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ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
COLLEGE OF DEVELOPMENT STUDIES

**OPPORTUNITIES AND CHALLENGES OF CARBON TRADE PROJECTS
IN PROMOTING SUSTAINABLE DEVELOPMENT: THE CASE OF
HUMBO ASSISTED NATURAL REGENERATION PROJECT**

**A thesis submitted to the school of Graduate Studies of Addis Ababa
University in partial fulfillment of the requirements for the degree of Masters
of Arts in Environment and Development**

BY:

BEKRI MOHAMMED

ADVISOR:

FEYERA SENBETA (Ph.D.)

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Title

*Opportunities and Challenges of Carbon Trade
Projects in Promoting Sustainable Development:
The Case of Humbo Assisted Natural
Regeneration Project.*

By

Bekri Mohammed

DEVELOPMENT STUDIES

APPROVED BY THE BOARD OF EXAMINERS:

SIGNATURE

Dr. Belay Simane
CENTER HEAD

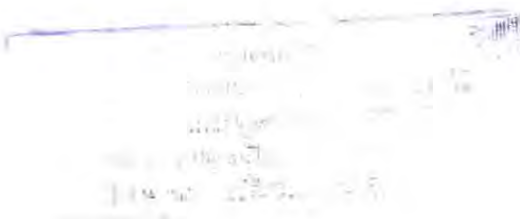


Dr. Feyera Senbeta
ADVISOR



Dr. Belay Simane
INTERNAL EXAMINER





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Table of Contents	Page
Acknowledgment.....	I
Table of Contents.....	II
List of Tables.....	V
List of Figures.....	VI
Acronyms.....	VII
Abstract	IV

Chapter One: Introduction 1

1.1 . Background.....	1
1.2 . Statement of the Problem.....	3
1.3 . Objectives of the Study.....	3
1.4 . Research Questions.....	4
1.5 . Significance of the Study.....	4
1.6 . Limitation and Scope of the Study.....	4

**Chapter Two: Review of Basic Concepts
and Related Literature.....5**

2.1. Background to the Kyoto Protocol and Carbon Trade.....	5
2.2. Flexible Mechanisms under the Protocol.....	7
2.2.1. Joint Implementation.....	7
2.2.2. International Emissions Trading.....	8
2.2.3. Clean Development Mechanism.....	8
2.3. Important Concepts of the CDM.....	10
2.4. The CDM Project Cycle.....	11
2.5. Sustainable Development and its Measurement.....	13
2.5.1. What is Sustainable Development?	13
2.5.2. Measuring Sustainable Development	15

2.6. Indicators of Sustainable Development.....	15
2.6.1 The Economic Dimension.....	17
2.6.2 The Environmental Dimension	17
2.6.3 The Social Dimension.....	17
2.7. CDM and Sustainable Development.....	18
2.7.1. The Twin Objectives of the CDM.....	19
2.7.2. Evaluation of Sustainable Development in the CDM Context.....	21

Chapter Three: Research Methodology and

the CDM project of Humbo.....22

3.1. Description of the Study Area.....	22
3.2. Methodology	23
3.3. Humbo Local Area Context.....	26

Chapter Four: Results and Discussion.....31

4.1. Characteristics of sampled Households	31
4.2 Overall Results of the Project in regard to Sustainable Development.....	36
4.2.1. Environmental Indicators.....	36
4.2.2. Economic Indicators.....	42
4.2.3. Social Indicators	46
4.3. Potentials and challenges for scaling-up CDM projects in Ethiopia	55

Chapter Five: Conclusions and Recommendations.....	57
5.1. Conclusions.....	57
5.2. Recommendations.....	60
References	63
Appendix I The questionnaire in English	i
Appendix II The questionnaire in Amharic.....	vi
Appendix III Guideline for interview with Key Informants	x
Appendix IV Definition of Indicators	xiii

List of Tables	Page
Table 1: Age of the respondents.....	32
Table 2: Distribution of Respondents by Gender.....	32
Table 3: Marital status of the Respondents.....	33
Table 4: The relationship between Family size and Education.....	35
Table 5: Frequency distribution of the Environmental Indicators.....	37
Table 6: Mann-Whitney U test for the Environmental Indicators	39
Table 7: Frequency distribution of the Economic Indicators.....	42
Table 8: Mann-Whitney U test for the Economic Indicators.....	44
Table 9: Frequency distribution of the Social Indicators.....	47
Table 10: Mann-Whitney U test for the Social Indicators.....	49

List of Figures	Page
Figure 1: Map of States Committed by the Kyoto Protocol as of 2010.....	6
Figure 2: Illustration of how the CDM works	9
Figure 3: Location of the Humbo Project.....	23
Figure 4: Humbo area before and after the Project.....	26
Figure 5: Educational Level of the Respondents.....	33
Figure 6: Family size of the Respondents.....	34
Figure 7: Major source of income in the Cooperatives	36
Figure 8: Summary of responses to Environmental Indicators.....	38
Figure 9: Summary of responses to Economic Indicators.....	43
Figure10: Summary of responses to Social Indicators.....	48

List of Acronyms

AAUs	Assigned Amount Units
AIJ	Activities Implemented Jointly
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CO ₂	Carbon dioxide
COP	Conference of Parties
CSA	Central Statistical Agency
DOE	Designated Operational Entity
DNA	Designated National Authority
EB	Executive Board
EPA	Environmental Protection Authority
ERUs	Emission Reduction Units
FDRE	Federal Democratic Republic of Ethiopia
FMNR	Farmer Managed Natural Regeneration
GDP	Gross Domestic Product
GHGs	Green House Gases
IET	International Emissions Trading
JI	Joint Implementation
LOA	Letter of Approval
MCA	Multi Criteria Analysis
NGO	Nongovernmental Organization
OECD	Organization for Economic Cooperation and Development
PDD	Project Design Document
PIN	Project Idea Note
PLCs	Private Limited Companies

SPSS	Statistical Package for the Social Sciences
UN	United Nations
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework Convention on Climate Change
WCED	World Commission on Environment and Development

Abstract

The Kyoto Protocol has been in effect since 2005 providing flexible mechanisms to combat climate change and its negative effects. The CDM, one of the flexible mechanisms in the Kyoto Protocol, has the objectives of GHG emissions reduction and promoting sustainable development in Non Annex I countries that host the projects. While the former is relatively easy to monitor and achieve; the later objective is facing difficulties because of the CDM's own market based arrangement. The primary purpose of this work is to explore the contribution of CDM projects to sustainable development using the Humbo Assisted Natural Regeneration carbon sequestration project as a case study. To achieve this objective selected sustainable development indicators are used that fall in to three broad environmental, economic and social categories allowing a multi dimensional assessment of the project's contribution to sustainable development in the area. A four-point Likert scale questionnaire is used to collect data about sustainable development contribution of the project with a 0.85 level of Cronbach's alpha coefficient. The sampling unit was drawn from 100 households participating in the project in addition to data collected from other stakeholders through key informant interviews. The Mann Whitney U test is also used to compare the two sample groups with the 0.05 p level as a dividing mark to decide significance. The overall result of the study indicates that the Humbo carbon sequestration project, unlike most similar projects in other developing countries around the world, is promoting sustainable development with socio-economic and environmental benefits to the local community even though there are issues that still need to be attended to. This work also highlights Ethiopia's potentials and challenges in exploiting the opportunity the climate change regime has to offer. Hence, clarifying and mainstreaming the issues surrounding CDM and sustainable development in the Ethiopian context are found to be of great importance. Finally, the study recommends what has to be done in the future to scale-up carbon trade projects to maximize their benefit.

Chapter One

Introduction

1.1. Background

The world's climate is being affected because of human intervention to a scale that threatens communities' and states' existence across the globe. Many scholars of the field agree that sustainable development practices and sharing responsibilities are the solutions to this pressing problem. Increased emission of Green House Gases (GHGs) especially after the industrial revolution is considered to be the major cause contributing to the change in climate (UNFCCC, 1997).

Mitigation measures are proposed and are being implemented at a global level to reduce increase in these gases. One such initiative is the carbon trade which allows Annex I countries (major industrialized nations with a commitment to reduce GHGs) of the Kyoto Protocol, which is adopted to implement the United Nations Framework Convention on Climate Change (UNFCCC), to meet their emission reduction commitments without jeopardizing their economy. The Clean Development Mechanism (CDM) is one of the three so called 'flexible mechanisms' of the Protocol along International Emissions Trading (IET) and Joint Implementation (JI).

As a result of the controversy surrounding the emission quotas allocated to industrialized countries in regard to their GHGs emissions through the UNFCCC, some groups (particularly the US) were pressing for flexible mechanisms such as the CDM to be applied for the reduction of emissions. Under this arrangement industrialized countries fund projects in developing countries through purchase of carbon offset credits from carbon projects like reforestation /afforestation schemes to meet their quota and reduce the gases.

The CDM is designed to achieve two basic goals according to Article 12 of the Kyoto Protocol: promotion of sustainable development in developing countries which host the projects and help Annex I countries achieve their emission reduction targets in a cost-efficient manner (UNFCCC, 1998). With this twofold approach the CDM, it has been argued, should give due emphasis to the sustainable development aspect to succeed beyond the GHG emissions reduction.

According to Olhoff, et al (undated)

in order to operationalize sustainable development in the context of developing countries in general and CDM projects in particular there is a need for a more pragmatic approach to sustainable development with a stronger emphasis on national development priorities such as poverty reduction, local environmental health benefits, employment generation, economic growth prospects, etc.

It has always been an issue whether CDM projects can promote sustainable development besides reduction of emissions (Nussbaumer, 2006). In the mean time, many developing countries are using the opportunity to establish carbon sequestration projects. Africa has been left behind accounting only for less than 2% of the projects registered under CDM.

The Humbo Assisted Natural Regeneration Project launched in 2006 is the first and the largest reforestation project in Africa to be registered under the CDM of the Kyoto Protocol .It is an NGO (World Vision) initiated climate mitigation project based on community managed reforestation and the practice of sustainable development.

This project is believed to be changing the livelihood of the community through sustainable use of forest resources and income generating mechanisms .The project, in addition to the income remitted from carbon offset credits, claims to promote local sustainable development (World Vision, 2008).

