Master's thesis

Comparing the monitoring and evaluation systems of watershed management related development projects in Amhara, Ethiopia

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ABSTRACT

Natural resource degradation is both a cause and a result of poverty in Ethiopia. Therefore it is important to include watershed management into efforts to reduce poverty and food insecurity in the country. In order to see if different interventions are effective in restoring the degraded environment, it is important to have a functioning monitoring and evaluation system that includes natural resource degradation and other environmental factors.

This study compares the monitoring and evaluation systems used by five different projects involved in watershed management in the Amhara region, Ethiopia. The objective is to find out whether these systems are providing adequate and scientifically valid information about the projects' success in decreasing erosion. The study has also two sub-objectives: suggesting additional and/or alternative methods for environmental monitoring, and helping the projects learn from each other by providing information about the indicators other projects are using as well as their successes and shortcomings

The environmental monitoring of the examined projects is done mostly with management-based indicators that monitor what is being done and assume environmental effects based on empirical knowledge. These management-based indicators are important in identifying where and how project resources are spent and in finding out the rate of adoption of the promoted methods. They serve an important function in the monitoring and evaluation systems but are not sufficient from an environmental point of view. Direct monitoring of erosion is done by one project. This hydrological monitoring system, possibly accompanied with low-cost estimation methods, could well be modified and applied to other projects as well if funds for the establishment of monitoring stations can be found.

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TIIVISTELMÄ

Luonnonvarojen köyhtyminen on sekä syy että seuraus köyhyydelle Etiopiassa, ja siksi valuma-alueen hallinnan sisällyttäminen yrityksiin vähentää köyhyyttä ja lisätä ruokaturvaa maassa on tärkeää. Toimiva, ympäristönäkökohdat huomioiva seuranta- ja arviointijärjestelmä on tärkeässä roolissa kun halutaan nähdä kuinka tehokkaasti erilaiset toimenpiteet onnistuvat elvyttämään rappeutunutta ympäristöä.

Tämä tutkimus vertailee viiden Amharan alueella Etiopiassa toimivan, valuma-alueen hallintaan liittyvän kehitysyhteistyöprojektin seuranta- ja arviointijärjestelmiä. Tutkimuksen tavoite on selvittää, tuottavatko nämä järjestelmät riittävää ja tieteellisesti pätevää tietoa projektien etenemisestä kohti tavoitteitaan. Tutkimus pyrkii myös ehdottamaan vaihtoehtoisia menetelmiä eroosion seurantaan ja edistämään projektien keskinäistä oppimista tuomalla esiin tietoa kunkin projektin käyttämistä indikaattoreista, sekä niiden vahvuuksista ja heikkouksista.

Tarkastellut projektit käyttävät pääasiassa indikaattoreita, jotka mittaavat tehtyjen toimenpiteiden määrää ja käsiteltyjä pinta-aloja. Toimenpiteiden ympäristövaikutuksia ei mitata suoraan, vaan niiden oletetaan toteutuvan empiirisen tiedon perusteella. Näillä toimenpiteisiin perustuvilla indikaattoreilla voidaan hyvin tarkkailla missä ja mihin projektin resursseja käytetään, ja kuinka paikallinen väestö omaksuu edistettäviä menetelmiä. Vaikka niillä on tärkeä rooli projektien seuranta- ja arviointijärjestelmissä, eivät ne ympäristönäkökohdista ole riittäviä. Ainoastaan yksi tarkastelluista projekteista mittasi eroosiota suoraan. Tämä hydrologinen seurantajärjestelmä, mahdollisesti vahvistettuna edullisilla eroosiota arvioivilla menetlmillä, voitaisiin muokata myös muiden projektien käyttöön, olettaen, että rahoitus seuranta-asemien perustamiseen löytyisi.

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GLOSSARY AND ACRONYMS

BoARD: Bureau of Agriculture and Rural Development (in Bahir Dar)

CBINReMP: Community-Based Integrated Natural Resource Management Project

Community Facilitator: project paid field coordinator working at community or kebele level

Development Agent (DA): a contact person between the project and the communities at kebele level

ENTRO: Eastern Nile Technical Regional Office

ESMF: Environmental and Social Management Framework of the PSNP

Exclosure: a rehabilitation technique where an area of degraded open access lands is closed for grazing and most other agricultural uses and usually controlled by guards

FSP: The Food Security Programme

JMM: Joint Monitoring Mission, a key pillar in the monitoring of the SLMP

Kebele: the smallest unit of local government in Ethiopia, equivalent to a ward or neighbourhood, a part of a woreda

LiDAR: Light Detection and Ranging, a method used in remote sensing

M&E: monitoring and evaluation

MASL: Meters Above Sea Level

MERET: Managing Environmental Resources to Enable Transition to Sustainable Livelihoods (a project)

MIS: Management Information System

NDVI: Normalized Difference Vegetation Index

PSNP: Productive Safenytnet Food Security Program

SLMP: Sustainable Land Management Project

SWC: Soil and Water Conservation

Watershed: an area from which rainwater drains to a single outlet

Woreda: an administrative division in Ethiopia equivalent to a district with an average population of 100 000. Woredas are composed of a number of kebeles.

1 INTRODUCTION

Degrading natural resources have been identified as the key underlying cause of poverty in Ethiopia (ENTRO 2008). The main land degradation arises from high erosion rates due to steep slopes, continuous encroachment and cultivation of marginal lands, and a long history of deforestation, overgrazing and negative coping strategies such as reduced rotation periods and burning of dung (Desta et al. 2005). Poverty is therefore both a cause and a result of natural resource degradation. Nevertheless, the reasons for poverty are not confined to natural resource degradation but include other aspects such as education, health and alternative sources of income (ENTRO 2008).

For reasons stated above, many development projects aiming to reduce poverty and food insecurity in Ethiopia include a watershed management component that aims to reduce land degradation. All projects studied in this paper are using the same guidelines in watershed management. The guideline, Community Based Participatory Watershed Development: A Guideline, by Desta et al. (2005) introduces methods of erosion control and watershed management that are feasible in the Ethiopian context. Therefore the methods of watershed management implemented by the projects are essentially the same. These include physical soil conservation (e.g. soil bunds and terraces), flood control, water harvesting, soil fertility management, different basins for agro-forestry, and gully control, for example check dams (Desta et al. 2005).

To fight poverty as a reason of degradation of natural resources it is important to include socio-economic issues into a holistic approach to watershed management. Therefore, although being a thesis in environmental technology, this study will also look at the environmental implications of some socio-economic interventions implemented by the projects.

Monitoring and evaluation (M&E) is an important part of project management. Timely and accurate data about the effects of different project interventions is the key to steering the project in the desired direction. Actors at all levels of the project (beneficiaries, project staff and donors) benefit from a functioning M&E system. The M&E systems of all the studied projects are based on the logical framework approach where the project identifies the inputs and processes as well as desired outputs, outcomes and impacts (World Bank 2004) and then defines indicators that are used to monitor the progress towards these goals.

There is large variation between the M&E systems of different projects and the question is: are these indicators providing adequate and scientifically valid information about the successes and failures of project interventions and about the progress of the projects towards their goals?

The main objective of this study is to answer the above question from an environmental point of view. As erosion is the main reason for natural resource degradation in the area, the question boils down to: Are the M&E systems providing adequate and scientifically valid information about the projects' success in decreasing erosion? The study has also two sub-objectives: suggesting additional and/or alternative methods for environmental monitoring, and helping the projects learn from each other by providing information about the indicators other projects are using as well as their successes and shortcomings.

This study examines the M&E systems of five watershed management related projects in the Amhara region of Ethiopia. The focus of the study is on environmental monitoring but some attention is also given to socio-economic issues and community participation. The following projects are included in the study: the watershed development component (B1) of the Tana-Beles Integrated Water Resources Management Project (later shortened as Tana-Beles project), the Sustainable Land Management project (later shortened as SLMP), the Productive Safenytnet Food Security Program (later shortened as PSNP), the MERET project and the Community-Based Integrated Natural Resource Management Project (later shortened as CBINReMP). Most of these projects are on-going and are already implementing the designed M&E systems. The CBINReMP is not yet implemented and the M&E system is under construction. This should be kept in mind when comparing it with the other projects.

2 BACKGROUND

The Federal Democratic Republic of Ethiopia is located in east-central Africa and bordered by Sudan, Kenya, Somalia, Djibouti, Eritrea and the Republic of South Sudan (Figure 1). The projected population of Ethiopia in the year 2012 is 84.3 million (CSA 2012) of which, over 80 % are rural dwellers (Tana-Beles WME 2009). Out of the total economically active population 78.2 % were involved in agriculture in 2005 (CountrySTAT Ethiopia 2012). The current population growth rate is 2.6 % (CSA & ICF International 2012). With the growing population, the average land holding has fallen from 0.5 ha/person in 1960 to 0.11 ha/person in 1999 (Liu et al. 2008).

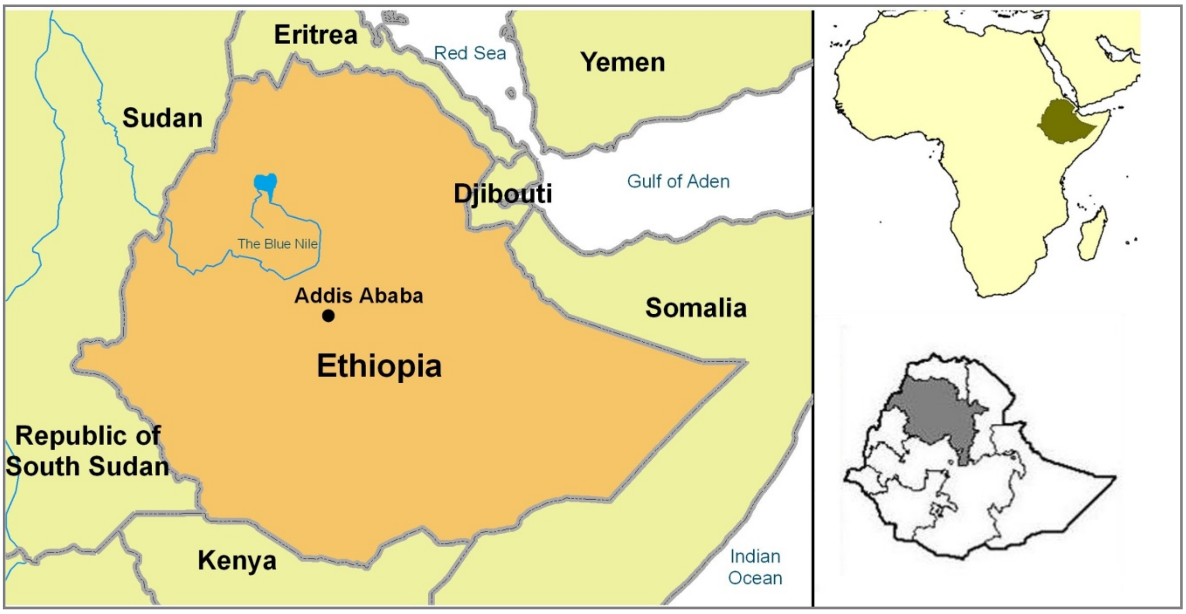

Figure 1. Map of Ethiopia (left) and the location of Ethiopia in Africa (upper right) (Map Data: ESRI ® Data & Maps 9.3.1), and the location of the Amhara National Regional State in Ethiopia (lower right, picture from MERET project documents). Lake Tana and the republic of South Sudan were not included in the map data but added by the author. The border between South Sudan and Sudan is therefore not defined.

The Amhara region is situated in the north-western highlands of Ethiopia (Fig. 1). It covers an area of 154 709 km² and hosts a population of 18.8 million inhabitants (CSA 2012) of which 89.8 % live in rural areas (Tana-Beles WME 2009). The pressure on natural resources is, therefore, very high and increasing with population growth (3 % growth rate in rural areas) (Tana-Beles WME 2009). The landscape in Amhara is fluctuating, ranging from plateaus to steep gorges and tall mountains, such as the Ras Dashen at 4550 MASL (CSA & ICF International 2012). For example, the majority of the project area in the Tana-

Beles project lies in between 2100 and 2900 MASL with an average slope of 8-30 % (Wondie et al. 2011).

Rain-fed agriculture is the most common farming strategy in Ethiopia (Descheemaeker et al. 2010, Rosell 2011). There are two rainy seasons: the Belg (February-May), caused by easterly wind from the Indian Ocean, and the Kiremt (July-October), caused by the inter-tropical convergence zone being located over the horn of Africa (Rosell 2011). The farming system in the Ethiopian highlands is a mixed crop-livestock system, where livestock provide the draught power needed for farm operation and a large part of the crop residue is fed to the livestock (Bewket & Sterk 2003). According to Nyssen et al. (2004) the current land degradation in the Ethiopian highlands is caused by stagnated agricultural technologies and a lack of agricultural intensification.

Lake Tana, the largest lake in Ethiopia and a major source of the Blue Nile, is located in the Amhara region. The lake and the Blue Nile, along with their historical sites and wildlife, are the main tourist attractions in the area, and therefore important to the livelihoods of local communities, especially in the town of Bahir Dar. The Blue Nile is also an important source of hydropower for the whole country. These ecological services are directly influenced by the management of the surrounding watershed.

The Blue Nile contributes about 86 % of the annual discharge of the Nile (Bewket 2002). The sediment eroded from the highlands of Ethiopia is transported by the Blue Nile downstream to Sudan and Egypt and causes severe financial losses due to hydropower underperformance and maintenance, and the clogging of irrigation channels (ENTRO 2008). The issue has, therefore, international significance as well.

3 MATERIALS AND METHODS

3.1 Materials

Information on the M&E systems was gathered from reports and project documents given by project staff to the author during her stay in Ethiopia in spring 2011. Key members of watershed management teams in Bahir Dar and Addis Ababa were also interviewed to gather further information and to clarify some aspects of the reports and documents. All interviews were recorded with a digital recorder (Olympus Linear PCM Recorder LS-5) and summaries of them can be found in written form in Appendix 1. The written summaries have been submitted for the interviewees' approval.

Due to limited time and resources only one or two interviews were made per project. With such a small sample size, deriving statistical data from the interviews was rejected. As the purpose of the interviews was not to derive any statistical data, the interviews were conducted with a semi-structured method (Ruusuvuori & Tiittula 2005) and the questions were not the same for different interviewees. For the same reasons the prepared questions were also not strictly followed in form and order. Instead the interviews were conducted as guided conversations (Warren 2001) with the goal of explaining specific details concerning each project.

Interviews are not widely used in environmental science, but choosing a qualitative method was justified in this case because of inconsistency in some of the written documents. It was also necessary to ensure that the information in the documents was up-to-date. Project documents are not scientific publications and there is a possibility of them presenting the projects in "a good light", leaving out possible shortcomings and setbacks. Interviews were seen as a method for identifying some of the possible gaps between project documents and reality. Due to the limited number of interviewees, achieving anonymity was not feasible. This raises a question of truthfulness. Similar to the project documents, the interviewees could have also left out critical opinions in order to please employers. Therefore information derived from the interviews cannot be seen as an objective truth. However, the interviews did serve their purpose and revealed important information, for example indicators that were listed in the Logical Frameworks but not used. For the readers' convenience interviews are always mentioned as the source of information when used in the text. Content analysis (see chapter 3.3 Methods) is used to assess the validity of the interviews as a source of information.

The project reports and documents received varied widely in form and contents. Many of them are unpublished and available only from project staff and therefore not listed as references. This is also the case with reports that were labelled confidential. Published documents are listed as references and should be available from project financiers or responsible authorities. The ones readily available on the Internet are listed with the Internet address. Indicators of the Tana-Beles project are from August 2010, but the ones discussed in more detail are updated according to a recent project report.

The assessment of the relevance of different indicators and suggestions for additional monitoring methods are based on an overview of scientific literature and recent studies conducted in environments similar to the area in question.

3.2 Criteria for the assessment of the M&E systems

To examine the indicators used by the projects, we must first define what we mean by a good indicator. Indicators communicate information about progress toward chosen goals. They enable managers to track progress, demonstrate results and take corrective actions to improve service delivery (World Bank 2004). They do not measure the phenomenon of interest directly but should have a strong correlation to it. The stronger the correlation, the better the indicator. As Hammond et al. (1995) define them, indicators quantify information so that progress can be measured and simplify information about complex phenomena in order to improve communication between stakeholders.

In order to quantify information, the indicator needs to be measurable in an unambiguous way and provide numeric results. From numeric results, a regression equation can be established between the indicator and the goal. The design of M&E system must be scientifically valid. As Casley & Luri (1981) explain, controls for the “treatments”, or project influence in this case, can be hard to establish. This is because communities outside the project area might adopt methods promoted by the project on their own and stopping them from doing so would be unethical. Another problem is that you cannot isolate the communities from outside influence that could affect the phenomenon studied. Often monitoring is done using an interrupted time-series design, where the area of concern is surveyed on a “before-and-after” basis. With this approach it is important to conduct a baseline survey before any project intervention has occurred. In many cases the monitoring of the whole project area can prove to be a vast and resource consuming task and there is a strong incentive to derive samples and extrapolate the results to cover the whole project. In doing this, valid statistical methods should be kept in mind. The sample should not be bias, e.g. only from well performing or poor performing communities, and the size of the sample should be sufficient to produce statistically valid results.

The results obtained from the monitoring of an indicator should be simple enough to be understood by a person with no education in the respective field. For practical reasons, the indicator itself needs to be simple to measure so that the monitoring can be performed by a Community Facilitator, Development Agent or a community member instead of a highly educated expert that may be costly or hard to find in a developing country.

Defining too many indicators or indicators without accessible data sources can make the system costly, impractical and likely to be underutilized (World Bank 2004). The importance of this became obvious during the interviews where several projects were discovered to have indicators that were not monitored due to their complexity. One interviewee also stated that the project in question had too many indicators and that only a few of them were actually monitored. Focusing on a limited number of key indicators that measure what is essential in the project is recommended (Uitto 2004).

