestock units. A bull is considered as one livestock unit and other animals contribute according to their relative importance. Households that are member of a cooperative possess on average 4.48 livestock units whereas other farmers contained less, namely 2.14.

Two main strategies for livestock management were observed in Lante, namely zero grazing and grazing on communal lands. The zero grazing strategy, where animals get fed with crop residue or tree leaves, is applied in 72.7% of interviewed households that own cattle. This could indicate a shortage of human resources or of interest to take the animals to grazing lands. When animals get ill, veterinary services and medicines are commonly purchased. However, animal disease was still often mentioned as important problem, especially when households have no resources to buy medicine.

Animals are mainly used for manuring and ploughing farmer's fields, transportation and as a food resource. Using animals as a food resource is a risk reducing strategy when (cash) cropping yields are insecure, especially for during the dry season. Using livestock is also an efficient way to convert low quality crop residues into high quality products and services (animal power

3.4.3 Off farm employment

Besides farming, another livelihood strategy used by the interviewed people is off farm employment. Since the village is located on the highway, relatively close to Arba Minch, there are a lot of employment opportunities outside of the village. Table 7 contains information on the number of people working off farm and the average share of money derived from this employment for this sample.

Table 7: Information on off farm employment

OFF FARM EMPLOYMENT	Total sample	Cooperative Members	Other farmers
Share of adults that earn money off farm (%)	43		
Share of the income derived from off farm employment (%)	21.7	14.1	30.4

Out of all the adults in the households that were interviewed, 43% is engaged in off farm employment. Most of these people, namely 63%, are self-employed. Examples of jobs encountered were drivers and shop owners. The other part is working for a wage, for example employees of the cooperative, teachers, health workers and people working in hotels and restaurants in Arba Minch. Only 6% of the people included in the sample is employed on someone else's farm. On average the interviewed households derive 21.67% of their income from these different types of off farm employment. The share of income derived from off farm employment was found to be higher for households that were not affiliated with the cooperative, namely 30.37%, while members of the cooperative obtain 14.06% of their income from off farm employment.

3.5 Livelihood Outcomes

3.5.1 Crop Yields

The agricultural yields are an important outcome of the cropping strategies and the allocation of inputs. As was stated in the section 'Livelihood strategies', the most important crops in Lante are banana, mango, maize, beans and teff. Table 8 summarizes the average yields (kg/ha/yr) of these crops, that were estimated from the survey data. The yields are based on the farmer's estimations of their land size and harvest and might thus be very rough approximations. Due to the high variability and the small sample size the standard deviations are very high.

Table 8: Estimated yields of the most important crops

Crop (total number of farmers; number of farmers in cooperative; number of other farmers)	Average Yield (kg/ha/year)	Average yield obtained by members of the cooperative (kg/ha/yr)	Average yield obtained by other farmers (kg/ha/year)
Banana (11;7;4)	5405 (±4655)	7065 (±5044)	2500 (±1915)
Mango (9;5;4)	2642 (±2466)	2715 (±1470)	2250 (±3649)
Maize (5;3;2)	2300 (±1577)	3467 (±923.8)	1700 (±2121)
Teff (3;2;1)	4333; (±6640)	500.0 (±141.4)	1200 (± ∞)
Beans (4;4;0)	1285; (±857.7)	1285 (±857.7)	NA

Based on this information it seems that farmers that are member of the cooperative have higher yields of all the important crops. This is however hard to say because of the high standard deviations.

3.5.2 Multidimensional Poverty

The poverty level of the households is another important outcome of all the other aspects discussed in the framework. Poverty levels were assessed by calculating the Multidimensional Poverty Index (MPI). If this index is larger than 0.3 for a certain household, this household is considered to be poor. The average MPI is 0.279. The average household is thus just below the poverty threshold. 33.33% of households had an index larger than 0.3 and are considered to be poor. When looking at the members of the cooperative versus other farmers, it is observed that average MPI's of 0.25 and 0.32, respectively. Farmers that are not in the cooperative are, in this sample, more multidimensionality poor than farmers that sell their products to the cooperative.