1.2. Statement of the Problem

Even though following to the Marrakech Accords it is the host party's prerogative to confirm whether a Clean Development Mechanism project activity assists it in achieving sustainable development markets are down playing this power. This forces host countries to set low sustainable development standards in order to attract investment from Annex I countries creating what is called "a race to the bottom" (Sutter, 2003). It means Non Annex I countries have to compete among themselves to attract investment in CDM projects which forces them to lower their sustainable development standards or abolish them altogether.

Hence, globally carbon sequestration projects are criticized for not meeting the sustainable development objective they claim to advance. This is basically because of the weak market power of these developing countries (Sutter, 2003).

1.3. Objectives of the Study

The general objective of this study is to assess the sustainable development contribution of a carbon sequestration project initiated through the CDM using a case study of the Humbo Assisted Natural Regeneration Project.

Specific objectives of the study include:

- Assessing to what extent the criteria and indicators of sustainable development that are generally agreed upon internationally and particularly adopted nationally (i.e. in Ethiopia) are achieved with this specific project.
- Discuss how the CDM works in reference to the Humbo Assisted Natural Regeneration Project.

1.4. Research Questions

1. Is the Humbo Assisted Natural Regeneration Project contributing to local sustainable development?
2. What are the general features of CDM?
3. What are the challenges and opportunities of carbon trade in general and particularly in Ethiopia?
4. How is the benefit distributed among community members who are participating in the project?

1.5. Significance of the Study

Generally it is hoped that this particular research will allow evaluating the status of carbon trade at the international level vis-a-vis the Ethiopian context. In addition, it will indicate lessons to be drawn from the Humbo project as a climate change mitigation mechanism as well as a way to combat poverty through sustainable development by highlighting Ethiopia's potential for CDM projects and make recommendations how to exploit it. An attempt is made to fill the gap in terms of research output regarding carbon sequestration projects' contribution to better understanding of the concept of CDM/ Carbon trading by clarifying grey areas of the field.

1.6. Limitation and Scope of the Study

As it has been outlined CDM projects are intended to fulfill two objectives, however, this study concentrates basically on the objective of assessing the sustainable development impact of a CDM project. The study is also limited in its coverage of stake holders. The focus here is on local stake holders who are easily accessible to the researcher. Therefore, different international partners and stake holders are not covered in the assessment.

Chapter Two

Review of Basic Concepts and Related Literature

2.1. Background to the Kyoto Protocol and Carbon Trade

The use of emissions trading as a solution to mitigate environmental problems started with the United Nations Framework Convention on Climate Change (UNFCCC). It was held at the Rio Earth Summit in 1992 and it, for the first time, officially recognized climate change as a problem and made some very modest recommendations for future action.

The ultimate objective of the UNFCCC is the “stabilization of green house gas concentrations at a level that would prevent dangerous anthropogenic interferences with the climate system.”(UNFCCC, 1992). With this core objective set it laid down the overall frame work for countries and other stake holders in regard to climate mitigation by stressing the principle of “common but differentiated responsibilities” (UNFCCC, 1992).

The Convention expected industrialized/developed countries to reduce their GHG emissions to 1990 levels by the year 2000; and that all nations would undertake voluntary actions to measure, report, and limit GHG emissions (Fletcher, 2004). Hence, like other voluntary initiatives the UNFCCC also needed a legally binding back up which expressed itself as the Kyoto Protocol, which is the second intergovernmental legally binding regime next to the World Trade Organization’s arrangement.

The Kyoto Protocol is a result of a growing awareness that human activities are having “discernible impact on global climate systems, possibly causing a warming of the Earth that could result in significant impacts such as sea level rise, changes in weather pattern and health effects – and as it became apparent that major nations such as the United States and Japan would not meet the

voluntary stabilization target by 2000.” (Fletcher, 2004). Hence, parties to the treaty at the first Conference of Parties (COP-1) in Berlin, Germany, decided to enter in to negotiations on a protocol to establish legally binding limitations or reductions in GHG emissions. Currently, 190 countries and one regional economic integration organization (i.e. the European Commission) have deposited instruments of ratifications, accessions, approvals or acceptances.

Though the US, the major emitter, has withdrawn its support of the protocol, the countries that contributed to 63.7% of the total CO₂ emissions for 1990 of the Annex I Parties have ratified the Protocol. Hence, the Protocol entered into force on 16 February 2005 (Mizuno, 2010).



Figure 1 : States committed by the Kyoto Protocol as of 2010

Green=Annex I countries that are fully committed.

Yellow=Annex I countries that only are committed within some freedom as to their requirements in the protocol (Countries with Economies in Transition (EIT)).

Red= Countries which are not committed by the Kyoto Protocol (countries that have Non-Annex I status in the Protocol, and thereby are not committed or countries that have not signed the Protocol yet) (Adopted from Wikipedia).

The Protocol aims to cap emissions of the main GHGs by reflecting on “underlying national differences in emissions, wealth and capacity, following the main principles agreed in the UNFCCC” (Grubb, 2003).

The Protocol commits Annex I countries to a reduction of four GHGs (carbon dioxide, methane, nitrous oxide, sulphur hexafluoride) and two groups of gases (hydro fluorocarbons and per fluorocarbons) while it assigns general commitments to all member countries.

2.2. Flexible Mechanisms under the Protocol

The Kyoto Protocol contains market based flexible mechanisms that allow Annex I countries to reduce their emissions in a cost efficient manner. There are three mechanisms included under the protocol: Joint Implementation (JI), International Emissions Trading (IET) and the Clean Development Mechanism (CDM).

While different in operation, the three mechanisms are based on the same principle: industrialized countries are allowed to reduce emissions outside their territory and then count those reductions towards their national target (Kagi and Schone, 2005).

2.2.1. Joint Implementation (JI)

In this arrangement countries in Annex I category will finance projects that reduce emissions in other Annex I countries (mostly in so called “Economies in Transition”) as an alternative to reducing emissions domestically which lowers their emissions reduction cost. Like the CDM, JI is project based.

In JI emission reductions are awarded credits called Emission Reduction Units (ERUs). The JI projects allow Annex I countries to exceed their emission cap as

defined in Article 3.1 of the Kyoto Protocol by the amount of ERUs purchased from the project activity (Burian, 2006).

2.2.2. International Emissions Trading (IET)

If a country does not need all of its emission budget on a national level according to Article 3 of the Kyoto Protocol, it may trade its surplus emission rights as so called Assigned Amount Units (AAUs) to other countries which emit more than they are allowed to. International emission trading is only possible between Annex B countries (Burian, 2006).

The difference between IET and the other two project-based mechanisms is that the former is based on the setting of a quantitative restriction of emissions, while the CDM and JI are based on the idea of "production" of emission reductions.

IET allows Annex I countries to "trade" their emissions (AAUs or "allowances" for short). The economic basis for providing this flexibility is that the marginal cost of emission abatement differs among countries. Trade could potentially allow the Annex I countries to meet their emission reduction commitments at a reduced cost. This is because trade allows emissions to be abated first in countries where the costs of abatement are lowest, thus increasing the efficiency of the Kyoto agreement (Toth et al, 2001).

2.2.3. Clean Development Mechanism (CDM)

Another project-based mechanism of the Kyoto Protocol is the Clean Development Mechanism which is discussed below in detail because the Humbo project to be assessed for sustainable development contribution falls under this category.

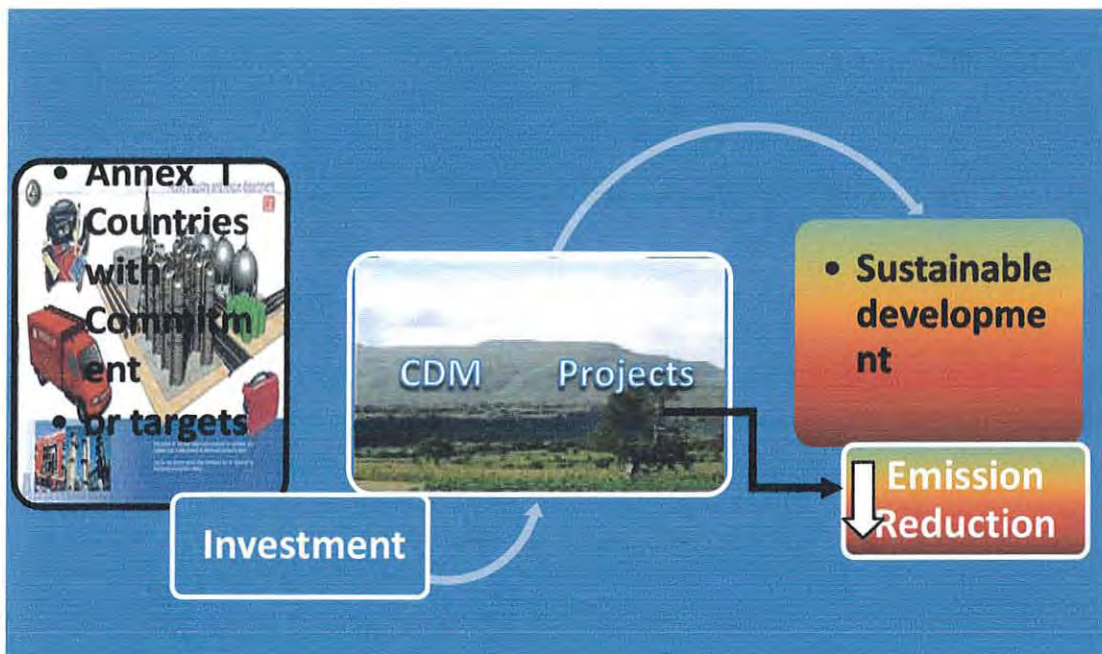


Figure 2: Illustration of how the CDM works

The CDM is defined as a project based mechanism that “assist[s] parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the convention, and [that] assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.”(UNFCCC, 1997).

The CDM, therefore, is loaded with the intention of meeting Annex I countries emission reduction targets and Non- Annex I countries development endeavors. CDM projects generate Certified Emission Reductions (CERs) in countries without emission targets that can be sold to countries with those targets (Burian, 2006).