In their Logical Frameworks the projects have divided their indicators into goals or development objectives, outcomes and outputs. This reflects the perceived importance of the indicator to the project. From an environmental point of view the most interesting indicators are the ones measuring actual impacts that the project interventions have on the environment. These are usually categorized as goals, development objectives or outcomes. Monitoring of outputs is however important in the day-to-day monitoring of the project, telling us how the project is advancing. The indicators discussed in the following chapters represent all these categories, emphasis being on their relevance to the environment.

3.3 Methods

As an attempt to assess the validity of the interviews as a source of information, a robust form of content analysis (Weber 1990) was performed. Three pre-determined categories were defined to analyse the speech of the interviewees. The definitions were as follows: “positive” –presenting the project, indicators or the M&E system as good, relevant, unique or better than others, “negative” – presenting errors, problems or negative aspects of the project, indicators or the M&E system, and “neutral” – all other sentences by the interviewee. Sentences by the interviewer were ignored. To assess the consistency (Krippendorff 1980) of the coding scheme presented above, the analysis was done twice by the same coder at different times. Similarly, to test the reproducibility of the coding scheme, a second coder was used and results compared. In this design, the category “neutral” includes also some sentences that are not directly related to the project, indicators or the M&E system. The wider definition of “neutral” was chosen because while testing the coding scheme it became apparent that coders not familiar with the projects had difficulty distinguishing between relevant and irrelevant sentences, and because the sentences categorized by the author as irrelevant were short and including them did not significantly affect the results.

Sentences were categorized according to the coding scheme and words in these sentences counted. If a sentence included several categories, it was divided, e.g. no words were counted twice. For example the sentence “The monitoring system is brilliant, except for the biological indicators that still need improvement” would be categorized as five positive words and nine negative words. The word counts were then converted into a percentage of all the words counted in each document in order to compensate for the different lengths of the interviews. A mean percentage of each category is reported along with the standard error of the mean (*SE*), calculated as:

$$SE = \frac{s}{\sqrt{n}} \qquad (1)$$

Where, s is the standard deviation, n is the number of observations

As SLMP was the only project with two interviews and the objective is to determine the validity of the materials as a whole instead of focusing on individual interviewees, the interviews were merged and treated as one.

Indicators defined by the projects were divided into categories. The categories were not pre-determined but arose from the list of indicators. Percentages of indicators in each category by project were calculated. Basic statistics are presented with the standard error of the mean calculated as above (Equation 1). Due to the low number of observations ($n=5$), no advanced statistical analysis was performed. Dividing the indicators into categories allows us to compare what issues the M&E systems are focusing on. It must be kept in mind, however, that sheer numbers or percentages do not reveal the whole truth. One well designed and relevant indicator measuring the phenomenon of interest can provide more useful information than several indicators that fail to capture the essential data.

The designs of the M&E systems and the indicators are weighed against the criteria stated above (chapter 3.2). The M&E systems of different projects are discussed as entities in chapter 4.7 to identify the strengths and weaknesses of each system. Project-specific monitoring tools are also discussed here. This chapter will enable comparison between projects and hopefully identify opportunities for projects to learn from each other. The projects will be discussed in alphabetical order.

4 RESULTS

4.1 Overview

Indicators in the M&E systems of five watershed management related projects were categorized and reviewed according to their relevance to the environment. It was discovered that most indicators were management-based; measuring what was done and assuming beneficial results. An emphasis on socio-economic and project management related indicators was found throughout the M&E systems, while direct and indirect environmental indicators received less attention. Problems with data collection were also discovered. The following chapters will present these results in more detail.

4.2 Content analysis of the interviews

When testing for consistency by replicating the coding by the same coder, the differences between the corresponding averages for positive, negative and neutral comments were less than 0.5 % in all cases. Standard deviations for the two runs were 0.16 % for positive, 0.19 % for negative and 0.35 % for neutral comments. The coding scheme can, therefore, be regarded as consistent. The coding scheme did not perform as well when testing for reproducibility. Compared with the two runs by coder 1 (author), differences were 3.0 %, 3.6 % and 6.6 % for positive, negative and neutral comments respectively. These do not fall within the error range (see following chapter) and therefore the reproducibility of the coding scheme proves weaker than the consistency. This was expected as the second coder was not familiar with the projects or the subject in general. The differences are, however, not big enough to demand the rejection of the coding scheme. Results presented in the following chapter are derived from the two runs by the author ($n=10$).

Positive comments usually referred to a well-designed M&E system or relevant indicators, while negative comments more evenly distributed among project, M&E system and indicators (Figure 2). A bias towards positive comments was expected but not found. On average, positive comments amounted only to 7.3 ± 1.6 % of words counted, while negative and neutral comments amounted to 11.6 ± 3.1 % and 81.2 ± 4.2 % respectively. In all projects neutral comments exceeded 60.1 %, while the maximum value for positive comments was 12.8 %. If the results from the second coder were included, the proportion of neutral comments would be even greater. Overall, these results indicate that the interviews can be regarded as a valid source of information.

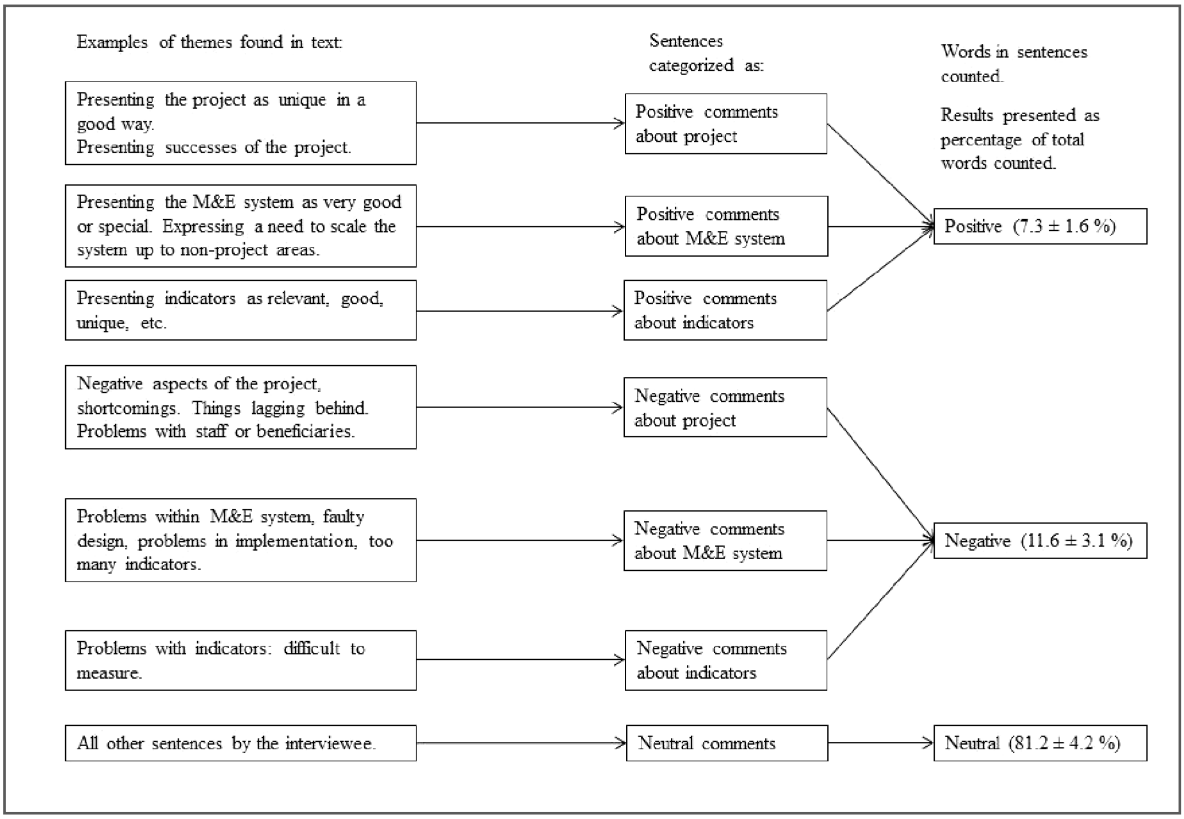

Figure 2. Examples of themes found in the interviews and their categorization according to the coding scheme.

4.3 Indicator categories arising from the materials

Four main categories arose from the project materials; direct environmental indicators, indirect environmental indicators, socio-economic indicators and indicators assessing project management and training.

The most important expected environmental impact of these projects is decreased erosion, associated with increased soil fertility, increased vegetative cover and increased water percolation. Indicators directly measuring changes in the environment are the most relevant from an environmental point of view because they tell us what has actually happened to the environment instead of just articulating what has been done. Altogether 8 out of 41 indicators examined fall under this category (Table 1). These indicators, discussed further in chapters 4.4 and 5.2, are the focus of this study.

Table 1. Indicators measuring changes in the environment by project. The abbreviation DO stands for Development Objective.

Project	Indicator	Level of indicator
CBINReMP	About 700 000 tonnes carbon sequestered in cropped soil, forests and pastures	Goal/DO
	Forest cover of the watershed increased by at least 10%	Output
MERET	% of biomass production increased	Output
PSNP	90% of households reporting that their environment has improved for the benefit of the community by 2012	Outcome
SLMP	Percentage increase in the amount of carbon sequestered (no target specified)	Goal/DO
	Increase in normalized difference vegetation cover index (no target specified)	Goal/DO
Tana-Beles-project	Suspended sediment load in targeted watersheds reduced by 10 per cent	Goal/DO
	Dry season base flow increased at mini- (1-10 ha) and micro-watershed (1-10 km2) levels	Outcome

A total of 36 indirect environmental indicators were divided into the following seven sub-categories: amount or area of soil conservation interventions, adoption and condition of soil conservation measures, soil fertility, water harvesting and irrigation, afforestation and forest conservation, controlled grazing and fodder production, and fuel efficiency and renewable energy. These indicators will be further discussed in chapters 4.5 and 5.3.

Sub-categories arising from socio-economic indicators were income, food security, water and sanitation, agricultural productivity, health and education, infrastructure, land tenure, access to markets, local enterprises, assets, equity, veterinary services and tourism. One indicator did not fit any of the sub-categories. These indicators will be discussed in chapter 4.6. Indicators monitoring project management and training revealed 10 sub-categories: transfers and reliability, participation, equipment and materials provided, training provided, community organization, staffing, planning and implementation, timeliness of reporting, cooperation with other organisations, and best practises and lessons learned.

Here two indicators did not fit any of the sub-categories. Indicators in the sub-categories of socio-economic and project management and training are presented in Appendix 2.

On average environmental indicators amounted to 4.9 ± 2.1 % of all indicators, while indirect environmental indicators, socio-economic indicators and management-related indicators amounted to 16.9 ± 3.7 %, 37.3 ± 7.3 %, and 40.9 ± 8.0 %, respectively. Socio-economic and project management and training related indicators combined amounted to more than 60 % of all indicators in each of the projects, ranging from 60.0 % with CBINReMP to 92.7 % with PSNP, and leaving only 7.3 % to 40.0 % to direct and indirect environmental indicators (Figure 3).

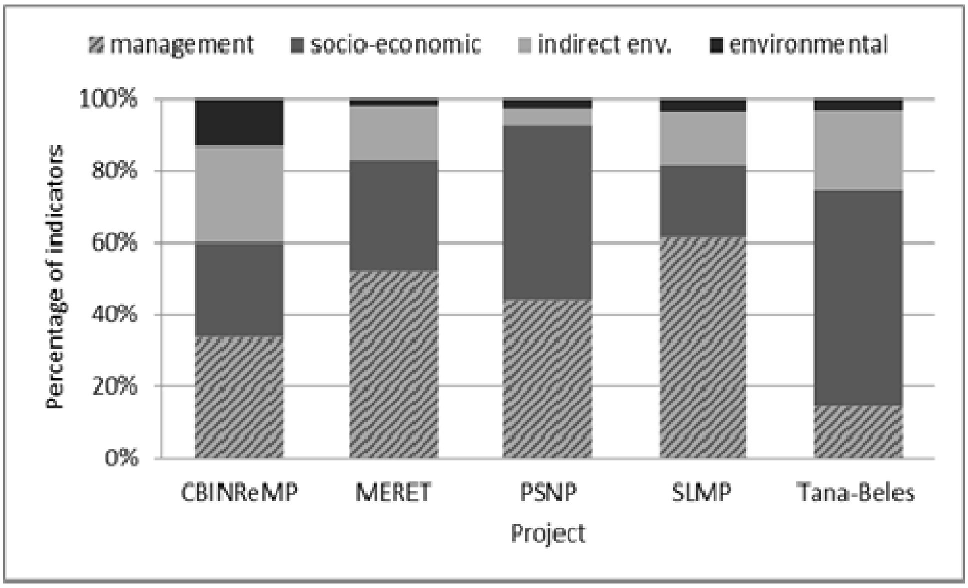

Figure 3. Proportion of indicators in different categories by project.

SLMP was the only project receiving critique in the interview for having too many indicators. However, when looking at the numbers (Table 2) SLMP is actually very close to the average (53.8 ± 4.6, if CBINReMP is excluded) in total indicators.

Table 2. Number of indicators by project and category

project	environmental	indirect environmental	socio-economic	management & training	total
CBINReMP	2	4	4	5	15
MERET	1	9	18	30	58
PSNP	1	2	20	18	41
SLMP	2	8	11	33	54
Tana-Beles	2	14	37	9	62
total	8	37	90	95	230

4.4 Monitoring environmental impacts

4.4.1 Hydrological monitoring

The Tana-Beles project has two indicators that are monitored hydrologically: 1) Suspended sediment load in targeted watersheds reduced by 10 per cent and 2) Dry season base flow increased at micro-watershed outlets. The hydrological monitoring of the Tana-Beles project is done at ten stations within the project area and five control stations in areas that are close to the project areas but where no soil and water conservation (SWC) methods are applied (Tana-Beles WME 2010c). Each station represents a micro-watershed with an area between 1.39 and 28.4 km² (average area 6.44 km²) and has its own manager. Two stations (one in the project area and one control) have two measuring points; one upstream and one downstream (Tana-Beles WME 2010e). When establishing the stations, channel cross-section surveys were carried out at each station. Current measurements were also conducted with a Valeport current meter and with a simple float method (Tana-Beles WME 2010c). Each station is measuring water levels and secchi turbidity twice daily (with the exception of one station where measurements are conducted only once every day due to long distances) and total suspended solids (TSS) if necessary (Tana-Beles WME 2010e). Secchi turbidity is used as an indicator for when water samples should be collected by station managers. It is measured with a practical application of the Secchi method called the secchi jug that gives measurements on a scale from 0 to 8, zero being highly turbid water and eight being clear water. The method is explained in detail in project report 20 (Tana-Beles WME 2010c). The suspended sediment samples are taken when the secchi jug reading is less than eight (Tana-Beles WME 2010e). Three stations also have a SEBA Dipper for continuous water level measurements and two stations have a crest gauge for measuring peak flows. Altogether 52 rain gauges are placed near the stations and checked twice daily by the station managers (Tana-Beles WME 2010d,e).

Water samples and data collected by the station manager are collected once a month. The samples are taken to the Bureau of Agriculture and Rural Development soil laboratory for analysis of TSS using a simple evaporation method. The sediment is coagulated from the water with 0.2 % aluminium sulphate (Al_2SO_4). Excess water is decanted and the dry weight of the sediment in each sample is determined by drying the samples in 105°C for 24 hours (Tana-Beles WME 2010c). According to the interview the collection of data from station managers and the calculation and analysis of results are done by the Bureau of Water.

Initial results imply that variation in sediment concentrations between stations are high and therefore it is more useful to compare results on a "before and after" basis than on a "with and without project" basis (Tana-Beles WME 2010c,e). The development of the hydrological monitoring system and statistical analysis of the results are well documented in Tana-Beles project documents and reports, and available on the Internet (Tana-Beles WME 2010b,c,d,e; 2011b).

The connection between erosion in the watershed and sediment concentration in the river is strong as is the connection between increased dry-season base flow and increased percolation. The measurements are simple enough to be performed by community members with reasonable training. This can increase a sense of ownership and participation. The biggest challenges are initial costs of monitoring equipment and their maintenance, and the distribution of responsibilities between different actors.

The CBINReMP is also planning to apply hydrological monitoring. The interviewee stated that the monitoring will follow the example of the Tana-Beles project to some extent but expressed concern about the cost of such a system. To mitigate the costs the monitoring might be done in cooperation with other projects and national programmes.

4.4.2 Carbon sequestration

Carbon sequestration is mentioned in the Logical Frameworks of two projects; the SLMP and the CBINReMP. The interviews revealed that also MERET is planning to use carbon sequestration (the actual indicator being "% of biomass production increased"). The SLMP intends to monitor the percentage increase in the amount of carbon sequestered. The

CBINReMP has specified a goal of 700 000 tonnes of carbon sequestered in cropped soil, forests and pastures. This number is, however, only an estimate and not based on any survey. The rationale behind measuring carbon sequestration is that the project could then sell the sequestered carbon on the international carbon market under the Kyoto Protocol to gain more funds.

None of the projects are monitoring these indicators at the moment. When asked about this, interviewees explained that this is a difficult thing to measure and that the project has not had the capacity or skilled staff to measure it. Some interviewees felt hopeful that this problem will be solved; some doubted that the indicator will ever be measured.

Carbon sequestration does not have direct correlation to erosion and therefore these indicators do not support the goals of the projects as such. Increased biomass production could lead to increased vegetation cover that has been proven to reduce erosion but this depends strongly on which species are planted and where. Increased production of fuel wood could also lead to conservation of the indigenous forests. If the funds gained from selling the sequestered carbon are bigger than the costs of monitoring and the use of resources is seen worthwhile, these indicators can provide a welcome addition to the M&E systems. The methods and costs of monitoring are discussed in chapter 5.2.2.