3.5.3 Food security

Farmers either acquire food directly from their fields or through buying them in the market. In Lante, there is currently an increase in the cultivation of cash crops, such as banana and mango, and a decrease in subsistence farming. This might have an effect on the food security. Based on the survey, two indicators of food security can be calculated, namely Months of Adequate Household Food Supply (MAHFP) and Dietary diversity score (HDDS).

Furthermore households can be classified into a food security scale based on the Household Food Insecurity Access Scale (HFIAS). According to the latter, only one of the households is completely food secure, one other household is slightly food insecure and all the other households are moderately to severely food insecure.

The average number of months in which the households have enough food is 10.4 (±3.04) and the average number of food groups eaten by the sampled households equals 5.5 (± 2.23). In Table 9 the average food security indicators for cooperative members and non-members is compared.

Table 9: Comparison of food security indices for cooperative and non-cooperative members

Indicator	Cooperative members	Other farmers
MAHFP	11.75 (±0.71)	8.867 (±4.00)
HDDS	6.625 (±2.07)	4.286 (±1.80)
HFIAS (share of the households that are moderately to severely food insecure)	86%	88%

In this sample, the households affiliated with the cooperative have, on average, a larger number of months in which food supply is adequate and their dietary diversity score is somewhat larger. However, in both groups the share of households that is moderately to severely food insecure is similar.

4. Discussion

4.1 Linkages within the framework

Lante is a planned village, which lowers the multidimensional poverty index by already providing physical

capital like water and electricity. This village has been planned as to have a good access to transportation, because it is built around the main road. In the vicinity of the village, there is also the river Baso which provides water for irrigation purposes. These two, the road and the river, form a basis for many of the major processes in Lante.

Having access to the road as a physical capital has a range of benefits, mainly coming from an increased access to markets outside of the community. This access makes off farm employment possible as a livelihood strategy for a larger portion of the population. Additionally, it also opens up the possibility to develop a cash crop economy in the village.

There are three main agricultural strategies which can be used alongside each other in the households. They are subsistence farming, cash cropping and livestock. The recent increase of land used for cash cropping has meant a decrease in the land used for subsistence farming. Due to the rising population pressure, the number of livestock has decreased, which has had a negative influence on the availability of manure as fertilizer.

The river Baso forms a source of natural capital for the kebele that is used for irrigation purposes as a strategy to reduce the risks associated with cultivating crops in the dry season. However, flooding also forms a major vulnerability for the community, mainly for agricultural activities. To reduce the risk of this kind of event, the government has worked to broaden the river and erect protection walls on its banks, acting as a transforming structure.

The irrigation system allows the farmers to have a higher yield and to cultivate crops that otherwise would not have been possible in this area. It also helps the development of a cash crop economy of banana and mango by providing a more continuous supply of produce. These processes originating from the river have a significant impact on the soils available to the people of Lante.

Because of the cash crop economy, some farmers saw the necessity to form a cooperative for the main cash crops (banana and mango). This cooperative ensures that its members will receive more for their products than if they sell everything individually. In the household survey, there is an indication of a lower Multidimensional Poverty Index of cooperative members compared to non-members, which suggest that the cooperative is successful in its endeavor.

5. Conclusion and recommendation

To conclude it is possible to answer the research questions asked in the beginning. Firstly, the evolution of the cropping systems to more cash cropping and less subsistence farming, together with livestock, is the most important observed change in the livelihood strategies. Consequently, intensification of agriculture through promoting and delivering improved technology packages should be carried out. Secondly, the influence of being a member of the cooperative on the livelihood outcomes of the households is positive by reducing poverty in the sample. Therefore, it is advisable to strengthen the existing cooperatives and establish well-functioning cooperatives in order to include all producing farmers. Lastly, the irrigation system helps to reduce the negative effects of the dry season on the livelihood of the households. As a result, it is worthwhile to improve the irrigation system by local and regional government and aids from different NGOs.

6 References

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