The basic principle of the CDM is that developed countries can invest in low cost abatement projects which produce emission reduction credits to meet their targets as outlined in the Kyoto Protocol. It encourages developing countries to

participate by promoting their developmental cause. In fact, it is the only mechanism of the protocol that involves developing countries in emission reduction .It also recognizes that development allows countries to contribute to combating climate change better. The CDM can also attract capital, encourage and permit the active participation of both private and public sectors, help in technological transfer and prioritize sustainable development goals through investment (UNEP, 2004).

2.3. Important Concepts of the CDM

The CDM involves a complex and dynamic process with multiple stakeholders interacting at different levels. Some of the most important concepts associated with the CDM are discussed below.

Baseline and Project Scenario

A base line scenario is the situation without the project. It is a hypothetical assumption of what would happen without the project. It is not a before-after comparison representing a historical situation. It only represents a historical situation if no results are expected (Von, 2009). The project scenario indicates the effect of the project. It has been clarified by the Executive Board (EB) of the CDM that CDM projects must estimate the project scenario (Kagi and Schone, 2005).

Additionality

Additionality dictates that reductions in emission should be additional to any activity that would occur in the absence of the certified project activity (UNFCCC, 1997). The measurement of additionality is disputable because the base line is a hypothetical concept (Von, 2009).

2.4 The CDM Project Cycle

The Project Idea Note (PIN)

After project identification, a given CDM project starts with the Project Idea Note (PIN) in which the project developer outlines the basics of the project in a five page summary. The project concept note is prepared by the project participants. It is prepared for potential financiers to gauge interest in the project.

Project Design Document (PDD)

This step is an important part of the project process. The PDD is submitted to the Designated Operational Entity (DOE) for validation. The CDM-PDD presents information on the essential technical and organizational aspects of the project activity and is key input in the validation, registration and verification of the project (Mizuno, 2009).

Host Country Approval

The host country's Designated National Authority (DNA) either approves or rejects the proposed project document. If approved, a Letter of Approval (LOA) is issued. Among other things the LOA should confirm that the host country has ratified the Kyoto Protocol, the host countries participation in the project is voluntary and implementation of the proposed project will contribute to its sustainable development (Curnow and Hodes, 2009).

Validation

Validation is the process of independent evaluation of a project activity by a DOE against the requirements of the CDM as set out in CDM modalities and

procedures and relevant decisions of the Kyoto Protocol Parties and the CDM's EB, on the basis of the PDD.

Registration

This is done by the EB after submission of the PDD and LOA by the DOE. This request can be taken as a Validation report (Kagi and Schone, 2005). The registration signifies the formal acceptance of the project. Registration is the prerequisite for the Verification, Certification and Issuance of CERs related to that project activity.

Implementation and Monitoring

After registration follows implementation of the project by the proponent according to what has been outlined in the PDD. Monitoring the performance of the project starts from the point of implementation following the validated monitoring procedure laid out in the PDD.

Verification and Certification

Verification is done by a DOE contracted by the project developer. Verification is the independent review and ex post determination by the DOE of the monitored reductions in anthropogenic emissions by sources of GHG that have occurred as a result of a registered CDM project activity during the verification period. Certification involves written assurance by the DOE that the project activity achieved the reduction in GHGs emission as verified.

Issuance of Certified Emissions Reductions Units

The EB finally provides the project owners with CERs which allows them to sell the carbon credits generated.

2.5. Sustainable Development and its Measurement

2.5.1 What is Sustainable Development?

Sustainable development is one of the most ambiguous concepts ever introduced in to the social science world. Though the debate was heated in the 1970s sustainable development is not a new concept at all (Dalal-clayton, Undated).

Many of the ideas that are now embedded in the idea of sustainable development have been around for a long time – from as long ago as the work of Malthus on population growth in the late 1700s (Dalal-clayton, Undated). But the concept appears really to have emerged during the early 1970s following a range of key publications drawing attention to man's over-exploitation of the environment, focusing on economic development and the growing global concern about development objectives and environmental constraints, and examining the links between environment and development.

The most common definition, however, which popularized the concept came with the report "Our Common Future"(1987), or commonly known as the Brundtland Report after the Chair woman of the World Commission on Environment and Development (WCED), Gro Harlem Brundtland ,then-Prime Minister of Norway. The report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."(WCED, 1987).

This definition came up with the issue of intergenerational equity which stresses advancement of human life within the carrying capacity of the environment without jeopardizing future generations' ability to do so.

The problem with this definition is that it is too wide that it has allowed different interpretations of the concept. Critics also point out that which needs are being referred to is not clear. In addition, the phrase “without compromising” is ambiguous since the needs of future generations are dependent on a variety of issues including technological advancement (Burian, 2006).

Beyond this technical definition sustainable development has also picked up political usage by embodying “a concern for taking a broad view of what human welfare entails, and for balancing the goals of economic efficiency, social development and environmental protection.”(OECD, 2001).

After the publication of this report there was a rapid escalation of alternative definitions of sustainable development with definitions involving two components: the meaning of development involving the main goals like economic growth, basic needs, rights and the conditions necessary for sustainability (Dalal-clayton, Undated).

Another way of defining sustainable development is by breaking it up into its component words: sustainable and development. This raises the question what is to be sustained and what is to be developed. In this regard the US National Research Council Board on Sustainable Development outlined what is to be sustained as nature, life support systems, and community with intermediate categories for each like Earth, environment and cultures. For what is to be developed there are also three distinct ideas: people, economy and society. Of course with no surprise, in the past the focus was on economic development with a recent shift to human development (Kates et al, 2005).

Definitions of sustainable development can be summarized as stressing on inter generational and intra generational equity with fair distribution of and access to resources within the same generation and between succeeding

generations(Warhust,2002).This is the normative aspect of sustainability, which was traditionally taken as a limit to the exploitation of resources.

2.5.2. Measuring Sustainable Development

As it is difficult to define sustainable development its measurement also follows suit. The difficulty in measuring sustainable development mostly arises because there is no universal agreement as to what sustainable development is.

An important point to make is that the methodology of measuring 'sustainability' or 'sustainable development performance' is not standardized, there is no textbook version available, one that is generally accepted and applicable across regions and sectors of the economy (Hardi and Pinter,1995).

2.6. Indicators of Sustainable Development

The process of developing indicators of sustainable development is an ongoing process extending back to the 1970s. However, it was with Agenda 21 that an agreement was reached to develop new indicators. As it is put in Agenda 21:

“Commonly used indicators such as the gross national product (GNP) and measurements of individual resource or pollution flows do not provide adequate indications of sustainability. Methods for assessing interactions between different sectoral, environmental, demographic, social and developmental parameters are not sufficiently developed and applied. Indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems.”

In addition, different international development institutions and individual countries are also participating in the development of indicators. For instance, the World Bank has developed its own World Development Indicators in collaboration with the UN and OECD.

Another important initiative is UN's sustainable development indicators which adds a fourth dimension as institutional aspects of sustainable development (Warhurst ,2002).The addition of other dimensions like institutional and technological dimensions is attributed to the inability to illustrate all aspects along the three dimensions(Von,2009).

Yet in spite of the difficulty to come up with a standardized measuring tool for sustainable development, indicators are traditionally aggregated into three broad categories called the "three pillars of sustainable development": economic, social and environmental. Each one of these pillars contains a group of indicators giving room for flexibility as to what to include as an indicator.

These dimensions of sustainable development are given generally equal weight in the measurement of sustainable development and efficiency in the three is expected to bring integration (Von, 2009).These indicators can be in a quantitative or qualitative form .Until recently most of the data regarding sustainable development performance was in quantitative form. However, with the addition of the social dimension it was difficult to measure sustainable development when impact has a larger degree of subjectivity (Warhurst, 2002).Next we look at each one of these criteria in detail (For the definition of sustainable development indicators used in this research see Appendix IV).



2.6.1. The Economic Dimension

This is the traditional measure of development especially before the 1970s. The measurement of development as an economic growth basically focused on Gross Domestic Product (GDP). An economically sustainable system is able to produce goods and services on a continuing basis to allow a balance among the different sectors of the economy (Harris, 2000). Economic indicators of sustainable development can be aggregated to GDP, improved balance of payment, transfer of clean and cost effective technology, generation of local employment opportunity, improved local economy.

2.6.2. The Environmental Dimension

The environmental dimension involves the ecological aspect of sustainable development. In the past resources were considered as free commodity that can be exploited indefinitely. However, starting from the 1960s there was a shift of paradigm. This came with different publications that stressed humans are over exploiting the environment and affecting its life support mechanisms.

Then environmental sustainability is taken as maintaining a stable resource base, avoiding over exploitation of renewable resource systems or environmental sink functions and avoiding depletion of non-renewable resources beyond investment in adequate substitutes (Harris, 2000).

2.6.3. The Social Dimension

As the newest dimension there are problems to incorporate it in to sustainable development measurement (Huq, 2002). A socially sustainable system must achieve distributional equity, adequate provision of social services including health and education, gender equity, and political accountability and participation (Harris, 2000). In addition, Huq (2002) gives the following list of

indicators: local employment; greater community participation; improved health; reduction of wealth disparities; poverty reduction; capacity building; improved access to power; helping backward communities; security of energy supply.

2.7. CDM and Sustainable Development

The challenge of responding to the dual problems of Climate Change and Sustainable Development is on the high political agenda globally. Traditionally, the orientation has been towards associating climate change with natural science and sustainable development with the social sciences and humanities at least until 2001-2002 when the International Panel on Climate Change and the World Summit on Sustainable Development organized a platform that directed focus towards integration between climate change and sustainable development. Since then there were efforts to consider climate change as a development problem rather than as an environmental one (Olson, 2005).

According to Olsen(2005) an over view of lines of conflict and key issues in the climate change and sustainable development regime include views from the south, equity, adaptation and poverty and the sustainability impact of CDM projects. The CDM has officially emerged with the Kyoto Protocol in 1997 even though it traces its root back to the negotiations preceding the protocol particularly in the Activities Implemented Jointly (AIJ) (Grubb et al, 1999).

After its adoption in Article 12 of the Kyoto Protocol the mechanism was generally positively received and named as “the Kyoto surprise”, the “win –win mechanism”, a “bridge between the north and south” and the “front runner of the Kyoto regime” (Olsen,2005).