4.4.3 Vegetation cover

The SLMP defines an increase in the normalized difference vegetation cover index as one of their indicators. The normalized difference vegetation index (NDVI) requires remote sensing data, such as satellite images or aerial photographs, and skilled staff that can process these images and use Geographical Information Systems (GIS) technology. As in the case of carbon sequestration, this indicator has not been monitored due to limited resources. These problems could be overcome by combining the resources of several projects in order to hire a remote sensing expert and acquire the required images of the area. Wondie et al. (2011) used NDVI in the Natural Resource Baseline study conducted for the Tana-Beles project. Experts from the Bahir Dar University could be consulted when attempting to implement the monitoring of these indicators. The NDVI was also used in a study conducted in South-Eastern Ethiopia by Bouaziz et al. (2011).

The CBINReMP has identified the forest cover of the watershed as one of their indicators, but has not yet specified the method of monitoring.

4.4.4 Surveys/polls

Surveys or polls are relatively easy to conduct and do not require expensive equipment. They can be conducted by a Development Agent, woreda staff or a community member with a basic training of the method. However, their value in providing information about the environment is questionable. The PSNP has an indicator (90 % of households reporting that their environment has improved for the benefit of the community by 2012) that uses this method. The results obtained from this survey do not measure the state of the environment directly but rather the perception the community has about their environment. This makes the indicator subjective. The phrase "for the benefit of the community" also raises a question of possibly conflicting interests of the community and the environment itself. On the other hand, conducting surveys increases community participation in the M&E of the project and could increase a sense of ownership that in turn could lead to better adoption of the project as a whole.

4.4.5 Biodiversity

The CBINReMP lists biodiversity and ecosystem conservation as one of their project components. Especially wetland management was mentioned in the interview. No indicators have yet been specified and the actual implementation of this component remains to be seen.

4.5 Indirect environmental indicators

4.5.1 Overview

On average, amount and area of soil conservation interventions merited most attention from the projects with an average share of 5.1 ± 2.3 % of indicators in each project, followed by adoption and condition of soil conservation measures (3.7 ± 1.1 %) and afforestation (2.6 ± 1.6 %). The averages are affected by the low number of CBINReMP indicators, and in plain numbers, the sub-category "adoption and condition of soil conservation measures" is the largest (Figure 4).

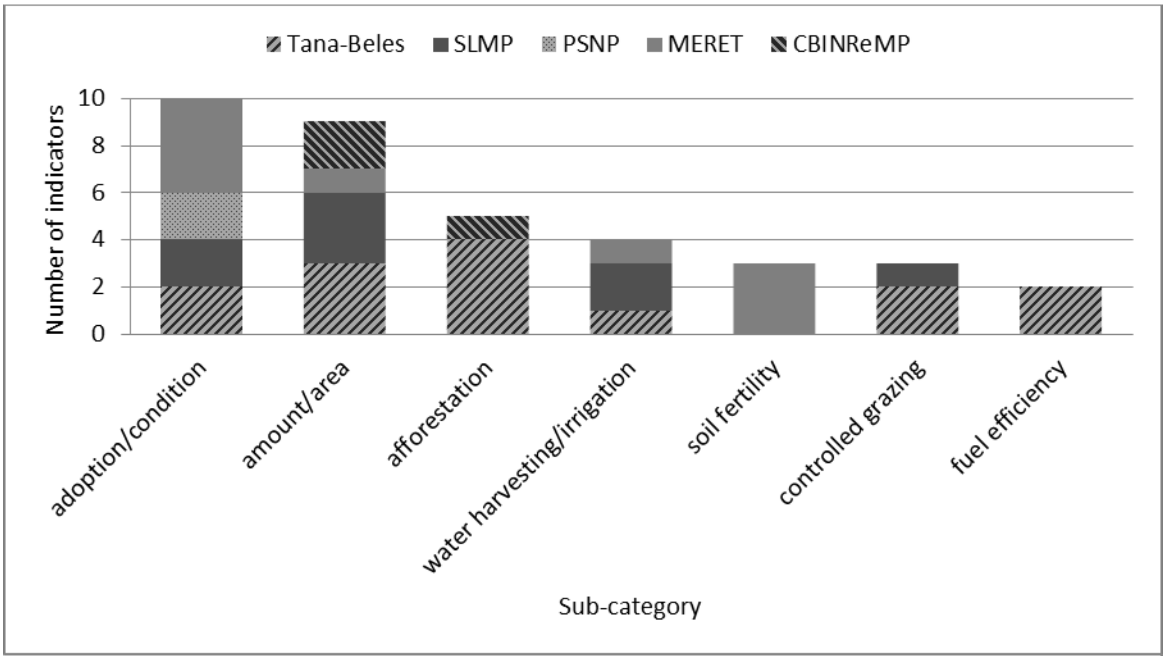

Figure 4. Numbers of indicators in each sub-category of indirect environmental indicators by project

4.5.2 Amount or area of soil conservation interventions

Most projects are monitoring the amount and/or area of interventions. This is useful in finding out what is being done but does not tell us about the quality of the implemented measures or about their environmental implications. It is therefore logical that these indicators are mostly categorized as outputs (Table 3).

Data for these indicators is readily available, since communities report all implemented measures and the area affected to the project management routinely and the indicators are easily calculated from this data. The smooth functioning of the monitoring of these indicators depends on the management and distribution of the data from the community level to the project management team. With the help of computers and the Internet data can be distributed in a fast and simple manner to all levels of project management. Methods of data collection, means of verifying whether the data submitted is accurate, and the frequency and procedures of reporting vary among the projects. These will be discussed further in chapter 4.7.

Table 3. Indicators monitoring the amount or area of interventions by project

Project	Indicator	Level of indicator
CBINReMP	Some 650 watershed management plans covering 227 500 ha implemented	Output
	32 500 ha of agricultural land rehabilitated	Output
MERET	% of degraded land reclaimed	Output
SLMP	Area put under SLM practices in the targeted watersheds (target: 120 000 ha by 2013)	Outcome
	Hectare of communal lands/hillsides and gullies rehabilitated with appropriate bio-physical measures and technologies (target: 52 500 ha by 2013)	Output
	Hectare of farmland treated with appropriate bio-physical measures and practices, by gender of household head (target: 67 500 ha by 2013)	Output
Tana-Beles project	1370 ha of gullies rehabilitated by 2013*	Output
	SWC measures implemented on 51 409 ha of cultivated land by 2013*	Output
	SWC measures implemented on 30 978 ha of grazing land by 2013*	Output

* Indicator updated according to a recent report (Tana-Beles WME 2012a)

The use of the words "rehabilitated" and "reclaimed" requires further analysis. When is an area considered rehabilitated or reclaimed by the projects? As the CBINReMP M&E system is only preliminary, no specification was found for this indicator. In the case of MERET, the monitoring plan matrix indicates that the types and amounts of interventions and the area affected are measured, but the success of such interventions is not assessed. Therefore the area is considered reclaimed as soon as any intervention is implemented. The same applies to SLMP. No detailed definition of "rehabilitated" was found in Tana-Beles documents and the indicator refers to the total area covered with SWC methods. Both quantity and quality of implemented measures are, however, checked before feeding the data into the Management Information System (MIS).

4.5.3 Adoption and condition of soil conservation measures

This group of indicators attempts to assess the quality of the measures or structures implemented and the rate of adoption of these methods by the local community (Table 4). These indicators tell us about the sustainability of the projects. If soil conservation methods are not adopted or sustained by the local community, the benefits of the projects are short-lived.

Table 4. Indicators measuring the quality and adoption of soil conservation methods by project

Project	Indicator	Level of indicator
MERET	% of activities that meet technical standards	Output
	% of households responded and adopted the promoted technologies by gender	Output
	% of non MERET sites using SLM approaches	Output
	% of household replicating specific house hold based technologies and improved practices	Output
PSNP	90% of public works reaching satisfactory standards and sustainability ratings by December 2010	Output
	100% of PW projects screened by ESMF by December 2010	Output
SLMP	No of households (10% of them female headed) who have adopted one or more SLM practices on individual land as a result of SLM interventions (target: 60 000 by 2013)	Outcome
	Percent of areas treated with bio-physical measures and exist in good condition one year after implementation (target: 80 % by 2013)	Output
Tana-Beles project	85 026 ha of vulnerable Tana sub-basin micro-watersheds rehabilitated and well-managed**	Goal/development objective
	Improved SWC practices adopted by all (100%) 38,275 households in targeted kebeles by 2013*	Outcome

* Indicator updated according to a recent report (Tana-Beles WME 2012a)

All projects in Table 4 have indicators designed to ensure that the quality of the SWC structures is satisfactory. This is of course important since low quality structures will discourage community members from adopting the method. MERET, SLMP and Tana-Beles are also monitoring the adoption of practices and approaches promoted by the project. ESMF is a safeguard procedure against any adverse environmental effects associated with the public works. In practise this means that the SWC structures are constructed according to the Guideline by Desta et al. (2005) which is endorsed by the other projects as well. In the case of larger constructions an Environmental Impact Assessment could be required by the Regional Environmental Protection Agency.

MERET indicators are monitored through surveys at woreda, planning team and household levels. In MERET, PSNP and Tana-Beles the quality of structures is assessed by the DA, woreda experts or watershed team member. The SLMP indicators are covered with the Joint Monitoring Missions (JMM). Chapter 4.7 will discuss the methods in more detail.

4.5.4 Soil fertility

MERET is the only project with specific indicators for soil fertility measures. The indicators (Table 5) measure the amount of soil fertility practises that are being applied and are classified as outputs. Unfortunately these indicators do not tell us how successful these measures are in returning nutrients and organic material to the soil. Occasional soil samples analysed for nitrogen, phosphate and organic material could provide an easy way of determining the success of these measures. These analyses are fairly easy to conduct but do require some laboratory equipment. The current level of equipment at the BoARD soil laboratory is unknown to the author and therefore the feasibility of soil sample analysis is left for the projects and BoARD to decide. If soil sampling and analysis is not feasible, local indicators describing soil quality could be used (see chapter 5.4.1).

Table 5. Indicators associated with soil fertility by project

Project	Indicator	Level of indicator
MERET	% households exercising soil fertility practices in selected sites	Output
	% MERET sites where improved soil fertility management technologies are being applied	Output
	Number of MERET sites where improved soil fertility management technologies are being applied	Output

Data for these indicators are collected with questionnaires at woreda and household levels. The questionnaire at woreda level determines the number of sites implementing improved soil fertility practises and tries to identify reasons if soil fertility practises are not implemented. Households are asked whether they are implementing soil fertility practises and if yes, what kind. Respondents are also asked whether they feel the measures have improved soil fertility in their homesteads, and what the main benefits from applying the practises have been.

4.5.5 Water harvesting and irrigation

Indicators under this category (Table 6) are mostly focused on irrigation. They are categorized as outputs and measure the area or number of interventions.

Table 6. Indicators related to irrigation and water harvesting by project

Project	Indicator	Level of indicator
MERET	% of area of irrigated land increased	Output
SLMP	Number of functional surface water harvesting systems (target: 12 000 by 2013)	Output
	Ha of farmland put under irrigated agriculture (target: 5000 ha by 2013)	Output
Tana-Beles project	1500 ha of Small Scale Irrigation established by 2013	Output

MERET determines the area of irrigated land with a questionnaire that is answered by the planning team and the DA. Both SLMP indicators are included in their quarterly reporting system. The accuracy of data and the functionality of structures are checked by the woreda focal person. Tana-Beles extracts data for this indicator through the computerized MIS reporting. All these systems are discussed further in chapter 4.7.

4.5.6 Afforestation and forest conservation

The Tana-Beles project has four indicators concerning forest conservation and forestry (Table 7). The CBINReMP is planning to monitor forestry establishment as well, but the numbers will be specified later on.

Table 7. Indicators associated with afforestation and forest conservation by project

Project	Indicator	Level of indicator
CBINReMP	Participatory forestry established on 18 900 ha	Output
Tana-Beles project	All community forests within the targeted watersheds are conserved in their entirety by 2013	Outcome
	Appropriate modern and sustainable forestry/agroforestry adopted by 75 % of communities in watersheds	Outcome
	3000 ha of community forests planted by 2013	Output
	2000 ha household woodlots planted by 2013	Output

Data for these indicators is easy to measure and readily available through the MIS. Planting forests is not, however, sufficient if the forests are cut down shortly after the project period. It is important that the communities understand the value of forests and are willing to sustain them. Each project needs to make an effort towards this goal in order to ensure sustainability.

4.5.7 Controlled grazing and fodder production

Overgrazing has been identified as a major problem leading to soil erosion in the highlands of Ethiopia by most projects. Interviews revealed that limiting the amount of cattle is not feasible at the moment and therefore other ways of mitigating the effects of cattle on the degraded soils are pursued. These include controlled grazing and improved fodder production (Table 8).

Table 8. Indicators associated with controlled grazing and fodder production by project

Project	Indicator	Level of indicator
CBINReMP	About 9 400 ha under fodder production	Output
SLMP	Increase in percent of male and female headed households who adopted improved fodder production (target: 30 % by 2013)	Output
Tana-Beles project	Additional 11 095 (25 %) households have adopted improved fodder production by 2013*	Output
	Total of 8876 (20 %) of households have adopted controlled grazing and/or stall feeding by 2013*	Output

* Indicator updated according to a recent report (Tana-Beles WME 2012a)

Controlled grazing is a broad term. As free grazing is an important part of the traditional agricultural system of Ethiopia, the most likely form of controlled grazing to be adopted by the communities are exclosures. Exclosures are rehabilitation techniques where degraded open access lands are closed for grazing and most other agricultural uses and usually controlled by guards. The form of controlled grazing promoted by the Tana-Beles project is the so-called cut-and-carry method. As explained by a project employee (personal communication), this means that during the rainy season when crops are growing in the fields (July – October), cattle is prevented from grazing in the crop lands and fodder (mainly green grass) is cut by sickle and carried to the home yard of the farmer where the cattle is kept. This is called the cut-and-carry period. Immediately after crop harvest (starting October and lasting until next June-July) cattle is allowed to graze in the farmers' own cropland. The previously common free grazing lands are divided to individual farmers. The farmer can crop the land, grow fodder, plant trees, or combine them to agroforestry. According to the project employee, farmers are reluctant to give up their rights to common grazing lands. Therefore it is essential to have working controlled grazing models that sustain more income from the farming as a whole. When such models in one village are visited by farmers from another village, the reluctance to change the system diminishes. In July 2011 controlled grazing had been adopted in some villages and watersheds in the Tana-Beles project area, totaling a value of 6 % (Tana-Beles WME 2011a).

Direct benefits of improved fodder production are private in the form of increased livestock production and extra income if the fodder is sold. Possible environmental benefits arise if increased livestock production leads to decreased livestock numbers or if more area can be turned into exclosures.

CBINReMP has not yet specified the method of verification for this indicator. For SLMP this indicator is part of the quarterly reporting system, while Tana-Beles extracts data through the MIS.

4.5.8 Fuel efficiency and renewable energy

One of the reasons for deforestation in Ethiopia is fuel wood harvesting. Fuel efficient stoves can mitigate this problem and decrease carbon dioxide and other emissions from households. Because the traditional huts in the area do not have outlets for smoke, it is important for the health of especially women and children that stoves emit harmful substances such as particulates and carbon monoxide as little as possible. Renewable energy solutions, such as bio-gas, can produce cleaner forms of energy to communities. According to project documents CBINReMP is planning to introduce bio-gas production to the community with 120 demonstrative plants located across 13 woredas, but no indicators have yet been identified. The Tana-Beles project is currently the only one monitoring the adoption of fuel efficient stoves and renewable energy (Table 9).

Table 9. Indicators associated with fuel efficiency and renewable energy by project

Project	Indicator	Level of indicator
Tana-Beles project	10 % households adopting renewable energy innovations by 2013	Outcome
	Fuel efficient stoves adopted by 50% of households (22 190) in the 163 watersheds by 2013*	Output

* Indicator updated according to a recent report (Tana-Beles WME 2012a)

Because the indicators are management-based, they are simple to monitor but do not reflect changes in the environment. From an environmental point of view it would be interesting to monitor whether the adoption of fuel efficient stoves leads to reduced fuel wood harvesting or increased income to the community via selling the excess wood.

4.6 Socio-economic and project management related indicators

4.6.1 Overview

Out of socio-economic indicators, income merited the most attention from the projects, with an average share of 7.2 ± 1.8 % of indicators in each project, and all projects having at least two indicators in this category. Income was also the largest sub-category in plain numbers (Figure 5). The second largest share of indicators was found in the category food security (4.4 ± 3.2 %), followed by health and education (4.1 ± 1.3 %). Standing out was the emphasis given to agricultural productivity in the Tana-Beles project with 10 indicators (16.1 % of all project indicators), and to food security in PSNP with 7 indicators (17.1 % of all project indicators).

In project management and training related indicators planning and implementation merited most attention on average with 5.2 ± 2.2 % of all indicators in each project, followed by cooperation with other organisations (4.9 ± 2.2 %) and transfers and reliability (4.6 ± 3.8 %). The high error on the latter is due to most indicators in the sub-category being from the PSNP (8 indicators, 19.5 % of all PSNP indicators) which in turn leads to high standard deviation (s = 8.5 %). Timeliness of reporting was the only sub-category shared by all projects. Training was the largest sub-category in plain numbers (Figure 6).