Despite all this optimism years after the CDM projects are implemented around the world questions are being raised about their contribution to sustainable development. A review of literature on the subject tends to support this argument by implying that the trade-off between sustainable development and

emission reductions is working in favor of the latter basically because of market forces and the CDM's arrangements (May et al, 2004) .

A literature review of around 200 researches by Olsen (2005) has grouped the views in to four categories: 1) forward looking studies trying to predict future sustainable development impacts 2) methodological development of criteria and indicators to assess the sustainability impact of CDM projects 3) forestry carbon projects analyzed with regard to their sustainable development contribution and 4) other studies raising different questions using different approaches. An important finding is the high interest of researchers on forest carbon projects compared to other types like energy or industrial projects.

As noted above one critical issue is the attempt to develop different criteria and indicators to measure the sustainability aspect of CDM projects. At the project level deciding the sustainability criteria for approving CDM projects is reserved for the DNAs creating variability in how strictly countries define and implement the sustainability criteria and this causes a contradiction between desire for the benefits of CDM and broader sustainable development objectives (Olsen and Fenhann, 2008).

Methodologically different approaches are followed to measure the sustainability impact of CDM projects including the MCA, the cost benefit analysis, livelihood analysis (Tschakert, 2004). The MCA is popular in this regard because sustainable development is multidimensional and examination of a project's influence on sustainable development requires considering many aspects (Nussbaumer, 2006).

2.7.1. The Twin Objectives of the CDM

As described the CDM based on Article 12 of the Kyoto Protocol is loaded with two objectives: reduction of emission in a cost efficient way and contribution to the sustainable development of developing countries. Developing countries are concerned about their development while their emission is expected to surpass

the industrialized countries soon. Therefore, any initiative in climate change mitigation should incorporate these two pressing problems. The involvement of both developing and developed countries as well as the integration of climate change policies with sustainable development are key to successful climate policy (Olhoff et al, Undated).

The sustainable development aspect of the CDM is very important because it is the only mechanism that involves Non-Annex I countries in the emission reduction process and their active participation is dependent on meeting their national development objectives through the CDM.

However, there have always been questions whether the second objective is being met. The reasons given to this failure are associated with the framework of the Kyoto Protocol and how it works. While emission reductions are measurable because the whole integrity of the protocol depends on that, the power to validate and measure sustainable development contributions are left to the host countries because they are sovereign entities.

The DNAs are left in a dilemma that emanates from this arrangement: as a DNA they want to attract foreign investment however if they set the sustainable development standard at a higher level they risk losing the investment.

Therefore, they are forced to make a compromise between these two objectives in favor of investments from the CDM by setting low sustainable development criteria or not specifying them at all. They opt to the reduction of these criteria in a continuous basis in order to compete with other countries for investment leading to what is called “race to the bottom”.

Even though direct local benefits from CDM projects are questionable, some give credit to the indirect benefits in the form of improvement to infrastructure, CER revenues to the economy and employment (Schneider, 2007).

2.7.2. Evaluation of Sustainable Development in the CDM Context

Selecting and defining specific goals and aspects of sustainable development is the first step in the assessment of sustainable development of CDM projects (Lee, 2004). In the present context monetary value is assigned to GHG emission reductions whereas the contribution to sustainable development is not subject to a generally applicable evaluation procedure (Von, 2009).

There are different steps suggested to be followed in the assessment of sustainable development impacts of CDM projects. The UNEP has come up with a six step procedure that involves overview of national development priorities ,selection of sustainable development criteria based on those policy priorities ,initial screening for potential CDM projects, outlining of procedure for assessing the sustainable development impacts ,general decision making procedure and finally evaluating the performance of the implemented CDM project(Olhoff, Undated).

Since the CDM is a market based mechanism that operates at the project level, operationalizing sustainable development in the CDM context involves operationalizing sustainable development at the project level. The implication of this assumption is that CDM projects have their effect marginally at the national or global level.

Therefore, the challenge here is to come up with sustainable development criteria that reflect the national level development objectives and that is meaningful at a project level context (Olhoff, Undated).

Chapter Three

Research Methodology and the CDM Project of Humbo

3.1. Description of the study Area

The study area is located in South Western Ethiopia around 430 km from the capital Addis Ababa. The geological formation of the Woreda belongs to the Precambrian rock formation underlain by sedimentary rocks and volcanic ashes. The soil of the area is mainly brownish red predominated by clay soil (Deribe, 2006).

The Humbo Woreda (district) is one of the highly populated areas in the country. The Woreda covers an area of 86,646 ha with a population of around 125,286 according to the 2007 national population and housing census (CSA, 2007). There are about 22,375 households of which 15% are female headed. Population growth is about 3% per annum. Live stock is estimated at about 108,000. Main crops grown in the area are maize, sweet potato, teff, coffee and cotton. It is predominantly a farming community with an average of 0.25 ha of land holding, subsistence agriculture as the main stay of the people (Deribe, 2006).

According to World Vision Ethiopia before the CDM project was commenced this once largely forest covered area has been highly degraded because of population pressure and unsustainable use of resources. Only bushes and shrub lands were left which led to reduced supply of wood and wood resources, low productivity, flood and drought recurrence (World Vision, 2008). With the new project it has been said that these have been changed, and the objective of this study is to assess the changes made in that regard.

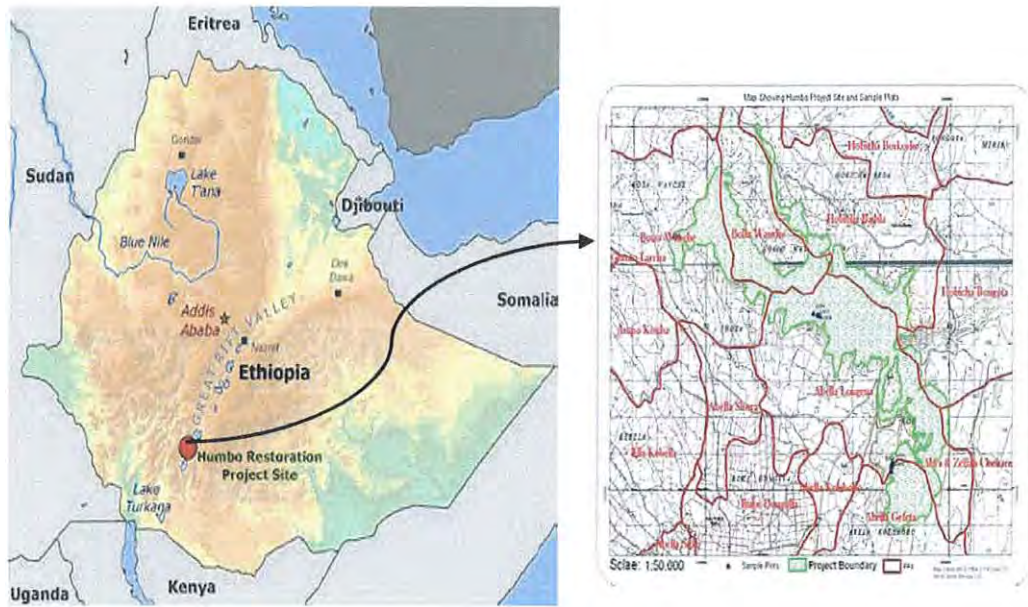


Figure 3: Location of the Humbo Project

Source: World Vision

3.2. Methodology

This study used the Multi Criteria Analysis approach. It is one of the most widely used methods to assess sustainable development contribution of CDM projects. The method is used to analyze local stakeholders' assessment of the sustainable development contribution of the Humbo carbon sequestration project in terms of its socio-economic and environmental impacts.

In traditional discourse sustainable development has three pillars that sometimes overlap. These dimensions of sustainable development are economic, social and environmental, each with their own multiple indicators.

Stakeholders at different levels (federal and regional) are approached through interviews and questionnaires to assess their views of the project in the context of promoting sustainable development along the analysis of important documents. Stakeholders include local community members who are directly affected by the project, World Vision Ethiopia (the NGO responsible for

developing and implementing the project), Federal and Local Government Authorities in particular the Designated National Authority (Environmental Protection Authority of Ethiopia).

Method

This study employs the survey method to analyze the sustainable development contribution of the project. The survey method is economical and allows rapid turn out in data collection. Self administered questionnaires and interviews are the main instruments used to collect data (see Appendices) along other sources of data.

Using multi stage sampling the population is clustered into 7 cooperatives out of which 2 cooperatives are randomly selected. One hundred (100) questionnaires are administered taking the household as a sample unit in two cooperatives, Hobicha Bada and Bolla Wanche, each approximately with 450 and 550 households respectively. With an alpha level of .05, a .03 margin of error and t value of 1.96 for an approximated population of 1000 households in the two cooperatives the sample size is calculated to be approximately 100. Purposive sampling is used to identify those households that are participating in the project.

Data Analysis

Data analysis is mainly based on simple descriptive summaries (e.g. mode and median), graphical procedures (e.g. bar charts) and data tabulation forming the initial stage of the data analysis. In addition, inferential statistical tests are used to analyze the Likert item questions.

A 4-point Likert scale forced choice method that ranged from strongly disagree to strongly agree was used by avoiding the middle point option (i.e. the undecided/neutral option). The remedy to the 4-point scale is it shields against respondents bias to the central response option. The presentation of the

findings of the survey data is organized in two parts .Descriptive statistics which is based on the median, the mode and the frequency of responses is presented first using tables, pie charts and bar graphs. The median and the mode are chosen over the mean because with statistical analysis of individual Likert items the mean is not considered to be an appropriate measure since the measurement scale is ordinal at this level. In this study priority is given to the mode value. With inferential statistics , as was the case for descriptive statistics Likert scale data forms an ordinal level of measurement necessitating a nonparametric statistical test that does not require parametric and distribution assumptions about the population to analyze differences between groups (e.g. differences in the two cooperatives). The appropriate nonparametric test for two independent groups like cooperatives and gender on an ordinal level measurement is the Mann-Whitney U test (aka the Wilcoxon Sums Rank test) which is the nonparametric equivalent of the parametric *t* test.