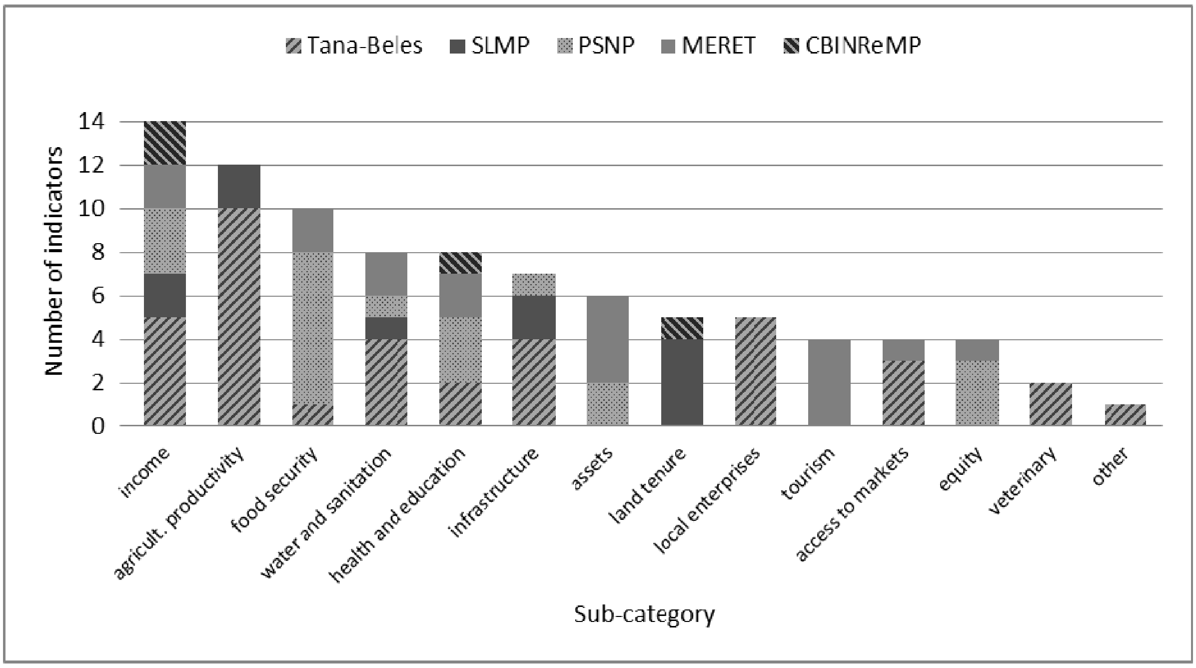

Figure 5. Numbers of indicators in different sub-categories of socio-economic indicators by project

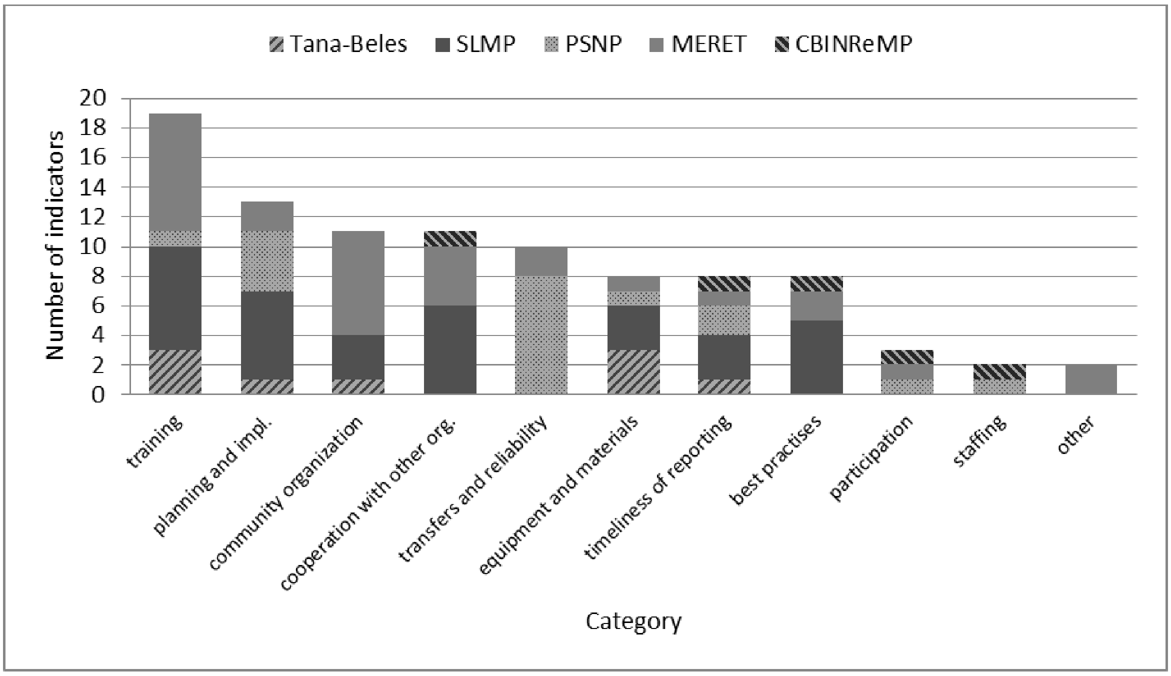

Figure 6. Numbers of indicators in different sub-categories of project management and training related indicators by project

4.6.2 Community participation

As a phenomenon, community participation is linked to two of the sub-categories of project management related indicators: “participation” measures numbers of people participating in project activities while “community organization” measures the amounts of different user groups developed to implement project activities. All projects have at least one indicator in either of these sub-categories (Tables 10 and 11).

Table 10. Indicators under the sub-category Participation

Project	Indicator	Level of indicator
CBINReMP	Representatives from all targeted communities fully participate in for a organised to review policy and legal framework	Output
MERET	% of households by gender participating in FFA	Output
PSNP	90% of households participating in the PSNP for at least 3 consecutive years by December 2011	Output

Table 11. Indicators under the sub-category Community organization

Project	Indicator	Level of indicator
MERET	Number of marketing groups organized by gender	Output
	% of functional farmer groups engaged in adaptive SLM research*	Output
	% of functional farmer groups engaged in exercising SLM practices	Output
	%of functioning user groups established by gender for assets management and/or income generation.	Output
	% of functional water user groups	Output
	number of (tourism) user groups established and made functional	Output
	55% of sites with functional HIV/AIDS Community Conversation teams	Output
SLMP	Number of gender balanced functional watershed planning and management entities (target: 20 at kebele level and 50 at community level by 2013)	Output
	Number of community watershed that adopted legalized bylaws (target: 100 by 2013)	Output
	Number of gender balanced functional local user groups that adopt by-laws for conservation and utilization of natural resources (target: 1000 by 2013)	Output
Tana-Beles	User groups & management plans made for forest conservation in 75% of comm. Watersheds by 2013	Output

* Materials revealed conflicting information about the existence of this indicator. See chapter 4.7.2 for more detail.

MERET collects data for these indicators through questionnaires. Participation in FFA (food supported asset creation) is measured through the household level survey (the survey uses the abbreviation FFW, food for work), while the user groups were discussed in the survey answered by the DA and planning team. HIV/AIDS community conversation teams were covered in the woreda level survey. The questionnaires did not cover marketing groups or tourism-related user groups. The PSNP indicator is monitored with the FSP (Food Security Programme) panel survey, which is defined as an “eight woreda survey, which includes repeated visits to households as the approach to assess progress towards outcomes and impacts”. The small sample size is justified in the FSP project document with rapid calculation of results (FSP 2009). However, using small sample sizes comes with a risk of getting results that do not represent the reality of the project as a whole and should be used with caution. The SLMP indicators are covered with the quarterly reporting system and the Tana-Beles indicator is monitored through the MIS database.

4.6.3 Land tenure

Land tenure is perceived to have a big influence on farmers’ willingness to adopt soil conservation methods. Without land tenure the farmers face a risk of losing their land and are therefore not willing to invest capital or labour in it. Two of the studied projects have indicators concerning land tenure (Table 12).

The land registration system in Ethiopia has two levels. The first level certificate is given to the applicant after the borders of the holdings of each farmer in the kebele is agreed upon while the second level certificate adds the specific spatial location of the holding using GPS coordinates (Hailu 2010). Since this is a state-run system, the numbers should be easily obtained from officials and the monitoring should not require much additional effort.

The SLMP indicators “percentage reduction in land related dispute cases” and “percentage of households who invest on individual land” are both monitored through surveys conducted within the JMM described in more detail in chapter 4.7.4.

Table 12. Indicators related to land tenure by project

Project	Indicator	Level of indicator
CBINReMP	Some 450 000 rural households have land tenure	Output
SLMP	Percentage reduction in land related dispute cases (target: 50 % by 2013)	Output
	Percentage of households (male and female headed) who invest on NRM on individual land (target 25 % by 2013)	Output
	Percentage of male and female headed households who are certified for first level certificate (target: 100 % by 2013)	Output
	Percentage of male and female headed households in 2 kebeles per woreda who received second level certificates (target: 60 % by 2013)	Output

4.7 Monitoring systems as entities

4.7.1 CBINReMP

As the M&E system of the CBINReMP is under construction and the indicators (Table 13) are preliminary, much cannot yet be said about it. Environmental indicators amounted to 13.3 % of all indicators, while indirect environmental, socio-economic and project management related indicators amounted to 26.7 %, 26.7 % and 33.3 % respectively. These numbers may well change when the list of indicators in refined. The interview revealed that the project is willing to learn from the successes and failures of other projects. This is a promising feature and hopefully the current study will further help in the process.

The goal of the project is "Poverty sustainably reduced for about 312 000 households in 21 districts of Lake Tana watershed", specified with the sentence "Household incomes and food security increased as a result of sustainable land management and improved ecosystem integrity". The project design included several environmentally interesting features such as wetland conservation and biogas production. Conserving the wetlands around Lake Tana will most likely have a positive effect on biodiversity as well as the wellbeing of the whole ecosystem. This could also support tourism in the area and therefore enhance the livelihoods of local communities. Biogas can provide an inexpensive and sustainable form of energy for the community. If biogas production is to be attempted, the design of the plant as well as the feeds and other process variables need to be carefully considered by an expert in order to enable a smooth functioning of the process. Many biogas projects have failed due to a lack of understanding of the physical and chemical processes involved.

Table 13. CBINReMP indicators discussed in this study

Category	Indicator	Level of Indicator
Environmental	About 700 000 tonnes carbon sequestered in cropped soil, forests and pastures	Goal/development objective
Indirect environmental	Some 650 watershed management plans covering 227 500 ha implemented	Output
	Forest cover of the watershed increased by at least 10%	Output
	About 9 400 ha of agricultural land rehabilitated	Output
	Participatory forestry established on 18 900 ha	Output
Socio-economic	Some 450 000 rural households have land tenure	Output
Project management	Representatives from all targeted communities fully participate in for a organised to review policy and legal framework	Output

4.7.2 MERET

The goal of the MERET projects is “resilience to shocks, improved food security and enhanced livelihoods”. MERET is not measuring erosion directly. The indicators (Table 14) are management-based; measuring what is being done and then assuming that this will lead to reduced erosion. Positive features include the monitoring of technical standards as well as taking soil fertility management into account. The only direct environmental indicator “% of biomass production increased” does not as such have a strong correlation to erosion. According to the interviewee the increased biomass comes mostly from area exclosures and planted trees which can reduce erosion and produce fodder if carefully designed. This indicator can be modified to measure carbon sequestration but is not yet used. Project management related indicators, amounting to 51.7 %, are emphasized, followed by socio-economic (31.0 %), and indirect environmental indicators (15.5 %).

Table 14. MERET indicators discussed in this study

Category	Indicator	Level of indicator
Environmental	% of biomass production increased	Output
Indirect environmental	% of degraded land reclaimed	Output
	% of households responded and adopted the promoted technologies by gender	Output
	% of non MERET sites using SLM approaches	Output
	% of household replicating specific house hold based technologies and improved practices	Output
	% of activities that meet technical standards	Output
	% households exercising soil fertility practices in selected sites	Output
	% MERET sites where improved soil fertility management technologies are being applied	Output
	Number of MERET sites where improved soil fertility management technologies are being applied	Output
	% of area of irrigated land increased	Output
Project management	% of households by gender participating in FFA	Output
	Number of marketing groups organized by gender	Output
	% of functional farmer groups engaged in adaptive SLM research	Output
	% of functional farmer groups engaged in exercising SLM practices	Output
	%of functioning user groups established by gender for assets management and/or income generation.	Output
	% of functional water user groups	Output
	number of (tourism) user groups established and made functional	Output
	55% of sites with functional HIV/AIDS Community Conversation teams	Output

To the author's knowledge, data for the indicators are collected via questionnaires. Specific questionnaires are filled at woreda, community and household levels. This is a simple and cost-effective way but does not yield exact results. However, keeping the system simple can ensure the smooth functioning of the M&E. The questionnaire formats received from the project were from 2007. They covered the indicators listed in table 10 with the exception of biomass production, marketing groups and tourism-related user groups. Reasons for potential successes and failures concerning the project were also inquired, which brings important feedback to project management. The materials received from the projects did not specify target figures for the indicators beyond the year 2008.

The interview conflicted with the written materials in the case of one indicator, "% of farmer groups involved in adaptive SLM research". The interview suggests that this indicator does not exist, while it is persistent in all official project material. The 2008 Annual Performance Measurement Report does not show any measured results for this indicator. Based on this information, it is assumed that this indicator is not monitored.

The documents received did not specify a method for measuring biomass production and the Annual Performance Measurement Report of 2008 did not show any measured results for this particular indicator.

4.7.3 PSNP

The focus of PSNP is clearly on socio-economic issues which are monitored in detail (PSNP 2010). Socio-economic indicators (48.8 %) combined with project management related indicators (43.9 %) constitute the bulk of the monitoring system, leaving only 4.9 % to indirect and 2.4 % to direct environmental indicators. The goal of the project ("To assure food consumption and prevent asset depletion for food insecure households in chronically food insecure woredas, while stimulating markets, improving access to services and natural resources, and rehabilitating and enhancing the natural environment") includes an environmental aspect, but the monitoring of SWC, or public works as referred to in the project documents, has been somewhat neglected. PSNP recognizes that there have been problems with environmental issues in the past years. This became apparent from the project documents as well as during the interview. These indicators (Table 15) are a step in the right direction as public works are now screened for environmental implications with the ESMF safeguard system and sustainability is pursued through quality standards.

Table 15. PSNP indicators discussed in this study

Category	Indicator	Level of Indicator
Environmental	90% of households reporting that their environment has improved for the benefit of the community by 2012	Outcome
Indirect environmental	90% of public works reaching satisfactory standards and sustainability ratings by December 2010	Output
	100% of PW projects screened by ESMF by December 2010	Output
Project management	90% of households participating in the PSNP for at least 3 consecutive years by December 2011	Output

A technical assessment of the quality of a given public works structure is done by the DA or a woreda expert after the completion of the structure. Project documents imply that all public works structures are screened this way. Specific steps for correcting deficits in quality or quantity are defined in the Programme Implementation Manual (PSNP 2010, p.161). The ESMF screening is done with a checklist that is filled out during the planning phase by the DA in cooperation with the community. The checklist will determine if the public works structure needs to be earmarked for environmental concern. Earmarked structures are referred to the regional level where a decision is made whether an environmental impact assessment is necessary.

In the author's opinion, polls are not sufficient to determine actual environmental impacts. Erosion is not monitored at all, which is the case with several other projects as well. The monitoring of public works requires improvements. According to the interviewee this work is already in progress.

4.7.4 SLMP

The goal of SLMP is "to reduce land degradation in agricultural landscapes and improve the agricultural productivity of smallholder farmers. The global environment objective is also to reduce land degradation, leading to the protection and/or restoration of ecosystem functions and diversity in agricultural landscapes". The bulk of SLMP indicators (Table 16) are project management and training related (61.1 %), followed by socio-economic (20.4 %) and indirect environmental indicators (14.8 %), leaving 3.7 % to direct environmental indicators. These environmental indicators are, however, not monitored according to the interview.

Table 16. SLMP indicators discussed in this study.

Category	Indicator	Level of indicator
Environmental	Percentage increase in the amount of carbon sequestered (no target specified)	Goal/development objective
	Increase in normalized difference vegetation cover index (no target specified)	Goal/development objective
Indirect environmental	No of households (10% of them female headed) who have adopted one or more SLM practices on individual land as a result of SLM interventions (target: 60 000 by 2013)	Outcome
	Area put under SLM practices in the targeted watersheds (target: 120 000 ha by 2013)	Outcome
	Hectare of communal lands/hillsides and gullies rehabilitated with appropriate bio-physical measures and technologies (target: 52 500 ha by 2013)	Output
	Percent of areas treated with bio-physical measures and exist in good condition one year after implementation (target: 80 % by 2013)	Output
	Hectare of farmland treated with appropriate bio-physical measures and practices, by gender of household head (target: 67 500 ha by 2013)	Output
	Increase in percent of male and female headed households who adopted improved fodder production (target: 30 % by 2013)	Output
	Number of functional surface water harvesting systems (target: 12 000 by 2013)	Output
	Ha of farmland put under irrigated agriculture (target: 5000 ha by 2013)	Output
Socio-economic	Percentage reduction in land related dispute cases (target 50 % by 2013)	Outcome
	Percentage of households (male and female headed) who invest on NRM on individual land (target 25 % by 2013)	Outcome
	Percentage of male and female headed households who are certified for first level certificate (target: 100 % by 2013)	Output
	Percentage of male and female headed households in 2 kebeles per woreda who received second level certificates (target: 60 % by 2013)	Output
Project management	Number of gender balanced functional watershed planning and management entities (target: 20 at kebele level and 50 at community level by 2013)	Output
	Number of community watershed that adopted legalized bylaws (target: 100 by 2013)	Output
	Number of gender balanced functional local user groups that adopt by-laws for conservation and utilization of natural resources (target: 1000 by 2013)	Output

Similar to MERET, most of the SLMP indicators are management-based. The positive environmental effects of the SWC measures are assumed and not monitored. Sustainability is taken into account by monitoring the condition of the applied SWC measures after one year. NDVI can give a good picture of how the project is advancing and identify areas that are vulnerable to erosion. Vegetation cover has a strong correlation to erosion, but it must be kept in mind that the ability of vegetation to reduce erosion is dependent on the species. NDVI is not monitored at the moment due to a lack of resources. Cooperation with other projects and with the University of Bahir Dar might be a way of solving this problem. A clear emphasis is given to land tenure. This reflects an understanding of the social reasons behind environmental degradation in Ethiopia.