Two methods are used for data collection: a questionnaire addressed to the community to assess the sustainable development contribution of the project and interviews conducted to grasp the opinion of different stake holders. The survey questionnaire data is analyzed using SPSS 17.

Validity which is the correctness and effectiveness of the questionnaire items has been verified by reviewing different literature on the measurement of sustainable development in addition to consulting different stake holders.

In regard to the analysis of the internal consistency of the 35 scaled items a 0.85 Cronbach's alpha was derived indicating an excellent reliability since 0 .8 alpha values are considered to be perfect measures of reliability.

3.3. Humbo Local Area Context

The Humbo area and its surroundings have severely been exposed to drought and recurrent famine (World Vision, 2008). Over exploitation of the resources particularly the forest resources of the area due to lack of land rights, agricultural expansion, land grants to outside investors and resettlement schemes are mentioned as reasons (Rijsoort and Asferachew Abate, Undated). Three decades ago the area has been covered with dense tropical jungle with different species (World Vision, 2008).



Humbo: February 2002



Humbo: March 2010

Figure 4: Humbo area before and after the project

Photograph by World Vision

More than 85% of the population in the Humbo Woreda is assumed to be living in poverty (World Vision, 2008). Variability of rainfall coupled with environmental degradation led to food shortages and famines in the 1980s. The deforestation of Humbo has resulted in calamities that threatened water supply, intensified soil erosion, and reduced agricultural productivity enormously (World Vision, 2008).

Landholding Rights

In Ethiopia land and natural resources are exclusively owned by the state as stipulated in Article 40 of the FDRE Constitution (FDRE, 1995) which holds true for the study area as well.

In addition, the Federal Rural Land Proclamation states that land is the common property of the Nations, Nationalities and Peoples of Ethiopia and shall not be subject to sale or to other means of exchange. The implication of this is that land rights and tenure are the jurisdiction of the government.

Before the commencement of the project access to the land for fuel wood, grazing and other resources was common: everyone in the community has been provided with free access to these resources.

This has raised concerns of conflict as reflected in the community consultations prior to the implementation of the project. Therefore, considerations were made how to involve those who claim user right to the land in question (PDD, 2009).

Hence, the land on which the project activity was to be commenced was transferred to community ownership giving the right of using the carbon trade income and other forms of income from the land to the community (PDD, 2009).

Farmer Managed Natural Regeneration

Farmer Managed Natural Regeneration is a non conventional method of regenerating forests. It is the systematic regeneration of “underground forest” by giving priority to indigenous plant species rather than exotic species as was the case in conventional reforestation projects.

This method was tried out in Niger in the 1980s with an enormous success in increasing crop yield, fodder production and firewood. In the Humbo regeneration project this method was applied building on the experience of World Vision Ethiopia in other areas.

Establishment of Cooperatives and Bylaws

As indicated seven cooperatives were formed pertinent to the Cooperatives Society Proclamation No.402/2004. According to the proclamation they are an autonomous self help organizations that possess judicial personality upon registration.

The seven cooperative societies have bylaws that govern them in conducting their activities outlining the structure of their organization, rights and duties, objectives, membership criteria, conditions of withdrawal and dismissal and issues related to management and the management bodies established according to these bylaws (PDD, 2009). Each cooperative is composed of locals (both men and women) as well as representatives from World Vision Ethiopia and the Ethiopian forestry department.

In the bylaws for each cooperative the functions, composition, power and hierarchical reporting structures of these organs of the cooperatives are outlined. The highest decision making authority is the General Assembly which is the assembly of all the cooperative members.

National Stakeholders involved in the Project

There were different national and international stakeholders involved in the project design and implementation as well as at different stages of the project.

EPA is established by the Environmental Protection Organs Establishment Proclamation No.295/2002 with the general mandate to protect and manage the environment and natural resources of the country. It is the implementing organ of international climate change and environmental instruments like the Kyoto Protocol which Ethiopia ratified in 2005. Ethiopia has also mandated EPA to be the Designated National Authority according to the requirement of the Kyoto Protocol in regard to CDM project activities. This mandate gives it the authority to approve or disapprove CDM projects based on the assessment of sustainable development criteria.

World Vision Ethiopia is the NGO responsible for the proposal and implementation of the project. The idea of a carbon sequestration project emanated from World Vision Australia which later collaborated with World Bank in developing it. World Vision Ethiopia also played an important role in mobilizing the community, raising fund, giving technical and human support and facilitating the flow of funds.

There were different government bodies involved at different hierarchies. At the federal level the most important participants were the Ministry of Agriculture and Rural Development and the Environmental Protection Authority. Because of its affiliation with forestry activities, land administration and development the former was an active participant in the project.

The regional bureaus were also equally important in implementing regional forest and land policies and regulations. At the local level the Woreda (district) Agricultural Office is responsible for allocating land to the community as well as facilitating the establishment of cooperatives in the community.

The local Cooperatives Office was the one responsible for providing certificates to the seven cooperatives that are established with the project in addition to discussing the bylaws with the community and providing technical support on the matter.

Since the whole idea behind the project is to help the local community and reduce poverty, the most important stake holder is the community who will be affected by the activities of the project.

Through consultative meetings a lot of work has been done to involve much of the community in the proposed project. In addition, there were proposals made to create other livelihood mechanisms to those who will be affected by the project upon denial of access to the remaining forest resource of the project site.

As a result membership to the cooperatives has increased from time to time as evidenced by the example from one cooperative, Hobicha Bada in which there were only 418 men and 9 women but now there are 630 men and 80 women as members. Membership is open to all community members who are eligible to certain criteria as put in the bylaws.

Chapter Four

Results and Discussion

The results of this study are presented in a way in that first description of the characteristic of the households surveyed is presented. Then the questionnaire items on sustainable development are analyzed and discussed along other sources of data.

4.1. Characteristics of Sampled Households

Age of the Respondents

The age of the respondents is divided into six categories considering the youngest age to be 18 since the respondents are household heads who are at least expected to be at the lowest marital age according to the Ethiopian family law. This age category is followed because it is used as a conventional method of categorizing adult respondents in the collection of survey data. The survey data shows that the two middle age categories, "25-34" and "35-44", have the majority of the respondents constituting 62% (Table 1).

Table 1: Age of the Respondents

Age category	Frequency	Percent	Valid Percent	Cumulative Percent
18-24	13	13.0	13.0	13.0
25-34	31	31.0	31.0	44.0
35-44	31	31.0	31.0	75.0
45-54	18	18.0	18.0	93.0
55-64	6	6.0	6.0	99.0
65+	1	1.0	1.0	100.0
Total	100	100.0	100.0	

Source: Survey data (2010)

Gender of the Respondents

The distribution of gender in the respondent groups shows difference in the two cooperatives indicating that traditionally the male being the head of the household. Data was collected from household units via the household heads.

Table 2: Distribution of the respondents by Gender

The Cooperatives	Gender		Total
	Male	Female	
Hobicha Bada	31	19	50
Bolla Wanche	35	14	49
Total	66	33	99

Source: Survey data (2010)

Only 20% of female household heads were married, as compared to 59% of the males, while 5% of the females were widowed against 1% of the males indicating that the chance of a female respondent becoming a household head increases on the departure of her spouse (Table 3).

Table 3: Marital Statuses of the Respondents

Gender	Marital Status in Percent					Total
	Married	Never married	Divorced	Separated	Widowed	
Male	59	4	2	1	1	67
Female	20	6	2	0	5	33
Total	79	10	2	1	6	100

Source: Survey data (2010)

Educational Level of the Respondents

As can be seen from figure 4 most of the respondents (47 %) in the survey constitute the “Illiterate” and the “Grade 1-3” category.

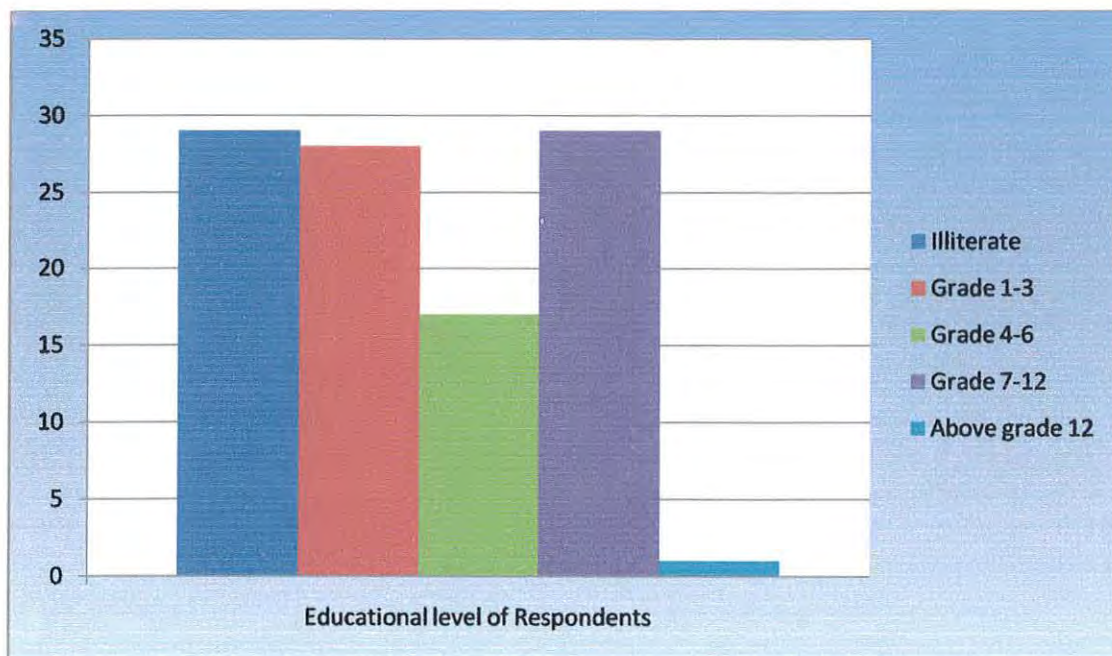


Figure 5: Educational level of Respondents

Source: Survey data (2010)

Family Size

Humbo is one of the areas in Ethiopia with high population density. The households in the survey have an average family size of 6.