The monitoring of SLMP relies mostly on the three following pillars: informal monitoring of activities through regular meetings, monitoring the quantity of outputs through quarterly reporting, and monitoring outputs and selected outcomes through the JMM conducted twice a year (SLMP 2011). Out of the indicators listed in Table 12, six are covered through JMM (indicators 3-6, 11-12), eight are covered through quarterly reporting (indicators 8-10, 13-17) and two are currently not covered at all (indicators 1 and 2).

The JMM is conducted before and after the main rainy season. The main purpose associated with the indicators in question is to assess the quantity and quality of reported bio-physical methods and to discuss reasons for their successes and failures with the communities. The JMM is conducted by teams that include members from all levels of project management from regional/zonal experts to community watershed team members. The main tools are focus group discussions and a sensory assessment of the quality of some constructed bio-physical methods. The quantity and quality of SWC constructions are extrapolated from a selected sample. Sampling procedures and definitions of quality standards are explained in the JMM implementation guide (SLMP 2011) and the results are collected on a detailed format (SLMP 2011, annex 2). The verification of data reported through the quarterly reporting system is the responsibility of the woreda focal person.

4.7.5 Tana-Beles project

If presented as numbers, the Tana-Beles M&E system seems to focus on socio-economic indicators, totalling up to 59.7 % of all project indicators. The system stands out with a smaller than average amount of project management related indicators (14.5 %, the average being 40.9 ± 8.0 %), while direct and indirect environmental indicators amounted to 3.2 % and 22.6 % respectively.

Tana-Beles is the only project monitoring erosion directly. The hydrological monitoring system is well constructed and easy to operate. If running smoothly this system can produce timely and accurate data on erosion in the area and thus give a good picture of how the project is advancing. The frequency of data collection allows the analysis of results with consideration to rainfall and other variables. The goal of the project is stated as "Sustainable livelihoods and natural resource management systems in the Tana and Beles sub-basins through community participation". Although community participation is mentioned in the goal, it is not monitored in any way (Table 17). This poses a risk of a technical top-down approach in project planning and implementation, and avoiding this should be kept in mind at all times.

The quality and the accuracy of the reported quantity of each project activity are checked directly after completion by the DA and a Community Watershed Team member. After this, the quality of activities done at field level and data submitted are checked by woreda watershed team members before feeding the data into the computerized database. This evaluation is done once a month. Entering the data into the database is conducted at woreda level for two reasons. Firstly, this allows the verification of the data and secondly, the access to computers and the Internet is poor below woreda level.

At zonal and regional levels data quality is checked quarterly in watersheds selected with random sampling. Procedures for data quality assurance are presented on page 10 and formats for data quality assessment in Annex 1 of the data quality assessment guideline (Tana-Beles WME 2010a).

Table 17. Tana-Beles project indicators discussed in this study

Category	Indicator	Level of indicator
Environmental	Suspended sediment load in targeted watersheds reduced by 10 per cent	Goal/development objective
	Dry season base flow increased at micro-watershed outlets*	Outcome
Indirect environmental	83 757 ha of vulnerable Tana sub-basin micro-watersheds rehabilitated and well-managed*	Goal/development objective
	Improved SWC practices adopted by all (100 %) 38 275 households in targeted kebeles by 2013*	Outcome
	All community forests within the targeted watersheds are conserved in their entirety by 2013	Outcome
	Appropriate modern and sustainable forestry/agroforestry adopted by 75 % of communities in watersheds	Outcome
	Renewable energy innovations adopted by 10 % (4438) of households by 2013*	Outcome
	1370 ha of gullies rehabilitated by 2013*	Output
	SWC measures implemented on 51 409 ha of cultivated land by 2013*	Output
	SWC measures implemented on 30 978 ha of grazing land*	Output
	3000 ha of community forests planted by 2013	Output
	2000 ha household woodlots planted by 2013	Output
	1500 ha of Small Scale Irrigation established by 2013	Output
	Additional 11 095 (25 %) households have adopted improved fodder production by 2013*	Output
	Total of 8876 (20%) households have adopted controlled grazing and/or stall feeding by 2013*	Output
	Fuel efficient stoves adopted by 50% of households in the targeted watersheds by 2013	Output
Project management	User groups & management plans made for forest conservation in 75% of community watersheds by 2013	Output

* Indicator updated according to recent report (Tana-Beles WME 2012a)

5 DISCUSSION

5.1 Overview

The objective of this study was to determine whether the M&E systems succeeded in providing adequate and scientifically valid information about the projects' efficiency in reducing erosion. It was discovered that in most cases the information provided did not meet these standards. Most of the projects discussed did not monitor the success of SWC interventions directly. Instead, amounts and areas of interventions are monitored and beneficial results are assumed.

The World Bank (2004) warns projects not to define too many indicators or indicators without accessible data sources. The projects discussed provide a good example of this with several indicators not monitored due to the complexity of the methods. One interviewee also stated that the project in question had too many indicators and that only a few of them were actually monitored. Projects need to carefully prioritize their indicators. This should not, however, mean that scientific validity can be discarded. Instead, new cost-effective ways of monitoring should be developed and studied. This challenge is directed at project managers as well as the scientific community.

On average, a strong emphasis on socio-economic indicators was found. This is understandable in the sense that the projects are primarily focused on improving the livelihoods of the communities. However, all of the projects acknowledge that reducing erosion is crucial in reaching this goal. Yet only 4.9 % of all indicators were aimed at directly measuring changes in the environment. Out of these, most were not monitored (or not yet implemented in the case of CBINReMP) and one measured people's perceptions rather than the environment, leaving the percentage of functioning environmental indicators to 0.9 %. From an environmental and scientific point of view, this number is alarmingly low. A strong emphasis on monitoring project management was also discovered. Although the internal monitoring of the project is important in ensuring participation and preventing corruption, the average share of over 40 % seems excessive.

The management of a development project is a constant struggle between limited resources and desired efficiency. Although not directly related to watershed development, a study by Annecke (2008) provided an interesting example of management-based and results-based monitoring: "For example, in an electrification programme, one of the indicators suggested by the implementer was the number of houses connected to the grid at the end of the project. The target group, on the other hand, suggested the indicator should be the number of households able to use the electricity connection for lighting for at least 3 h each night every month, thus reflecting the different perceptions and criteria implementers and beneficiaries were using to judge the success and sustainability of the programme". Although the monitoring suggested by the beneficiaries would cost more initially, not meeting the community expectations could cost a lot more in the form of lost investment in a failed project (Annecke 2008). While the current study only covered a small sample of projects and cannot as such be generalized, the author believes that the tendency to monitor simple and data-abundant indicators at the cost of scientific validity may well be a broader phenomenon. The literature review did not reveal previous studies on the M&E systems of individual projects, and additional research is needed to verify the above assumption. Although not exhaustive in any way, this study serves as a starting point for further research.

In line with the sub-objectives, the following chapters will review the issues monitored and the methods used by the projects, as well as provide additional and/or alternative methods for monitoring erosion.

5.2 Methods used in monitoring environmental impacts

5.2.1 Hydrological monitoring

The Tana-Beles project has a well-designed hydrological monitoring system that can yield accurate information about erosion in the project area. A similar system is going to be used by CBINReMP. An obvious weakness of monitoring erosion with hydrological measurements is that the data are spatially aggregated (Bewket & Sterk 2003). In other words, only a total sediment yield is measured and how much of it comes from which part of the watershed remains unknown. Another possible source of error is the sedimentation of eroded soil on the riverbed upstream from the monitoring station. However, since the watersheds monitored in the Tana-Beles project are small, the distortion of results by untreated areas or by sedimentation can be assumed to be of little significance and the results should give a fairly accurate picture of the success of project interventions. This claim is supported by the fact that the station managers are encouraged to report unusual events, such as collapsed river banks, and these can be taken into account when interpreting results. The rill survey method (Bewket & Sterk 2003) is an inexpensive way of getting more detailed information about erosion in specific fields. This can serve to convince farmers about the need for SWC measures as well as to focus resources to where they are most needed. However, Bewket and Sterk (2003) emphasize that the watershed approach should not be overlooked. The rill survey method was suggested to the Tana-Beles project by their short term technical consultant Peter Baur (Tana-Beles WME 2010b) but it has not yet been used.

5.2.2 Carbon sequestration

Three of the projects studied were interested in monitoring carbon sequestration in order to gain additional funding from carbon credits. However, none of the projects had been able to measure the indicator yet in the absence of resources and/or a suitable method. Carbon sequestration can be measured by measuring the biomass of trees and then converting this to carbon. A general conversion coefficient of 0.50 is used by Montagu et al. (2003) and Carswell et al. (2009) while some studies use species- and partition-specific coefficients (Wang et al. 2009, Hudak et al. 2012). Different models for estimating tree biomass from easily measurable variables, such as breast height diameter (BHD) and height have been developed. One example of a complete system for measuring carbon sequestration is the one developed in New Zealand, explained in detail in the data collection manual for natural forests by Payton et al. (2004). This system utilizes a computer program called Carbon Predictor (Montagu et al. 2003). Modelling biomass growth is, however, specific to site or region and to species. Zewdie et al. (2009) studied the ability of two variables (diameter above stump and height) to predict above ground biomass in *Eucalyptus globulus* coppice plantations around Addis Ababa in Ethiopia. They found that combining the two variables produced the best estimates, but diameter above stump could also be used alone, since reliable measures of height are difficult to obtain from standing trees. The highest dry-weight was allocated to stemwood, followed by leaves, stembark, twigs and branches respectively. Montagu et al. (2005) reached similar results with *E. pilularis* in Australia, concluding that a general allometric relationship using BHD alone could be as accurate as site-specific allometry, eliminating the need for measurements of height and wood density as well as expansion factors. The age of the tree affects the partitioning of biomass within the tree and equations using stand age as an additive variable have also been developed for eucalyptus (Saint-André et al. 2005).

In order to reduce the amount of fieldwork needed, methods utilizing remote sensing have been developed for carbon sequestration monitoring. Many of them use LiDAR (Light Detection and Ranging, also known as Laser Scanning) (Boudreau et al. 2008, Hudak et al 2012). The method measures the distance of different points of the surface of interest from the device using a laser beam scattering back from the surface. As a result a three-dimensional picture of the surface is formed. In the case of forests, some of the beams are scattered back from the canopy while some reach the forest floor thus providing the information needed to measure canopy height and density. Vegetation indices (see chapter 5.2.3), can also be used to assess canopy densities (Hudak et al. 2012), while some studies are combining satellite imagery with field inventory (Fuchs et al. 2009, Wang et al. 2009).

A study conducted in New Zealand concluded that monitoring sequestered carbon was only viable if a forest inventory system was already in place or if monitoring was done at intervals of at least five years, reducing the costs of fieldwork (Robertson et al. 2004). The results of this study are, however, highly dependent on the assumed value of carbon credits (US$ 10/tonne C in the study) and the discount rate (10 % in the study). Cost of labour is also an obvious variable. The components monitored affected the costs as well. The most viable system was to monitor carbon sequestration in stem, crown, roots and forest floor, while including undergrowth and soil increased costs. The internationally suggested annual monitoring of all components would be viable only if the price of carbon credits was US$ 111/tonne C. The authors suggest modelling and remote sensing as alternatives to field measurements, but it is yet unclear whether these methods meet the definitions of ‘transparent and verifiable’ under Article 3.3 of the Kyoto Protocol.

Field based inventory methods have been criticized for being labour intensive and time-consuming, and unsuitable for the monitoring of large forest areas where a single measurement campaign can extend over several years (Boudreau et al. 2008). In the case of Ethiopia, however, the forested areas are small and fairly accessible, while obtaining remote sensing data can prove to be too expensive for development projects with limited resources.

5.2.3 Vegetation cover

Only two projects defined vegetation cover as an indicator. This is surprising, since vegetation cover has been identified as the most important erosion-controlling factor in several studies conducted in Ethiopia (Descheemaeker et al. 2006b, Girmay et al. 2009, Bouaziz et al. 2011) and therefore it can provide a good indicator for predicting erosion. However, the type of vegetation should not be overlooked, since according to Bewket (2002) and Descheemaeker et al. (2006b) eucalyptus plantations hardly reduce erosion. Although eucalyptus is not efficient in reducing erosion, it can bring additional income to local communities and produce an abundant source of fuel wood, thus possibly conserving indigenous forests. The focus should, however, be on species that are both efficient in reducing erosion and bring benefits, such as fuel wood or fruit, to the community.

CBINReMP has not yet specified methods of data collection while SLMP intends to use NDVI. SLMP is not monitoring the indicator currently because, according to one the interviewees, the project does not have skilled staff familiar with the method. Vegetation indices are dimensionless radiometric measures that indicate the abundance and activity of green vegetation (Jensen 2005). They are based on the spectral reflectance characteristics of vegetation that change rapidly around the border of red and infrared wavelengths. The NDVI was developed in 1974 and is still widely used. The formula is as follows:

$$NDVI = \frac{\rho_{nir} - \rho_{red}}{\rho_{nir} + \rho_{red}}, \quad (2)$$

where ρ_{nir} is the reflected near-infrared radiant flux and ρ_{red} is the red radiant flux.

The NDVI is well suited for arid, semi-arid and grassland environments, while high-biomass conditions, such as forests can present scaling problems. Considering the vegetation in Amhara, and keeping in mind that the purpose is to monitor inter-annual change in biomass rather than to determine exact figures, the NDVI should provide sufficient information. However, several new indices with different approaches to eliminate noise and scaling problems caused by soil and atmospheric interference have been developed since 1974 (Jensen 2005). Some of them could provide additional information, such as soil and vegetation moisture content, that would be useful in monitoring the effects of SWC measures.

The greatest advantage of remote sensing technologies here is that they can cover large areas systematically and thus remove the sampling bias included in *in-situ* studies covering a limited area. The main disadvantage is that remote sensing data may be expensive to collect and analyse (Jensen 2005). From a scientific point of view, utilizing remote sensing in determining vegetation cover and other relevant variables is recommended but, as project resources are limited and varied, the final decision must be made by each project individually.

5.3 The methods and the need for indirect environmental indicators

The indicators discussed in chapter 4.5 are mostly management-based indicators that tell us what is being done. Management-based indicators can, according to Herrick (2000), be both efficient and cost-effective. However, they simply predict changes based on empirical relationships and do not reflect actual changes in the environment, and therefore overreliance on these indicators comes with large risks (Herrick 2000). The phenomena these indicators are attempting to monitor do have environmental importance and are discussed here with the help of recent studies conducted in similar environments.

The use of soil fertility measures was monitored only by MERET. Soil fertility measures, such as mixing compost or manure to cultivated soil, can reduce erosion both directly and through increased vegetation. An increased input of carbon usually leads to important increases in soil microbial biomass which in turn results in increased soil organic matter, infiltration capacity and nutrient availability. Increased infiltration capacity reduces erosion directly and enhances biomass growth by providing plants with more water (Herrick 2000). Unfortunately, only the adoption of the methods, and not their success, is monitored.

Irrigation and surface water harvesting were included in the M&E systems of three projects: MERET, SLMP and Tana-Beles. The obvious benefits of irrigation and surface water harvesting are to the farmer and include increased crop yields and a wider selection of possible crop species. Surface water harvesting can also lead to increased livestock production as was discovered in a study conducted in the Amhara region (Descheemaeker et al. 2010). Water harvesting reduced the walking distance of the cattle to the drinking point in the dry season. The energy saved, equalling about 10 % of the annual energy budget, could then be used for other purposes, such as extra growth, milk production and overall health (Descheemaeker et al. 2010). There are possible environmental benefits of irrigation and water harvesting. If the beginning of the growing season was made earlier with irrigation the fields would not be bare in the beginning of the rainy season. This could reduce erosion dramatically. Theoretically an increase in livestock production could lead to a decreased need of livestock numbers which in turn could diminish the negative effects of overgrazing. In a society where cattle are also used for ploughing the need for livestock is more complicated. A decrease in livestock numbers is promoted by most projects but interviewees believed that the change will take a long time.

Three projects (CBINReMP, MERET and Tana-beles) defined improved fodder production as an indicator. As such, improved fodder production does not have direct implication to the environment; the reduced pressure on natural resources can be offset by increased amounts of cattle. Only Tana-Beles was monitoring controlled grazing although establishing exclosures has been discovered to have many beneficial effects. Descheemaeker et al. (2006a) found that establishing exclosures lead to litter build-up that can in turn contribute to humus production, carbon sequestration and soil fertility, while Mekuria et al. (2007) found significantly higher levels of nitrogen, organic matter and available phosphorus in exclosures compared to free grazing lands. Other positive on-site effects include increased soil moisture and decreased run-off, increased depth of top soil, increased soil organic matter and soil fauna populations leading to better nutrient recycling and aeration, and increased wild life and biodiversity (Balana et al. 2012). Since exclosures are typically established in highly degraded areas, a complete recovery of soil nutrient status takes a long time. An exponential increase in litter production after exclosure establishment implies, however, that the process is self-sustaining with increased litter production leading to improved soil fertility which in turn leads to an increase in litter production (Descheemaeker et al. 2006a). Positive off-site effects include reduced sedimentation of water reservoirs and reduced smothering of crops by sediment, while negative off-site effects, such as harboring of rodents and pests, were deemed negligible by Balana et al. (2012). A cost-benefit analysis on establishing exclosures in Tigray under varying circumstances concluded that establishing excolures on degraded marginal lands had a large positive Net Present Value even under varying discount rates and prices for wood and grassy biomass, while establishing exclosures on productive cropland was unprofitable in all scenarios (Balana et al. 2012). Yayneshet et al. (2009) discovered that semi-arid vegetation in Tigray recovered rapidly after exclosure establishment in both species diversity and biomass production. However, the richness of herbaceous species decreased after long periods of protection, and the authors suggest that exclosures older than 8 to 15 years could be moderately used for grazing (Yayneshet et al. 2009).

Tana-Beles specified two indicators related to fuel efficiency and renewable energy. Both indicators measure the adoption rates of the promoted technologies. The adverse health effects of burning biomass fuels indoors with traditional open fires are widely known (Saatkamp et al. 2000, Fullerton et al. 2008, Miah et al. 2009, Vaccari et al. 2012) while emissions due to the incomplete combustion of fuel carbon contributing to global warming are a recent concern (Miah et al. 2009, Vaccari et al. 2012). A recent study conducted in Chad and Cameroon found that with improved stoves a reduction of up to 35 % in fuel wood consumption can be achieved compared to the traditional three stone fire (Vaccari et al. 2012). Monitoring the assumed results of improved health and decreased wood consumption would be enormous undertakings and thus monitoring on the basis of adoption rates is understandable. The author would, however, recommend that the project actively requested user feedback. This is because many past wood cookstove programs have underperformed due to a lack of quality control and inappropriate stove designs (Vaccari et al. 2012).

5.4 Socio-economic issues

5.4.1 Participation

Although many previous SWC projects in Ethiopia have succeeded in restoring degraded natural resources, they have been criticized for not being able to trigger voluntary conservation practices outside the project area (Tefera & Sterk 2010). Farmers have also been reported to demolish SWC structures on their fields after the project period (Bewket 2007, Tesfahunegn et al. 2011) because the structures were neither addressing their needs nor fitting to their farming circumstances. This was caused by a top-down approach in designing the structures that did not take into account the priorities and needs of the farmers. Other reasons for not adopting SWC technologies include high labor demands, difficult technical structures, land tenure insecurity and loss of land to SWC measures (Bewket 2007, Tefera & Sterk 2010).

To overcome these problems many projects, including all projects discussed in this study, are now pursuing participatory methods of planning and monitoring. Scientific studies support this trend and promote the use of farmers' knowledge, but also point out that scientific data collection is needed to properly identify the needs of each watershed (Barrios et al. 2006, Liu et al. 2008). Studies attempting to combine the two knowledge bases have found that usual indicators for soil quality used by farmers are soil biota and native flora, as well as crop performance (yield, leaf color etc.), soil properties (color, depth, workability) and site properties (slope, previous crop, fallowing history) (Barrios et al. 2006, Mowo et al. 2006). Common indicator species were found for Eastern Africa and Latin America, such as the tropical bracken fern (*Pteridium arachnoideum*) for poor soil quality and goat weed (*Ageratum conyzoides*) for good soil quality (Barrios et al. 2006). The bracken fern was associated with low soil pH by Mowo et al. (2006). By combining technical and indigenous knowledge, such indicator species and other visible indicators can provide an early warning system and guide decisions concerning land use. Mowo et al. (2006) concluded that farmers' indigenous knowledge on soil fertility mostly agreed with laboratory analysis. For example, a strong link between indicator species of shrubs identified by the farmers and the presence of the limiting nutrient (potassium (K) in the study area) was found. A study conducted in Tigray, Ethiopia, found that farmers had a well-structured and robust soil quality knowledge base but that knowledge was not homogenous among farmers (Tesfahunegn et al. 2011). More research is needed to identify discrepancies and similarities between farmers' and scientific knowledge (Tesfahunegn et al. 2011).

Although many studies support farmers' participation in M&E, Parkinson (2009) provides a warning example of how participatory M&E with the best intentions can fail due to ill-advised assumptions and unawareness of power relationships between programme management, staff and intended beneficiaries, as well as amongst the project beneficiaries themselves. The case study conducted in Uganda revealed that even the most basic assumptions, such as programme and participant goals are compatible, participants are willing to work for the greater good of the community and information sharing is free and open, can be flawed in a real life situation with complex social and political relationships. The author calls for a heightened awareness of power dynamics and political factors when designing participatory M&E.

5.4.2 Land tenure

Two projects (CBINReMP and SLMP) were discovered to monitor land tenure. Land tenure has a vivid history in Ethiopia from a feudal system during the imperial era to a Marxist system of the Derg regime with frequent, and sometimes political, land redistributions. Up to this day the land is owned by the government and not subject to sale or mortgage (Hailu 2010, Bezabih et al. 2011). The rationale behind this is to prevent the land from falling into the hands of rich elite or international companies, thus leaving the farmers landless and without source of livelihood (Bezabih et al. 2011). In a study conducted in Western Ethiopia Tefera & Sterk (2010) found that, although the area has not experienced land redistribution since 1975, farmers still feared loss of some plots of land. This was the case especially with farmers that had bigger holdings than average. Informal arrangements of sharecropping were discovered in the study, as was the fact that, due to insecure land tenure, land under sharecropping received less soil fertility management than land that was farmed by the holder and near the holder's homestead (Tefera & Sterk 2010). Bewket (2007) found that land tenure insecurity was an important reason for the farmers not to adopt SWC methods, especially if they were labour intensive. A total of 73.4 % of all respondents said that periodic land redistribution discouraged them to adopt SWC measures (Bewket 2007). Hailu (2010) presents very positive outcomes for the land certification process in Amhara. Effects mentioned included increases in tree planting, investment in farming equipment, agricultural production and farmer self-esteem, and a reduction in land related disputes. An increase in farmers' willingness to rent their land was also observed. However, Bezabih et al. (2011) found that although the land certification system in Amhara had increased people's trust towards authorities and other people, an underlying fear of losing land to tenants still exists. The situation in Amhara is now good with over 98 % of land using households having at least a first level certificate (Hailu 2010).

5.5 Alternative methods for erosion monitoring

This study revealed that only one of the five projects was monitoring erosion directly. In addition to the hydrological monitoring discussed before, the methods presented in the following chapter could be considered by the projects. The first two are aimed at getting highly detailed information while the last one is cost-effective but less accurate.

Using fallout radionuclides to trace sediment mobilization could bring additional information about sediment losses in specific areas as well as the distribution of the eroded soil in the river catchment (Walling 2006). The method assumes that the atmospheric fallout of certain radionuclides is uniform in a limited area and uses these nuclides to trace top soil particles. An absence of these nuclides implicates that the topsoil has been removed by erosion while concentrations higher than average implicate aggregation of eroded soil. This method can produce highly detailed information about sediment mobilization in the area, but requires equipment that might not be available in developing countries. Furthermore, this level of detail is not required for the purposes of project monitoring.

Changes in topography and volumes of gullies can be rapidly and accurately measured using LiDAR. The scanning device can be mounted on an aeroplane to cover large areas (aerial laser scanning, ALS) or used from the ground (terrestrial laser scanning, TLS). Combining ALS and TLS can produce a highly accurate picture of erosion events due to the possibility to minimize errors associated with either individual method. However, combining the two methods require extensive work in alignment and filtering, and thus pure ALS studies are recommended by Bremer and Sass (2012). TLS can also be hindered because of topographic shadowing and researchers therefore recommend ALS especially in the case of gullies (Perroy et al. 2010). Unfortunately, using ALS is very expensive with one flying day approximated at 12,000 to 14,000 Euros (£10,000-12,000, exchange rates 1.3.2012) by Kincey and Challis (2010). Perroy et al. (2010) suggest that TLS could be used to create time-series data sets to monitor on-going erosion if the problem of topographic shadowing was reduced by increasing the view angles of data collection. Because of the high costs Laser Scanning is not feasible in the current circumstances in Ethiopia but should be kept in mind in the future. The Ethiopian highlands would be well suited for Laser Scanning because of the scarcity of forest and brushwood cover.

The rill survey method described by Evans (2002) in the UK and Bewket & Sterk (2003) in Ethiopia is an inexpensive way of evaluating erosion rates at a field scale. The volumes of rills in the selected fields are measured over time, thus producing an estimation of soil loss. Although this method does not give exact results, the results obtained in studies agree well with data from other methods (Evans 2002, Bewket & Sterk 2003). Field scale surveys were also seen as a more accurate and less expensive method than plot-based measurements (Evans 2002). Plot-based modelling such as the Universal Soil Loss Equation (USLE) and its revised version (RUSLE) have been criticized for poor prediction of erosion rates (Evans 2002, Bewket & Sterk 2003).

In a study comparing different methods of monitoring erosion, Steiner et al. (2000) identified field estimation, estimation of ground cover, sediment traps and erosion nails as cost-effective. The study concludes that quantitative methods are the most accurate way of monitoring sustainable land management but are not always cost-effective. This supports the findings of the current study. Sophisticated methods such as Laser Scanning or sediment tracing with radionuclides produce highly detailed information about sediment mobilization in the study area, but are not feasible in a developing country context. Hydrological monitoring can produce accurate data for erosion in the project area and can be implemented in the circumstances, but requires specified funds for equipment. Methods such as rill surveys and the NDVI can be used for estimations in the absence of resources.

6 CONCLUSIONS

This study examined the M&E systems of five watershed management related projects in the Amhara region, Ethiopia. It was discovered that the environmental monitoring of the examined projects was done mostly with management-based indicators that monitor what is being done and assume environmental effects based on empirical knowledge. These management-based indicators are important in identifying where and how project resources are spent and in finding out the rate of adoption of the promoted methods. They serve an important function in the M&E systems but are not sufficient from an environmental point of view. A strong emphasis on socio-economic and projects management related indicators was also discovered.

The only monitoring system in use that measured actual changes in the environment was the hydrological monitoring system of the Tana-Beles project. This system can bring accurate data about erosion in the project areas as long as the watersheds monitored are kept small enough to prevent distortion of results by untreated areas or riverbed sedimentation. The monitoring of NDVI can provide relatively accurate predictions of erosion rates. It should be kept in mind, however, that eucalyptus plantations are less efficient in reducing erosion than other, preferably indigenous, species. NDVI is not monitored at the moment due to limited resources. This problem might be solved with cooperation among projects and with the University of Bahir Dar. The use of alternative vegetation indices should also be considered in order to gain more and/or more accurate information. Increased carbon sequestration, on the other hand, does not have direct implications on erosion in the area. The monitoring of this indicator requires extensive fieldwork and might not be financially profitable. Before attempting to monitor this indicator the costs and effort should be carefully weighed against the current prices of carbon credits. For predicting the effect of increased vegetation on erosion the NDVI is more reliable and easier to monitor if satellite images or aerial photographs are available.

If the projects are interested in developing soil quality indicators that combine technical and indigenous knowledge, the guideline by Barrios et al. (2001) for Eastern Africa may be useful. When designing or reviewing a participatory monitoring system, it is recommended to examine the case study presented by Parkinson (2009) and critically compare it with the project in question in order to avoid the fundamental mistakes presented.

The author calls for increased dialogue between the scientific community and project management in order to increase the scientific validity of project monitoring and evaluation. This applies to issues concerning environmental science as well as social sciences.

A sub-objective of this study was to facilitate communication between the projects involved. Information provided in the results and discussion of this study can help to identify the strengths and weaknesses of M&E systems and individual indicators, and allow projects to compare best practises and lessons learned. The process of mutual learning is already in motion and the author is delighted to see communication between Tana-Beles and CBINReMP (information based on interviews) and between Tana-Beles and SLMP (Tana-Beles WME 2012b), and sincerely hopes that this forum can be expanded to include MERET and PSNP as well.

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APPENDIX 1: WRITTEN SUMMARIES OF INTERVIEWS

Appendix 1a: Interview with Alehegne Dagnew, CBINReMP

Appendix 1b: Interview with Getachew Engdayehu, MERET

Appendix 1c: Interview with Estifanos Tamirat, PSNP

Appendix 1d: Interview with Simegne Eshetie, SLMP

Appendix 1e: Interview with Aster Yoseph, SLMP

Appendix 1f: Interview with Mitiku Kebede, Tana-Beles project

Appendix 1a: Interview with Alehegne Dagnew, Regional coordinator, CBINReMP

Date: 31.5.2011

Interviewer (A. Kainulainen) is marked with A and the interviewee (A. Dagnew) with B in the following text. The interview was done in Bahir Dar on the 31st of May 2011.

A: Firstly I have this official part about the use of this recording. This recording will only be used for my master's thesis and it will not be played in public and it will be deleted after the completion of the study. I will write the key points of the interview as a word document and send them to you by email for approval so that I don't misunderstand anything. After your approval I will attach them as an appendix to the thesis so that they're there for anyone to read. Are these conditions of the interview OK with you?

B: Yes.

A: Am I right in assuming that these indicators in the project document are the starting point, that you are going to build the monitoring and evaluation system on this?

B: Yes, the figures in the logical framework are actual figures derived during the preparation of the project. There was a survey conducted in the area and based on the findings of that survey they tried to show some of the key indicators that have to be monitored and evaluated upon the implementation of the project. For us it is an initial benchmark so that later on when we enter into the baseline survey definitely these will be revised or some can be kept as they are.

A: Is there any plan yet on how the information will be collected and how the monitoring will work? Have you started to design this M&E system yet?

B: Actually we have a plan. When we start with the project implementation we need to set out key benchmarks and initially we have to develop the M&E system. In the M&E framework we need to clearly indicate development indicators. What are the main development indicators that would serve to achieve the project goal and the project development objective. Any development indicator that we try to indicate should clearly address both the development objective and the project goal. In that case in the very beginning we need to develop development indicators and based on those indicators we will have a baseline survey.

A: Are there any thoughts on if there is going to be a computerized database system or just a reporting system?

B: In any development initiatives one has to think about the MIS system. That is very important to input-output analysis. Otherwise the systematical management of the project itself is problematic. So this is the other thing we already have a plan for, the MIS system will be developed based on this specific contexts. For us it is a very good opportunity that we have good experience in the Tana-Beles project, so what I'm thinking is that either we customize that MIS system or if not compatible, we have to change it and have our own MIS system, but hopefully that is not the case. In all watershed management initiatives we have the same guideline developed by the ministry of agriculture. We have the same monitoring and evaluation system and we have more or less similar environmental and social management frameworks although there are some minor differences depending on the components in each project. In some cases there are additional components that try to widen the scope of the project. In some other cases there is a focused approach to the development initiative that narrows down your MIS system. Otherwise hopefully we can customize and adapt the system we have in Tana-Beles.

A: There is a mention about carbon sequestration. Are there any plans on how it will be measured, are you going to hire some expert for that for example?

B: This carbon sequestration is one of the issues to be addressed under the sub-component adaptation to climate change. That component is actually financed by the Spanish government and the responsibility of the implementation of this component goes to the organization for rehabilitation and development in Amhara region, ORDA, a local NGO. So our responsibility at bureau level is overseeing these components, we are not the ones to implement all the components. Our initial plan is that ORDA ,the local NGO, will have the capacity to measure carbon sequestration. If we don't have a skilled person at ORDA we will have technical assistance to train some. I think it will be possible to measure carbon sequestration at field level, if not accurately then at least to get an estimate that is close to reality.

A: There is a mention of 700 000 tonnes of carbon sequestrated. What is that number based on or is it just an estimation?

B: That is just an estimation. At the very beginning you just have to put in some figures that might be provocative instead of just leaving it empty. This is very common. Experts can then come up with the actual figures later.

A: Any thoughts on the indicators concerning biodiversity or biogas production?

B: With the biogas production we tentatively indicated 120 biogas applications to be adopted by the watershed community. The experience we wanted to bring to this project is from GIZ, they have very good experiences with biogas. Actually we have also started this in some extent in one Tana-Beles project woreda, called Mecha, in cooperation with the rural energy office. So that experience could help us a lot in proper implementation of biogas and thus minimizing the pressure on natural resources.

A: In the assumptions and risks sector there is a mention of stabilization or reduction in the livestock population. Is that something that you are expecting or is it a hope?

B: Sometimes some professionals are very ambitious and they go beyond reality. The reality in our social context or culture is that their livelihood is very much attached with livestock production. If you tell the farmer that he has to decrease his livestock size he will be upset and this will lead to inconvenience in the smooth implementation of project activities. This change will have to be brought through time, not within the project period. We have to demonstrate that if you feed your livestock in a manner that you can make your livestock more productive then you don't have to have a large number of them. That is the way you have to address the livestock size and that will take some time. Actually this work has been started already by the regional government.

A: There was also a mention about gauging stations. Is that something that you're adapting from the Tana-Beles system as well?

B: Yes. Definitely we have experience on how to establish and operate these stations, but the installation and running of the sediment monitoring and hydrological program is not an easy task and it is costly. It requires skilled manpower. We are trying to link this program with the national program because the ministry of water resources and energy already has a program that is going to monitor the discharge and of sediments in the main river and Tana-Beles is also monitoring some rivers that overlap with IFAD. So we have to find out which of our sites are already covered or will be covered by the ministry. So personally I think we may not go with the whole ten stations.

A: About biodiversity, do you think there are going to be some indicator species that you will monitor?

B: The idea is to get the community to participate and have community-based gene banks in-situ. We need to identify the crop species of national and global importance and their potential. There are indications that we have such species but that requires further study. For the time being we have some indication that five sites will be taken into account. In ecosystem conservation we try to give due emphasis on wetland management. We have a very extensive wetland area in the Tana area that influences the ecosystem of the lake itself. Bahar Dar university, with the environmental, land administration and use Bureau, the Bureau of culture and tourism and the Bureau of agriculture are trying to come up with a comprehensive wetland management plan.

A: I think I only have one last question. What is the time frame for constructing the M&E system and for starting the implementation?