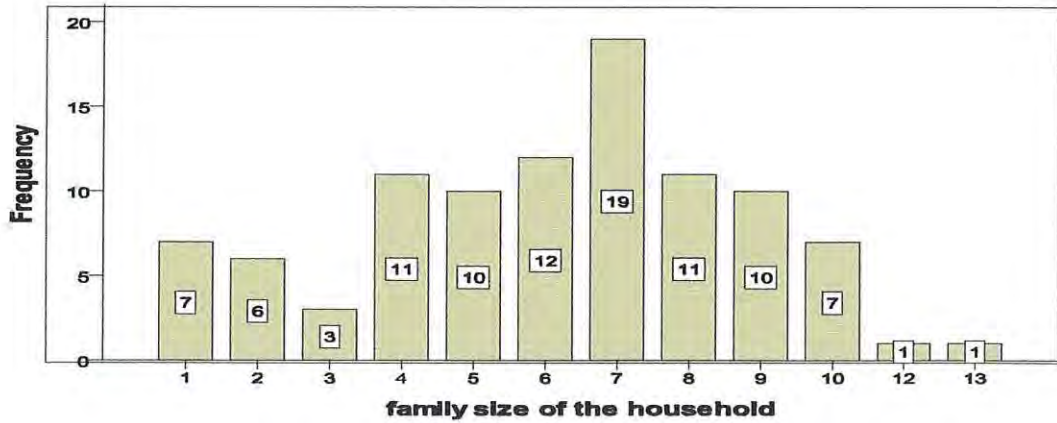


Figure 6: Family Size of the Households

Source: Survey data (2010)

In Ethiopia fertility is highly affected by educational status; a woman with no education is having as three times more children than a woman with some secondary education (CSA, 2005). This holds true for the households surveyed in Humbo in that the family size of the households decrease with increase in educational attainment.

Table 4: The Relationship between Education and Family size

		Educational Level of the Respondents					Total
		Illiterate	Grade 1-3	Grade 4-6	Grade 7-12	Above grade 12	
Family size of the Households	1	0	0	1	6	0	7
	2	2	0	1	2	0	5
	3	2	0	0	1	0	3
	4	2	4	2	2	1	11
	5	2	5	1	2	0	10
	6	3	4	3	2	0	12
	7	6	6	4	3	0	19
	8	3	5	3	0	0	11
	9	4	3	1	2	0	10
	10	4	0	0	3	0	7
	12	1	0	0	0	0	1
	13	0	0	1	0	0	1
Total		29	27	17	23	1	97

Source: Survey data (2010)

Income Source

In the study area most of the households depend on the sale of fruits and vegetables (31%) followed by the sale of livestock and livestock products (20%) and sale of crops (18%).



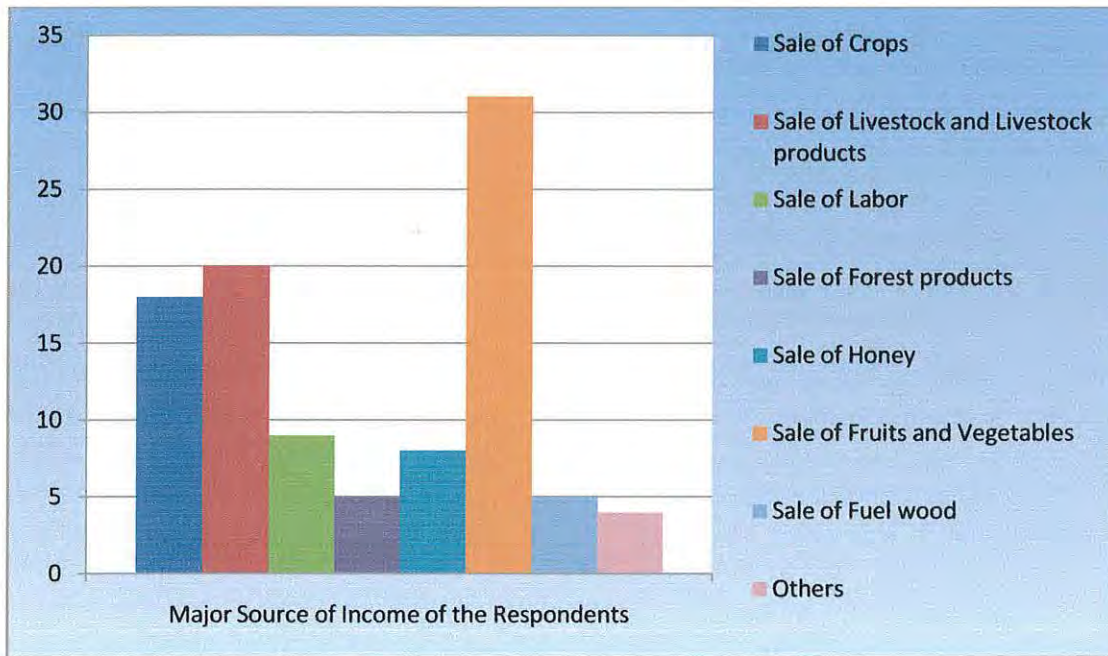


Figure 7: Major source of Income of the Respondents

Source: Survey data (2010)

4.2. Sustainable Development Contribution of the Project

4.2.1. Environmental Indicators

Environment is one of the three pillars of sustainable development used in this study. There are ten indicators used in the survey questionnaire to assess the people's attitude towards the project's contribution to environmental protection and regeneration of the degraded environment.

The indicators range from improvement in water quality and quantity, restoration of biodiversity, reduction in soil erosion, improvement of air quality, improvement in waste disposal, reduction in illegal deforestation to restoration of endangered animal and plant species of the area.

The findings of the survey are presented in Table 5.

Table 5: Frequency Distribution of the Environmental Indicators

(WQL=water quality improvement, WQT=water quantity improvement, Air QL=air quality improvement, Bio=restoration of biodiversity, Erosion=reduction in erosion, WD=waste disposal, Rainfall=rainfall variability, DID = decrease in deforestation, REP= restoration of endangered plants, REA= restoration of endangered animals).

	WQL	WQT	Air QL	Bio	Erosion	WD	Rainfall	DID	REP	REA
Me.	2.0	2.0	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0
Mo.	1, 3	2	3	3	3	3	3	4	3	3
Fr.	(38%), (38%)	(54%)	(81%)	(84%)	(75%)	(56%)	(51%)	(82%)	(54%)	(68%)

Source: Survey data (2010)

Water quality is measured as the concentration of main pollutants in the water after the project as compared to the baseline. Water quality has a median of 2.00 and two modes (1 and 3). While 38% of the respondents agreed that there was improvement in water quality after the project, another 38% reported that there was no water quality improvement. In one of the cooperatives respondents strongly disagreed to water quality improvement while in the other they agreed in an equivalent magnitude.

This holds true for water quantity as well, which is the projects contribution to better availability and access to water, though here there is only one mode (i.e. 2) which has a frequency of 54%. In this regard the difference in the two cooperative groups is not significant where in one group 47 of the respondents (87%) disagreed while in the other group 41 of the respondents implied a strong objection to the improvement in water quantity.

About 81% of the respondents have supported the improvement in air quality after the project. In the same way restoration of biodiversity (both fauna and

flora) of the area, has shown a remarkable score with 84 % of the respondents claiming that there was improvement in the biodiversity of the area.

About 75% of the respondents agreed to reduction in soil erosion. The rest of the indicators (waste disposal, rainfall variability, endangered plant and animal species) also have a median and mode of 3 with 56%, 51%, 54% and 68% frequency distribution respectively. One exception is reduction in illegal deforestation which has a mode and median value of 4 at 84% frequency.

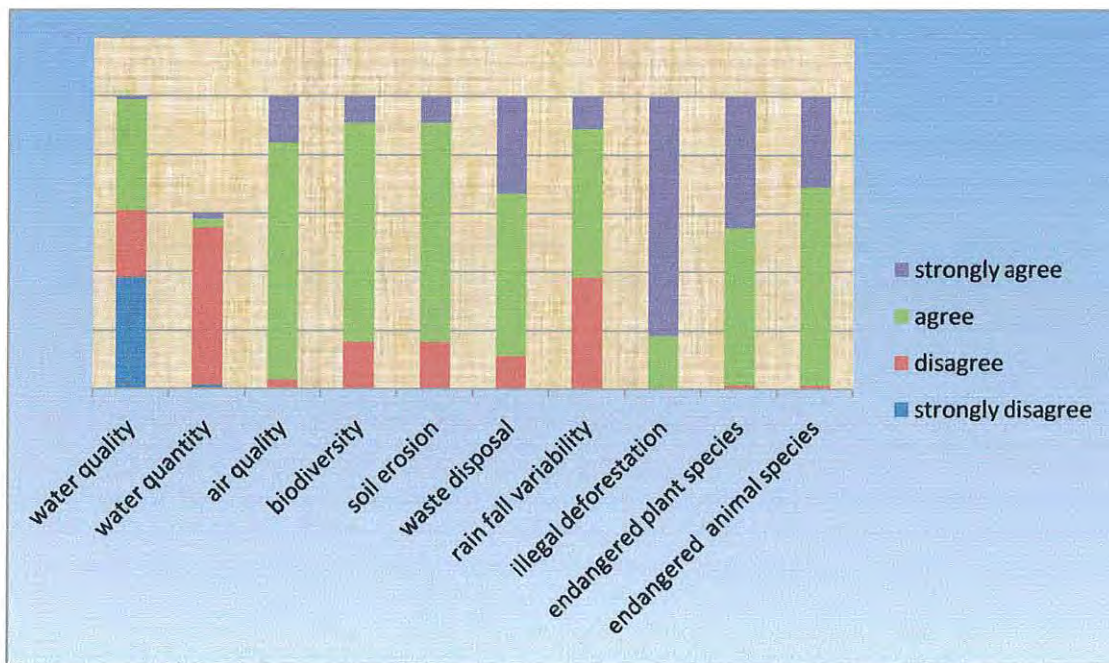


Figure 8: Summary of Responses to Environmental Indicators

Source: Survey data (2010)

The response of the two cooperatives with regard to the sustainable development indicators is discussed below.