B: You should come up with the M&E system within the first year of the project. We are planning to have this system within the next six months. The maximum time is one year; otherwise it will be useless for us.

A: And how long will the project go on?

B: The project period is from 2010 to 2017, but hopefully we will complete some of the project activities before the end of the project period.

A: Perfect, thank you very much for your time.

B: Thank you.

Appendix 1b: Interview with Getachew Engdayehu, Regional coordinator, MERET

Date: 30.5.2011

Interviewer (A. Kainulainen) is marked with A and the interviewee (G. Engdayyehu) with B in the following text. The interview was done in Bahir Dar on the 30th of May 2011.

A: Firstly I have this official part about the use of this recording. This recording will only be used for my master's thesis and it will not be played in public and it will be deleted after the completion of the study. I will write the key points of the interview as a word document and send them to you by email for approval so that I don't misunderstand anything. After your approval I will attach them as an appendix to the thesis so that they're there for anyone to read. Are these conditions of the interview OK with you?

B: Yes.

A: Could you see these (the printed list of indicators) through and say if these are the correct ones.

B: Yes, these are the ones we are using currently.

A: Can you explain what the rationale behind these indicators is? Why were they chosen?

B: The major objective of the project was to reclaim the degraded land. These woredas were selected due to the severity of the degradation. This indicator (first on list) was chosen to continuously follow the amount of reclaimed land, to get timely correction. All farmers in the area were advised to exercise soil fertility management in the beginning of the project in order to enhance their production. So this indicator (2nd on list) is closely followed in their homesteads. The 3rd and 4th are almost the same. The reason we selected the criteria of increase in irrigated land is: once the land has been reclaimed, meaning that the velocity of the water running from the top has been decreased, the water gets time to percolate to the ground and will impact the percolation water at the bottom of the watershed. So the community should use this accessed water to irrigate their land. We are monitoring how much we have increased the capacity of irrigation since we have reclaimed the land at the top of the mountain. The indicator measuring the percentage of biomass production increased refers to reforestation and area enclosures. Once the area is enclosed the remnants of the forest can grow. Also artificially we plant and grow plants. So the indicator measures how much the biomass has increased, for fodder, for carbon sequestration and so on.

A: We don't have to go deeper into these socio-economic indicators because I will not be focusing on those in my thesis. But there were some indicators I've put into organizational that I would like your comments on.

B: Functional farmer groups engaged in sustainable land management research. That should not be research but activities. There is an error. Most of the land rehabilitation activities in rural areas can't be implemented privately, they should be organized in group in order to simplify the work because they're very labor intensive. So their organization should be followed by experts at different levels. That is the reason behind this indicator. And the others are the same.

A: Can you shortly explain the chain of information? From the point that the data is collected to the point it reaches the donors and other people that are interested in the data.

B: We have formats to collect all the necessary data and they are submitted to the woreda. The woreda sends the different formats to the kebele level experts, development agents. The development agents fill the formats with the specially selected farmers. The selection takes gender, age and economic status into account. The DA collects and analyses the data and the woreda focal person strictly follows that this is done in the correct way. We also monitor how the woredas are monitoring or following the data collection system at the site level. After our approval and the woreda approval they're sent to us and we compile all the data coming from all the watersheds. The national project support unit in Addis also supports us, how we collect the data and how far it is from the reality. Then the data is sent to the donor agency through BoFED and the national project support unit.

A: How often does the DA go and talk to the farmers?

B: We have two major monitoring systems. One is the result based system, which is collected twice a year because it is very complicated. But we have a reports communication system that has a quarterly base. For our information the progress is followed weekly so that we know they're on the right track at the end of the quarter.

A: What do you feel would be the strengths and weaknesses of these land use management and environmental indicators? Have you had any problems with data collection? Would you change something if you had the chance?

B: We have not faced problems with the indicators except that the farmers cannot judge their progress correctly. The biggest problem at woreda level is staff turnover. Once you are acquainted with the formats with different reasons you'll turn over to another area. But the indicators are very nice and are accepted well at all levels.

A: Can you explain what this "measurement and observation" (mentioned as methods of verification in the Monitoring Plan Matrix) means in practice?

B: It means that there are some indicators that you can measure, such as the amount of terracing built, but some indicators, such as biomass, cannot be measured and have to be evaluated by the observation of experts and farmers.

A: Are there additional monitoring practices that don't show on this Monitoring Plan Matrix?

B: RBM is the only monitoring system applied by MERET project. This is because RBM follows the results of the project from where it starts up to the current status where you are. This is special for MERET and better than annual monitoring because one year you may fail but another year you may have good progress. So the cumulative effect can be observed in this RBM system and that is what makes it special.

A: About the biomass production increase, do you have plans to use that as carbon sequestration, to actually get money for the carbon that is sequestrated?

B: Yes, we are on the way to that. We are trying to find ways to measure the carbon that has been sequestrated, but there are some complications and currently we are unable to measure it. But we have a plan and we are even planting some species of wood that we think can sequestrate carbon strongly.

A: My last question is that is there any other material that I should have to get a complete picture of your monitoring system?

B: Yes we have but I don't know how I can give them to you because the computer is not working at the moment. If all the data is available later I can give them to you.

A: Yes, I will be here all week and after that you can maybe send them to me through Getie Asfaw or via email. Thank you very much for your time.

B: Thank you.

Appendix 1c: Interview with Estifanos Tamirat, M&E specialist, PSNP

Date: 30.5.2011

Interviewer (A. Kainulainen) is marked with A and the interviewee (E. Tamirat) with B in the following text. The interview was done in Bahir Dar on the 30th of May 2011.

A: Firstly I have this official part about the use of this recording. This recording will only be used for my master's thesis and it will not be played in public and it will be deleted after the completion of the study. I will write the key points of the interview as a word document and send them to you by email for approval so that I don't misunderstand anything. After your approval I will attach them as an appendix to the thesis so that they're there for anyone to read. Are these conditions of the interview OK with you?

B: Yes.

A: Could you see these (the printed list of indicators) through and say if these are the correct ones. I got them from the PIM that was done in August 2010.

B: Have you also got the PSNP Program Document? All official indicators are listed in that document. You need not only the PIM but also the logframe of that document. Can we check it now?

A: Yes, we could see that they match.

(Recording paused for a moment)

A: Can you explain what the rationale behind these environment-related indicators is? Why was this one chosen or the other ones in the organizational part?

B: Previously before this second program the program was evaluated by consultants and other stakeholders so the environmental issues were not meaningfully practiced at that time, and environmental aspects were not addressed as required. So the donors and the government of Ethiopia agreed to incorporate environmental issues to each sub-project and each public work activity with this second program. That is why we focus on these environmental issues in this document. The other thing is sustainability. During the evaluation of the past programs, after the completion of public works regarding watershed management there was a problem with sustainability. Some constructed activities were not found in that area. In order to stabilize public work activities these sustainability issues are considered in this second program by raising awareness in the communities and by making modalities for the sustainable management of public works.

A: Can you shortly explain the chain of information? Where is data collected and how does it end up to financiers and other stakeholders?

B: During the planning stage there is a watershed development planning format that includes a checklist for ESMF (Environmental and Social Management Framework). During the planning of public works all soil and water conservation related to ESMF parts are discussed with the community and the checklist is filled by the DA and checked by woreda experts and then attached to the community plans. These ESMF activities are then followed by monthly reporting from kebele to woreda, woreda to zone and zone to region.

A: What do you think are the strengths and weaknesses of your indicators? Do you feel that there are some problems with them? What would you change if you had the power?

B: The strength is that they give maximum values. It gives us a goal that we must achieve. The weaknesses are hard for me to say individually. We'll see in the future with the mid-term review if some of the indicators will have to be changed. We are expecting the consultants to modify them.

A: What extra features does the general monitoring framework bring to the monitoring of PSNP?

B: It only shows the relationship of the different components of the program (FSP). The components support each other and will be coordinated together. This document indicates the general goal of the program and the contribution of each component towards it. The other thing is program management, it shows how to coordinate or manage each program. The monitoring of how information is collected from each component, for example.

A: And this PSNP logframe hasn't been revised after August 2010? So this is the one you're implementing.

B: Yes, this is the most recent one.

A: Is there a different public works monitoring system? How are the public works monitored?

B: We still have some problems with this area. There is a general framework on how to monitor public work activities. There are consultants at the federal level in the ministry of agriculture that support public work activities. They are trying to develop a M&E system for public works. For the time being they're starting to monitor public work activities using a computerized database system. We have tested that database system in four pilot woredas in Amhara region, in eight kebeles in each woreda. There is a planning format and a reporting format. We tested that database in these kebeles and the feedback was sent to the federal level consultants to check it and modify the database system. We expect that it will be scaled up to the national level.

A: Are there any documents on that system yet?

B: Separately? No, not yet. But it will be developed soon.

A: Is the data fed to the system at woreda level?

B: Yes. The procedure is that at community or kebele level the DAs fill the format as a hard copy. After that the hard copy is submitted to woreda level. The woreda fill that hard copy into the computerized system and through that it will be distributed to zonal, regional and federal levels. However, we still use a hard copy reporting format at all levels.

A: How often will the community submit these formats? Is it a weekly or a monthly thing?

B: I think it will be a monthly report.

A: The last question I have is that am I missing some document you feel would be important for my research?

B: I can give you soft copies of some documents you might need.

A: Thank you so much for your time.

B: Thank you.

Appendix 1d: Interview with Simegne Eshetie, M&E advisor, SLMP

Date: 4.6.2011

Interviewer (A. Kainulainen) is marked with A and the interviewee (S. Eshetie) with B in the following text. The interview was done in Bahir Dar on the 4th of June 2011.

A: Firstly I have this official part about the use of this recording. This recording will only be used for my master's thesis and it will not be played in public and it will be deleted after the completion of the study. I will write the key points of the interview as a word document and send them to you by email for approval so that I don't misunderstand anything. After your approval I will attach them as an appendix to the thesis so that they're there for anyone to read. Are these conditions of the interview OK with you?

B: Yes.

A: OK. I've printed a list of the indicators I found in the document from July 2010, and I've put them there according to fields: land use management, environmental, socio-economic and organizational or project management related indicators. Can you go through just these two first ones, land use management and environmental are the most important for me because I'm studying environmental technology. Are these the ones you are using at the moment? Are these the current ones?

B: Yes, I think these are the indicators which we are using at the moment.

A: Can you explain the rationale behind these indicators, focusing on the first two tables? Why were these indicators chosen instead of some other ones? Why are these ones good for your project?

B: For example these two indicators ("No of households who have adopted SLM practices" and "Area put under SLM practices") are very relevant because we wanted to know what the farmers are adopting and also what type of practices or technologies this project is providing to the farmers. It is not only a matter of providing but the farmers also have to use and adapt these practices on their own land. I think these are good indicators and related to the intermediate objective. Also this "hectare of communal land rehabilitated" is relevant because this is watershed management and we want to know how far we are covering the farmlands and communal lands with the different biological and physical structures. To my observation most of the indicators concerning watershed management and also other components are relevant, but it is my feeling that we have too many indicators. Totally I think we have 56 indicators and it will be difficult to measure all of them in terms of cost and time. Practically we are not measuring all of them, we are focusing on some output indicators and some outcome indicators. Instead of having too many indicators it would have been better if we had some selected indicators that are very relevant to the objective. Some indicators are actually difficult to measure. This M&E system has seven pillars. The first thing is conducting a baseline survey at the beginning of the project, the second one is day-to-day activity monitoring at the grass root level done by watershed committees, kebele watershed committees and the DAs. The third pillar is output reporting or output monitoring on a quarterly basis. The DAs of the watershed committees at local level prepare reports and they send them to the woreda level. The woreda focal persons go to the grass root level and check if the reported outputs are actually there or not and then they compile the reports. The fourth pillar is the Joint

Monitoring Missions. They focus on some selected outputs and mainly on higher level results, the outcomes. It is conducted twice a year, in May and in October. These three things are the internal monitoring of the project. In addition there are some indicators that are monitored through special surveys. For example the increase in the amount of carbon sequestered is expected to be identified through a special survey. But this thing is difficult to measure and I doubt that we will have the capacity to conduct this survey. Most of the indicators are under our capacity and we can measure them but some require special skills and are beyond our ability to measure. This is why this survey is not done yet. And the same is true with this (increase in normalized difference vegetation cover index) as well. These are not done so far and I think we cannot do them by ourselves. "Percentage reduction in land related disputes" is a good example of a relevant indicator. Yesterday we were discussing with the community about soil and water conservation and about land certificates. The land certificates give the farmers evidence of how much land they have and create a sense of ownership, and as a result the farmers are now implementing soil and water conservation practices on their own land. You have listed some of the watershed management related indicators into "organizational".

A: Yes, they are there because they don't have any direct effects on soil or the environment but are more related to training of people and such.

B: I think some of them are still relevant, for example the land certification. This "number of kebele index maps" is not done so far. The problem with the knowledge management component of the program is that, although it is a crucial component of the program, only some of the activities are implemented. In the first place I think we have not proposed enough policies and strategies.

A: You have already answered most of my questions. You said that you feel there may be too many indicators and that it is hard to collect data for some of the indicators. Do you feel that there are any other problems with the indicators?

B: This project is implemented through the government structure and there are many stakeholders involved so for example with regard to the collection and analysis of the baseline information, normally the baseline survey should be in place before the beginning of the project, but still now it is not finalized. It was supposed to be done by a government organization but I think they are still working on that even though we are now on the third year of the program. The other thing is, when you design an indicator you have to ask whether that indicator is feasible in terms of time, does it need a long or a short time for data collection, can the indicator be managed by the existing staff and is the indicator feasible financially. It is expensive to conduct special surveys. As I've said I think we have too many indicators. When designing the program you should be clear about specific roles and responsibilities. For example: who will measure each indicator, how and when, who is responsible and so on. I think that is not very clear among ourselves, at least to most of us. For example on the JMM we are working on ten indicators, out of which six are outcome indicators and the rest are output indicators. So out of fifty-six indicators we are only checking ten. There are indicators that may remain unchecked because of unclarities on responsibilities.

A: I have found a document called "merged SLMP indicators". Do you know if these are implemented yet? For example sediment loads are mentioned here. Is there a plan to do hydrological monitoring?

B: I am not familiar with this document. I have the recent monitoring and evaluation system from the Addis Ababa office and I think out of the five components this policy advice might be left out because they are saying that the government has good policies.

A: There has also been mentions of the "Eco-pop -tool", some sort of a computerized database system. Can you explain about that?

B: That is one of the activities that have been lagging behind. In the M&E system it says that the planning and reporting tool or system would be computerized and automatic. This was supposed to be in place I think at the end of last year (2010) but it is not still functional. They are working in Addis on that. But at the moment our reporting system is manual. We have planning and reporting formats but the system is mainly manual based. I think that computerized system will have a great contribution to our monitoring and evaluation system.

A: I was going to ask you how the JMMs are done, but since I can get the manual I think it will be explained there.

B: Yes, you can take the manual. I can tell you that it is a very important pillar of our program. It has to be done in every project woreda and it is done by the woreda technical people, the kebele representatives, the watershed committee representatives and the development agent. So the team is a combination of all the different actors from the woreda level and the grass root level. It is conducted twice a year and it is focusing on outputs and higher level outcomes. It is a major pillar because with regard to routine monitoring or output reporting and monitoring, these activities don't involve many stakeholders. The JMM is more participatory. You can see the details from the manual. The JMM is conducted on ten indicators, because we cannot cover all the indicators.

A: Are the indicators you are focusing on mentioned here?

B: Yes, you can find them there. The system takes into account the quantity and quality of the implemented practices, the lessons learned and possible failures as well. You can see the details in the manual.

A: I think those were all the questions I have at the moment. I will talk to someone in Addis about the Eco-pop-tool and the merged indicators. Thank you for your time.

B: Thank you.

Appendix 1e: Interview with Aster Yoseph, SLMP

Date: 15.6.2011

Interviewer (A. Kainulainen) is marked with A and the interviewee (A. Yoseph) with B in the following text. The interview was done in Addis Ababa on the 15th of June 2011.

A: Firstly I have this official part about the use of this recording. This recording will only be used for my master's thesis and it will not be played in public and it will be deleted after the completion of the study. I will write the key points of the interview as a word document and send them to you by email for approval so that I don't misunderstand anything. After your approval I will attach them as an appendix to the thesis so that they're there for anyone to read. Are these conditions of the interview OK with you?

B: Yes.

A: First of all I wanted to ask you about these merged indicators that I found in a document concerning your project. Why were these made and are they going to be implemented soon? Are you familiar with this list of indicators? There are some new indicators, for example the monitoring of sediment loads, that I haven't seen in any of the other documents.

B: I am not familiar with this document but I can give you the new revised and approved result framework with the indicators. Some indicators are dropped and some new added.

A: OK. So it seems that we can forget about this document then. The other question I had was about the eco-pop-tool. Are you using the tool at the moment?

B: Eco-pop was made for a previous project and it was designed according to the framework of that project. Now we have to simplify and revise the tool to be used in SLMP. We are now developing another format of eco-pop planning and reporting tool for SLMP. It is under development and not yet usable, but it is almost finished.

A: At what level is it going to be used?

B: At community level there is no computer or Internet access. The planning is done with the participation of the community and the woreda experts collect the data from the community and feed the data into the system.

A: When do you think it is going to be in use?

B: It is almost ready. For 2004 Ethiopian calendar. For the planning of this year it will not be ready but for the planning next year and the reporting of the next quarter maybe.

A: Do you know the details on how it works?

B: It will have two systems, on-line and off-line. If you have Internet access you can use it on-line, if not you can use it off-line and upload it later.

A: I think those were all the questions I have at the moment. Thank you very much.

B: Thank you. If you have any more questions you are welcome back anytime.

Appendix 1f: Interview with Mitiku Kebede, Regional manager, TBIWRDP (B1)

Date: 2.6.2011

Interviewer (A. Kainulainen) is marked with A and the interviewee (M. Kebede) with B in the following text. The interview was done in Bahir Dar on the 2nd of June 2011.

A: Firstly I have this official part about the use of this recording. This recording will only be used for my master's thesis and it will not be played in public and it will be deleted after the completion of the study. I will write the key points of the interview as a word document and send them to you by email for approval so that I don't misunderstand anything. After your approval I will attach them as an appendix to the thesis so that they're there for anyone to read. Are these conditions of the interview OK with you?

B: Yes.

A: Could you see these (the printed list of indicators) through and say if these are the correct ones. These were in a report from August 2010.

B: Well, there is some modification with some figures such as the project area (modified figures marked on the hard copy). In general they are the same.

A: My major is environmental technology, so I will be focusing on the indicators concerning land use management and the environment. Can you explain what the rationale behind these indicators is? Why were they chosen?

B: The main objective of the project is natural resource rehabilitation. In this area soil degradation in particular and natural resource degradation in general is very serious. Integrating with this, there are other problems. For example we have Tana lake here where siltation is a problem. This leads to flooding in the plain area around the lake, causing trouble to the people living there every year. The project is designed to protect the lake from sedimentation, the plain areas from flooding and the land from degradation. For controlling land degradation these outcomes are key pillars.

A: Could you explain the chain of information from data collection to when it reaches the donors and other stakeholders?

B: There is an institutional arrangement. At the federal level there is a coordination unit in the ministry of water and energy, at the regional level the project is divided into four components which are in turn divided into sub-components. Among the sub-components is B1 and for that there is a unit here at the bureau of agriculture. Taking only B1 into account, the coordinating office at woreda level is the office of agriculture in each woreda. Around this office there are other stakeholders such as environmental protection, land use and land administration office, water office, health, education and so on. Also at woreda level there is a team called woreda watershed team. This team serves as a focal unit. They have their own work in addition to coordinating the project watersheds at woreda level. We use them as subject specialists. They participate in planning and monitoring and evaluation and they also participate in implementation activities. Below woredas we have community facilitators in some watersheds, at the moment there are 16 CFs in 5-7 micro watersheds and maybe in the future we'll have even more. Again at kebele level there is a kebele watershed committee. Then below it there are micro-watershed committees which contain about ten to twelve committee members each. These are the main actors of project implementation. Because they are at grass root level they implement the activities on their own land and are the owners of the project. Regarding to the information linkages, data for every activity is collected by the community members, then combined at kebele level and sent to woreda level where it is again combined with other kebeles within the woreda and then sent to regional level.

A: You have this database system, which will possibly be on the Internet at some point. At what level is the information fed to this system?

B: At woreda level. We have supplied computers and the software. Information from community watersheds is fed into the computers and it is then sent to us as a soft copy as well as a hard copy. We usually receive the information from woredas on a CD.

A: In your opinion what are the strengths and weaknesses of these land use management and environmental indicators? Have you encountered any problems? Is there something that you would change?

B: From the day to day activities, from my observation there are no big weaknesses because this is very clear and easily manageable. The system itself is very fast and it is easy to control what has happened at community watershed level. Even at this level we can see the activities and implementation status at the grass root level. From this point of view it's very good. The problem is the capacity. The people at woreda level do not have enough skills in operating computers. Because of this we could not hand over the system. From this side there should be a lot of capacity building as well as frequent monitoring and support. That is the problem I can see now. Otherwise the system is very, very good. We need to scale it up to non-project woredas too.

A: Could we go through the timing and method of verification of these indicators. Many of these are marked "by 2013", is there going to be a big survey at that point or are they monitored continuously? For example I understand that the hydrological monitoring data is collected daily and then submitted to the woreda weekly, is that correct?

B: It is submitted monthly and not to the woreda but directly to the region. There are people at the bureau of water that look after the hydrological data collection, evaluation, reporting and so on. They go to the field and collect the monthly data and bring the sediment samples to the soil laboratory for analysis. So data is collected at the site daily and received at regional level monthly.

A: And what about the other indicators?

B: We have four experts on our team: a monitoring and evaluation expert, a natural resource expert, a livestock production expert and a crop production expert. They go to the field and evaluate what has happened, what is implemented in the field. This happens every one to two months. The reporting happens so that there are monthly, quarterly and annual reports.

A: I think that's all. Thank you very much for your time.

B: Don't mention it.

APPENDIX 2: SUB-CATEGORIES OF SOCIO-ECONOMIC AND PROJECT MANAGEMENT AND TRAINING RELATED INDICATORS

Socio-economic

Income	
Project	Indicator
CBINReMP	25% reduction in the number of households living below the national poverty line
	25% increase in per capita income
MERET	% of households claiming income increment by gender
	% of households involved in income generating activities
PSNP	75% of traders report increased trade volume by December 2014.
	70% of PSNP households have access to financial service through HABP by end 2011 onwards
	90% of graduating households have access to financial service through HABP from January 2011
SLMP	Number of male and female headed households who cultivated high value crops
	Number of male and female farmers benefiting from income generating activities
Tana-Beles	Per capita income growth of 3% to 4% per annum
	% of population below poverty line continues to fall by approximately 2.5% -units per annum
	Household income rises by 75% in real terms (ETB 4,000 to 7,000 between 2008 and 2018)
	Income from crop production increased by 20 per cent between 2008 and 2013
	Value of livestock & livestock products sales increased by 20 % in targeted watersheds by 2013

Food security	
Project	Indicator
MERET	% households claiming reduction in food deficit by at least two months
	% of households by gender participating in FFA
PSNP	By 2015, malnutrition among children under 2 years of age decreases by 1.5 percentage points per year on average
	By 2015, 80% of all households in rural Ethiopia access sufficient food at all times for an active and healthy life in the absence of PSNP transfers [food security]
	50% of male and female members of chronically food insecure households participating in PSNP public works access sufficient food at all times for an active and healthy life in the absence of FSP support by 2014 [food security
	80% of male and female members of chronically food insecure households participating in PSNP public works yet to achieve food security have sufficient food for 12 months and can resist moderate shocks in the absence of PSNP transfers by 2014 [food sufficiency
	90% of male and female members of chronically food insecure households participating in PSNP Direct Support have sufficient food from sustainable sources for 12 months and can resist moderate shocks by 2014 [food sufficiency
	90% of male and female members of (non-chronic) food insecure households involved in the FSP have sufficient food for an active and healthy life in the absence of FSP support by 2014 [food security].
	90% of PSNP participants achieve 12 months food access from all sources including PSNP from December 2010 onwards.
Tana-Beles	% of food insecure households in normal year reduced from 39 % in 2008 to 10 % in 2018

Water and sanitation	
Project	Indicator
MERET	% of time reduced on collecting water during critical months
	% of households access to water sources
PSNP	75% of households in PSNP woredas report improved availability of clean water and livestock fodder by December 2012
SLMP	Number of functional drinking water supply points
Tana-Beles	Access to potable water in targeted kebeles increased from 41 % in 2008 to 80 % by 2013
	10% households establish water harvest structure, micropond, handdug wells, hand pumps by 2013
	657 springs or hand pumps developed by 2013
	166 improved sanitation units provided in targeted kebeles by 2013

Agricultural productivity	
Project	Indicator
SLMP	Targeted households (10% of them female headed households) have increased agricultural productivity for one or more of their major crop and livestock enterprises in 2011 by 10% in 2013 by 15%
	Number of male and female headed households who adopted improved animal breeds including poultry
Tana-Beles	Increased production of fruits on 400 SSI sites covering a total of 1,500 ha and increases
	Increased production of vegetables on 400 SSI sites of a total of 1,500 ha and increases
	Average yields for cereals increased by at least 25 % by 2013
	Average yields for oilseeds increased by at least 25 % by 2013
	Average yields for pulses increased by at least 25 % by 2013
	Average yields for horticultural crops increased by at least 25 % by 2013
	Livestock productivity increased by 25 % by 2013
	10% of households have adopted improved animal breeds by 2013
	Livestock extension services improved in all targeted kebeles by 2013
	All farmers in targeted watersheds have access to effective agric. extension services by 2013

Land tenure	
Project	Indicator
CBINReMP	Some 450000 rural households have land tenure
SLMP	Percentage reduction in land related dispute cases
	Percentage of households (male and female headed) who invest on NRM on individual land
	Percentage of male and female headed households who are certified for first level certificate
	Percentage of male and female headed households in 2 kebeles per woreda who received second level certificates

Health and education	
Project	Indicator
CBINReMP	15% reduction in no. of children <5 years of age who are stunted
MERET	100% of schools in MERET sites implemented HIV/AIDs prevention ,mitigation and gender awareness activities
	60% of sites incorporating HIV/AIDS awareness activities in their plan
PSNP	75% of households in PSNP woredas report improved access to health clinics and primary schools by December 2012
	75% of households in PSNP woredas report improved use of health and education services attributable to PSNP by December 2012.
	90 % of PW schools and clinics providing services 2 years after completion by December 2010 onwards
Tana-Beles	Improved access to educational and health services / facilities in targeted kebeles by 2013
	Primary education and health services or facilities in 35 targeted kebeles supported

Infrastructure	
Project	Indicator
SLMP	Km of functional rural access roads constructed Number of kebele index maps produced
PSNP	90% of PW roads adequately maintained 2 years after completion by December 2010 onwards
Tana-Beles	135 km of access roads constructed or upgraded by end of project in 2013 192 km of internal access paths constructed or upgraded by 2013 232 footbridges / culverts constructed by 2013 Telephone posts established in 35 targeted kebeles by 2013

Access to markets	
Project	Indicator
MERET	Number of communities with improved access to market places
Tana-Beles	Reduced transport costs for markets and inputs in targeted kebeles by 2013 Improved access to markets, inputs and social services in targeted kebeles by 2013 30 % increase in quantity of crop produce reaching market in targeted kebeles by 2013

Local enterprises	
Project	Indicator
Tana-Beles	A group, or No of individual fuel efficient stove production enterprises established by 2013 No. households engaged in off-farm enterprises in targeted watersheds increased by 35 % by 2013 One fully functioning flour mill established in each targeted kebele by 2013 Modern charcoal and carbonization kilns produced in 10% of communities in watersheds by 2013 Fuel efficient stoves produced in 35 targeted kebeles by 2013

Assets	
Project	Indicator
MERET	% of households accessed to the created assets % of HHs who have created assets %households creating assets (physical and biological) initially through FFW and subsequently maintained on self help basis % of user groups created assets for benefiting community members
PSNP	Asset levels in 75% of PSNP households stable or increasing by December 2011 Asset levels of 90% households receiving transfers from Risk Financing or Contingency Budget stable or increasing by December 2011.

Veterinary	
Project	Indicator
Tana-Beles	Incidence of preventable livestock diseases in the targeted watersheds reduced by 85 % by 2013 Veterinary services improved in all 35 targeted kebeles by 2013

Equity	
Project	Indicator
MERET	60% of community members those participated in CC enforcing recommended positive behavioral practice
PSNP	Utilization of PSNP transfers benefits all household members equitably from December 2010
	95% of pregnant female participants are moved between public works and direct support according to PIM rules by January 2010 onwards.
	85% of beneficiaries and non-beneficiaries reporting that the targeting and graduation processes are fair by December 2010

Tourism	
Project	Indicator
MERET	Number of pilot potential ecotourism sites established
	Number of domestic and international tourists visited
	% of sites with more than one tourist attraction schemes
	Number and diversity of promotional materials prepared

Other	
Project	Indicator
Tana-Beles	20 % households adopting more efficient and appropriate processing technologies by 2013

Project management and training

Transfers and reliability	
Project	Indicator
PSNP	90% of PSNP transfers delivered to participants within 45 days after previous month from April 2010 onwards
	75% of participants report they are able to plan ahead on the basis of PSNP transfers by December 2012
	90% of transfers received have a value of at least 15 kg of grain per month by January 2010
	70% of participants receive cash or food transfers at a place within one to three hour of their home by December 2011 onwards
	90% of transfers to participants within 75 days after risk financing triggered by 2012
	50% of participants reporting they are able to plan ahead on the basis of transfers from PSNP Risk Financing or Contingency Budget by December 2012
	90% of transfers received have a value of at least 15 kg of grain per month by 2010
	70% of participants receive cash or food transfers at a place within one-three hour of their home by 2011 onwards
MERET	% of quality of food distributed under FFA
	% of quantity of food distributed under FFA

Participation	
Project	Indicator
PSNP	90% of households participating in the PSNP for at least 3 consecutive years by December 2011
MERET	% of households by gender participating in FFA
CBINReMP	Representatives from all targeted communities fully participate in for a organised to review policy and legal framework

Equipment and materials provided	
Project	Indicator
MERET	% of woredas received relevant technical materials
SLMP	Number of FTCs equipped with relevant demonstration materials and equipment Number and type of equipment provided Number and type of information and knowledge sharing products (i.e. technical publications, policy papers, brochures, posters, audio and video, etc in various local languages) delivered for policy makers, extension workers, other stakeholders and beneficiaries, outcome
PSNP	75% of equipment purchased and delivered as planned at all levels by December 2010 onward
Tana-Beles	DA's in NR offices of targeted kebeles provided with equipment by 2010 DA's in targeted kebeles provided with motorcycles by 2013 20 tree nurseries established by 2013 to supply communities and households by 2013

Training provided	
Project	Indicator
SLMP	Number of male and female kebele and community land administration committee members who received relevant training Percent of trained male and female experts, DAs and farmers who applies the skill and Knowledge gained Number of male and female experts trained at all levels on cadastral surveying and registration 50% of the gender disaggregated percentage of SLMP implementing government staff that are successfully trained/ familiarized with new policies/strategies/ procedures latest 6 months after formal acceptance Number of male and female experts trained on SLM knowledge management and data base systems Number of information and knowledge sharing centers supported No. of male and female experts who attended financial management, procurement, project planning and result based monitoring and evaluation trainings
PSNP	70% of beneficiaries received all information needed to understand how the program works by December 2012
Tana-Beles	Farmers Training Centers Upgraded /rehabilitated in all 35 targeted kebeles by 2013 Approp. farm production,processing & trans. equpment promoted/demonstrated in targeted kebele 2100 Farmers trained in FTC's in improved agriculture techniques & technologies by 2013
MERET	% of house holds trained in using time saving, yield augmenting and processing technologies at impact points by gender. %of implementing partner staff and community received training on participatory watershed development % of sites conducted experience sharing % of planning teams trained in natural resource management cycle 100% of implementing partner staff received training on HIV/AIDS by gender 60% of community members from MERET sites conducted gender sensitization and HIV prevention 100% of trained people on community conversation tool % of project woreda staff trained on MERET RBM

Community organization	
Project	**Indicator**
MERET	Number of marketing groups organized by gender % of functional farmer groups engaged in adaptive SLM research % of functional farmer groups engaged in exercising SLM practices %of functioning user groups established by gender for assets management and/or income generation. 55% of sites with functional HIV/AIDS Community Conversation teams number of (tourism) user groups established and made functional % of functional water user groups
SLMP	Number of gender balanced functional watershed planning and management entities Number of community watershed that adopted legalized bylaws Number of gender balanced functional local user groups that adopt by-laws for conservation and utilization of natural resources
Tana-Beles	User groups & management plans made for forest conservation in 75% of comm. Watersheds by 2013

Staffing	
Project	**Indicator**
CBINReMP	Annual rate on staff turnover less than 10%
PSNP	90% of woredas meeting minimum staffing standards by December 2010 onwards and 90% of staffing positions agreed at federal and regional levels filled by December 2010 onwards

Planning and implementation	
Project	**Indicator**
MERET	% of sites prepared RBM compliant community watershed plans % of MERET sites revised work plans using community re-planning
PSNP	100% of PW plans developed following community planning guidelines by December 2010 95% of public works have an established management mechanism at completion starting from December 2010 90% of PSNP plans fully incorporated in woreda development plans by December 2010 Incidence of poor programme performance caused by low prioritization by local administration reduced to less than 10% of woredas by December 2010
SLMP	75% of SLM related policies/strategies/ procedures are properly applied Overall average achievement of annual plans and budget Percentage of community/sub watershed for which development plans prepared according to the community based participatory watershed guideline Percent of Woredas’ utilizing at least 75% of their budget as planned on the annual work plan and report on time Number of Woreda, regional and federal review and re-planning workshops held timely by gender of participants Number of implementation support missions conducted
Tana-Beles	CBPWDP's and CAP's prepared for all(163) community watersheds in project area by 2013

Timeliness of reporting/information availability	
Project	Indicator
CBINReMP	Disbursement rate and timely reporting
MERET	% of performance reports received on time
PSNP	70% of PSNP staff report timely access to key Programme documents by December 2010
	90% of physical and financial reports and audits submitted on time by December 2010
SLMP	Land registration and administration data base system established at regional and woreda levels
	Number of reported joint monitoring missions per watershed
	Percent of Woredas submitting timely quarterly performance report meeting the standards
Tana-Beles	Sust. hydrol. monit. system established, functioning, providing timely and accurate data by 2010

Best practices and lessons learned	
Project	Indicator
CBINReMP	Lessons on SLM documented and disseminated
MERET	Number of development initiatives that incorporate lessons from MERET-PLUS and CHILD
	Number of CP best practices documented and circulated
SLMP	Information system for documentation of innovative technologies and practices developed and operational
	Percentage DAs and woreda experts in the project area accessing information on best management
	Number of lessons learnt and best practices documented in regions
	Number of appropriate SLM technologies and approaches successfully identified, tested, documented and disseminated
	Number of male and female woreda experts capacitated in knowledge generation and identification of best practices

Other	
Project	Indicator
MERET	% of households satisfied with technical and management support
	Volume of additional and complementary resources mobilized and used(in cash and in kind)