Mann-Whiney U test was conducted to test the null hypothesis that there is no difference in the median scores of the two cooperatives (Hobicha Bada and Bolla Wanche) in their response to the environmental indicators.

With the alpha value set at 0.05 as the dividing line all the indicators show statistically significant difference except for two indicators (i.e. reduction in soil erosion and decrease in illegal deforestation) which show no significant difference in the response of the two cooperatives ($p=0.126$ and $p=0.120$ respectively) leading to the rejection of the null hypothesis.

Table 6: Mann-Whitney U test for the Environmental Indicators

(Refer to Table 5 for keys to the Indicators).

	WQL	WQT	Air QL	Bio	Erosion	WD	Rainfall	DID	REP	REA
MWU	146.50	264.50	938.00	999.00	1082.00	331.50	990.50	1100.00	991.50	549.50
Z	-8.118	-7.724	-3.156	-2.722	-1.530	-7.137	-1.986	-1.554	-2.056	-5.963
Asymp. Sig. (2-tailed)	.000	.000	.002	.006	.126	.000	.047	.120	.040	.000

Grouping Variable: The Cooperatives

Source: Survey data (2010)

Although it is generally agreed that carbon sequestration projects “can often generate co-benefits such as more regular and higher quality water supplies” (Scherr et al, 2006 cited in Jindal et al 2006) this is not the case with the Humbo project which exhibits different scenarios in regard to the above indicators. In the Humbo area because of the high level of the areas exposure to drought from degradation it is not at this point to impact positively in water quality and quantity. In one of the cooperatives (i.e. Hobicha Bada) a significant amount of the respondents (38%) agreed that there was water quality improvement as a result of the project while in the other cooperative, Bolla Wanche, an equal percent (38%) of the respondents disagreed that there has been water quality improvement as a result of the project.

However, to come to the conclusion whether water quality has been improved by the project, it is appropriate to see the other two responses (i.e. disagree and strongly agree) which scored 23% and 1% respectively. This raises the cumulated disagreement level to 61% .Therefore, it is safe to conclude that overall there is no water quality improvement from the project according to the survey result.

In contrast to this the respondents in both groups agreed that there has been no water quantity improvement that resulted from the project. They highly stressed that there is water supply problem in both their respective cooperatives.

Air quality has improved significantly after the project according to the survey data. Since it is a project that targeted to improve the area's micro climate this comes as a no surprise. The success of the project in that regard has been affirmed by the majority of the respondents (81%) who agreed that there is improvement in air quality after the project. Dawit Koyera who is Humbo Woreda' s Natural Resource Development and Environmental Protection Coordinator said the area has been very hot before the project regenerated the forest. However, now this condition has been changed.

The same holds true with the biodiversity of the area which is successfully regenerated after the project. The restoration of the biodiversity of the area relied on the FMNR method which focused on the regeneration of indigenous species.

Soil erosion was one of the most pressing challenges in the area before the project with the population surge of the late 1980/90s coupled with the 1984 drought which destroyed the remaining vegetation cover of the area (Kamara, 2008). The findings of this research indicate that now this problem has been

successfully dealt with as indicated by the survey response in which 75% of the respondents said that there is reduction in soil erosion in the area.

More than half of the respondents (56%) said that there has been improvement in waste disposal after the project which is defined as the proper burial or burning of household waste. There is also a high level of agreement to the reduction in rain fall variability with 89% of the respondents saying that rainfall variability has been decreasing since the implementation of the project.

The project has established protected forests that are under the control of the cooperatives. This has resulted in a significant reduction of illegal deforestation. The survey result confirms that as 82% of the respondents strongly agreed that there is reduction in illegal deforestation. In the past the major cause of the area's degradation was the unrestricted access to these forest resources. Dawit Koyera said that even people from as far as Soddo (15 km from Humbo) and the surrounding areas used to come to the Humbo area to cut trees.

Regarding the restoration of endangered plant and animal species there is almost a complete agreement with 99% of the survey respondents confirming to that effect. Research on similar projects in Uganda, Madagascar and other countries also indicate that CDM projects are helping in restoring and conserving natural resource and biodiversity (Jindal et al, 2006). Ironically, the problem now appears to be the wild animals' (e.g. baboons and lions) interference with the people's lives after they have been restored to the area. Although the people affirmed that endangered wild animals and plant species are successfully restored, the wild animals are posing a threat by destroying crops and fruits. There are different mechanisms proposed to overcome this problem including "the establishment of food chains to control dominant species" according to Wubishet Genebo who is an Agro forestry expert in the Woreda's Agricultural Office. According to Hailu Tefera who is Environment

and Climate Change Program Officer at World Vision Ethiopia these methods are working since the complaints from the community are decreasing in recent times.

4.2.2. Economic Indicators

Eleven economic indicators are used in the survey to grasp the changes brought about by the CDM project in the Woreda. These indicators are intended to measure attitudes towards increase in household income, new employment opportunities created, technological transfers, resource management and access and market access created. The outcome of the survey is summarized below (Table 7).

Table 7: Frequency distribution of the Economic Indicators

(II=increase in income, ID =income diversification, NE =new employment, ITP =income from timber products, INTTP =income from non timber products, NT =new technology, RM=resource management, MA=market access, RR=renewable resources, NRR=non renewable resources, AR =access to resources).

	II	ID	NE	ITP	INTTP	NT	RM	MA	RR	NRR	AR
Me.	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Mo.	3	3	3	3	3	3	3	3	3	3	3
Fr.	58%	70%	77%	62%	52%	45%	70%	72%	72%	63%	62%

Source: Survey data (2010)

All the indicators have a 3 point mode and median value indicating that the respondents agreed to the affirmative statements in the survey. Similar studies in other developing countries show that CDM projects have the potential of improving communities' economic capacity especially through income generation. For example a study made by Brunt and Knechtel (2005) found out that a project in Kenya was improving the livelihood of the local community

of organic fertilizers. In the case of the Humbo reforestation project fodder and honey production along other timber and non timber products are the main sources of income. However, the frequency of their agreement to the economic indicators varied as can be seen from Table 7. The highest percentage (77%), for example, is given for the variable new employment opportunity where as the least percentage (45%) of agreement is recorded for new technology.

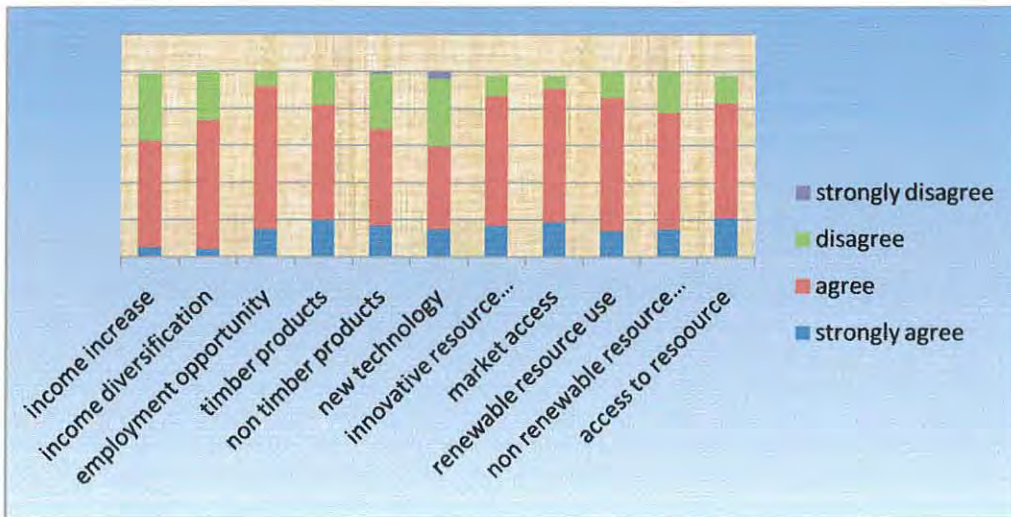


Figure 9: Summary of responses to Economic Indicators

Source: Survey data (2010)

Similarly the test score for the economic indicators shows that with the exception of access to market for resources produced ($p=0.357$) there is statistically significant difference between Hobicha Bada and Bolla Wanche in terms of the responses towards the sustainable development contribution of the project in the two cooperatives.

Table 8: Mann-Whitney U test for the Economic Indicators

(Refer to Table 7 for keys to the Indicators).

	II	ID	NE	ITP	INTP	NT	RM	MA	RR	NRR	AR
MWU	841.00	973.00	777.50	640.00	594.00	517.00	810.50	1100.50	820.000	617.50	476.00
Z	-3.102	-2.388	-4.434	-4.863	-4.971	-5.453	-3.494	-.920	-3.761	-5.083	-6.011
Asymp. Sig. (2-tailed)	.002	.017	.000	.000	.000	.000	.000	.357	.000	.000	.000

a. Grouping Variable: The cooperatives

Source: Survey data (2010)

As it was the case for the environmental indicators the economic indicators also produced positive impacts from the project. Over all the survey data indicated that there has been income increase in the households. About 58% of the respondents agreed to the affirmative. This income increase mostly resulted from proper management and utilization of the natural resources and the sale of forest products, honey and fodder.

The income increase is also accompanied by diversification of the income sources where members are engaged in different economic activities. According to an expert of World Vision Ethiopia there were different skill development trainings like tailoring given to the community members to detach them from their dependence on charcoal production.

Creation of employment opportunities is one of the contributions expected from carbon sequestration projects. The Humbo project in that regard has an ample

success especially with the temporary employment it created in tree nursery. The survey result supports this argument as 77% agree that there are employment opportunities created by the project. As this is a community owned project it is not expected to create administrative jobs so much as other similar privately run projects. For that reason most of the administrative activities are executed by the community members through the different bodies established according to the bylaws.

There is increase in income that is generated from both timber and non timber products with 62% and 52% agreement respectively. Timber products include the firewood that is generated from the lots reserved for that purpose. In the past one of the problems that came with the over exploitation of the forest resources was the shortage in fire woods. However, with the project people are getting fire woods and other products from their lots following the principles of the FMNR method.

Technological transfer in the CDM context implies the introduction of new technological innovation to the local community that will alleviate problems that the community faced. In this particular case it implies the introduction of different technologies like sewing machines, improved hives and others. In the Humbo CDM project though it is not as significant as it should be there is still new technological transfer to the locality as evidenced by 60% agreement of the survey respondents to that effect.

The use of innovative techniques for resource management is one of the areas of praise for the project which depended on the FMNR method to regenerate and manage the forest resources of the area. This method which depended on the local community is based on the promotion of restoring indigenous species. In the Humbo context this method was used by pruning and tinning the remaining forest patch. Hailu explains why this method is chosen and the reason for its success as: “unlike other closed regeneration projects the FMNR

allows the community to fetch fire wood and other tree products creating the sense of ownership”.

Market access has been created for products like honey. Even communities PLCs were established to facilitate the market access. In the survey more than 90% of the respondents confirmed that market access has been created.

The use of renewable and non renewable resources in a sustainable way is also appreciated by the project. These resources include the forest, soil, water and other resources of the area. As has been discussed different mechanisms are applied to create their sustainable use.

Access to resources has also been improved according to the survey responses in which more than 80% of the respondents indicated that there is improvement of access to resources.

4.2.3. Social Indicators

In the social dimension of the survey measurement there are 14 indicators used that ranged from property rights clarification ,community involvement in project design and implementation, community capacity building, investment in education and health services, formation of cooperatives to carbon payment and improvements in the livelihood of the community in general. Table 9 shows the frequency distribution of the responses.

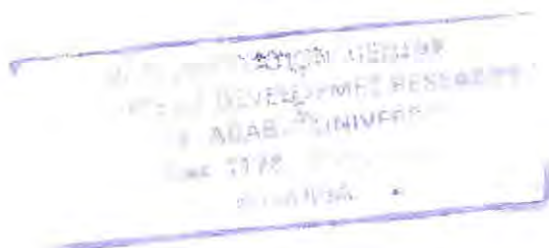
Table 9: Frequency distribution of the Social Indicators

(PR=clarification of property rights, FR= access to forest resources, CI=community involvement, CB=capacity building, IIE=investment in education, IIH=investment in health, FC=formation of cooperatives, BCO=bylaws have created order, WP=women’s participation, ILT=increase in literacy rates, DBC=distribution of costs and benefits, TRM=trainings for resource management, CI= agreement on carbon income, IL=improvement in the livelihood of the community).

	PR	FR	CI	CB	IIE	IIH	FC	BCO	WP	ILT	DBC	TRM	CI	IL
Me.	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	2.0	3.0	3.0	3.0
Mo.	3	3	3	3	3	3	3	3	2	3	2	3	2	3
Fr.	71 %	70.4 %	54 %	57 %	53 %	55 %	63. 6%	42%	49 %	50. 5 %	48%	51%	47 %	46 %

Source: Survey data (2010)

All the indicators have a median value of 3 except for women’s participation and cost and benefit sharing which indicates that the respondents like the preceding two criteria are in agreement to the positive social contribution of the project. However, that is not the case in regard to the mode values of three variables namely women’s participation, distribution of costs and benefits in the cooperatives and agreement on the distribution of income from the carbon trade each of which has a mode value of 2(signifying disagreement to the affirmative propositions).In this context the mode is preferred to make the conclusion by sticking to the general principle in Likert items data analysis.



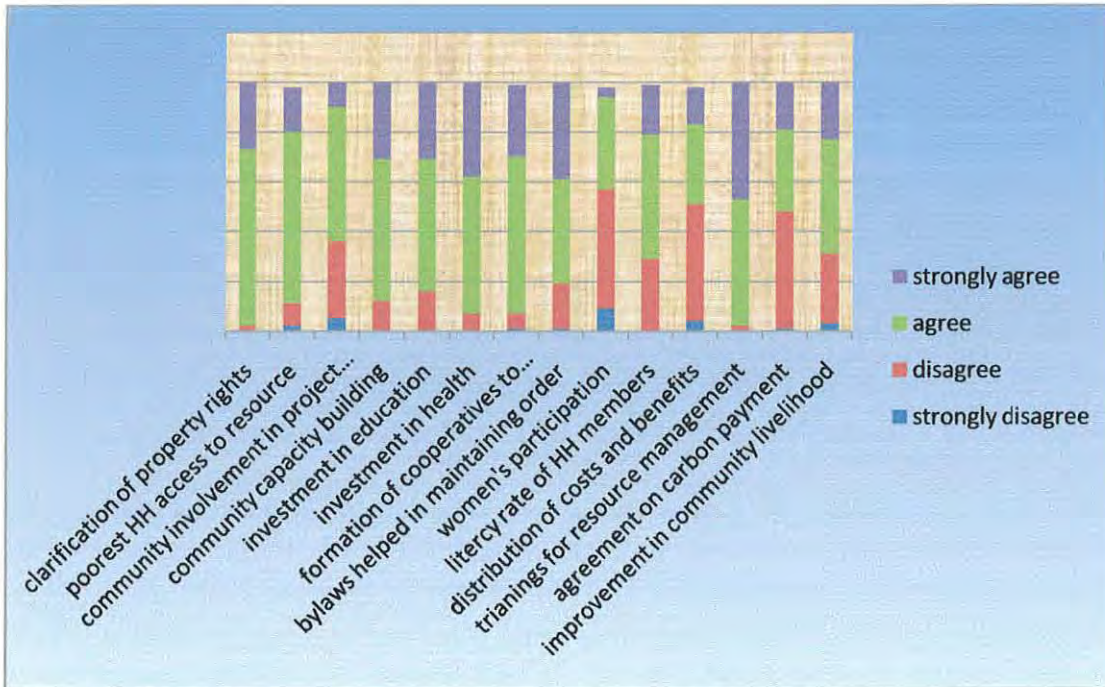


Figure 9: Summary of responses to Social Indicators

Source: Survey data (2010)

Unlike the above two categories, the social indicators have a marked deviation in the difference of the contribution of the project to social development in the area. This is witnessed by the fact that in 5 of the 14 social indicators there is no statically significant difference between the cooperatives. The indicators that revealed this are contribution of the project to clarification of property rights, improvement of poorest households' access to forest resources, women's participation in decision making, fair distribution of costs and benefits and provision of trainings for better management of resources and project participation. Therefore, at the 0.05 significance level there is enough evidence to conclude that there is statistically significant difference in the two cooperatives regarding the above social indicators. However, since they have a p value of less than 0.05 the rest of the indicators showed no difference in the two cooperatives.

Table 10: Mann-Whitney U test for the Social Indicators

	PR	FR	CI	CB	IIE	IIH	FC	BCO	WP	ILT	DBC	TRM	CI	IL
MWU	1127.5	1003.5	939.5	659.5	476.0	335.5	916.5	595.0	1007.0	751.5	1103.5	1127.5	717.0	910.0
Z	-1.070	-1.744	-2.37	-4.59	-5.90	-7.14	2.55	-4.86	-1.511	-3.62	-.743	.966	-3.97	-2.51
Asymp. Sig. (2-tailed)	.284	.081	.018	.000	.000	.000	.011	.000	.131	.000	.457	.334	.000	.012

Grouping Variable: The Cooperatives

Source: Survey data (2010)

(Refer to Table 9 for keys to the Indicators).

The social indicators are not different from the above indicators discussed in terms of the project’s impact on the development of the local community although there are exceptions to that argument. One of the successes of the project comes from its clarification of property rights (e.g. land and forest resources) which in the first place was one of the reasons for the over exploitation of the natural resources.

As has been discussed the land on which the project is implemented was under state ownership and the use of the resources including the forest was open to anyone. This led to the over exploitation and degradation of the area in a “tragedy of the commons” semblance. However, with the project the forest land has been converted in to community ownership giving the members of the cooperative the right to use the resources on the land including the income from the carbon trade.

The project was expected to facilitate poorest households access to resource which the project has achieved at a high level (87% of the respondents agrees to that). This is the case with other similar carbon sequestration projects in Africa as was found out by Jindal et al (2006) in which benefits from timber and non timber forest products are being reserved to local communities except in one case (Green Resource Ltd in Tanzania and Uganda) where the “implementing organization owned the wood and non-wood products generated by its plantations.”

One of the requirements for CDM projects is that they should have extensive consultation with stakeholders before they are implemented. The Humbo carbon sequestration project has also passed through the same path in involving the local community to participate in designing and implementing the project. Particularly consultation at the early stage of the project was vital since many of the community members were threatened assuming that they were to lose their traditional source of income.

The other challenge was introducing the community to the concept of carbon trade which in itself is complex in addition to being new. As the first of its kind in Ethiopia there were no other projects from which experience can be drawn. However, the success was enormous with people participating in the implementation of the project full heartedly as evidenced by the regeneration activity. Once the impact of the project has been felt the number of members to the cooperatives is also increasing. The survey also implies similar results with 64% of the respondents claiming that there was community involvement in the design and implementation of the project

In terms of building the community’s capacity there are different activities executed by the local government offices and the project proponent World Vision. Capacity building mostly focused on rehabilitating those whose livelihood was dependent on the forest resources which are now restricted with

the implementation of the project. Capacity building also stressed on the diversification of the sources of income through skill development. In a parallel study Jindal et al (2006) found out that carbon sequestration projects in Africa are focused on community development rather than profit making which led to community organization and capacity building. In the survey 84% of the respondents reported that capacity building was provided to them through trainings and workshops.

Investment in important social services like education and health is an important aspect of sustainable development which should also be considered with CDM projects that claim to promote local sustainable development. In that respect the Humbo CDM project has invested in basic services like education and health as confirmed by the survey respondents with their 88% and 93% agreement respectively.

Forming community groups to administer and look over carbon projects in community based forestry activities is highly recommended since it helps in the successful implementation of the project by creating sense of ownership. In one such project in Mexico, Corbera (2005) found out that this was highly effective in curving community conflicts. Cooperatives as is outlined in the bylaws are formed to advance the rights of the members. These cooperatives help members to be aware of their rights better and advance them. They are also facilitating the administrative process through the committees formed under their auspices. The members also indicated in the survey that the formation of these cooperatives was helpful in making them become aware of their rights in regard to resources and other rights including the right to the income from carbon trade. A 92% level of agreement was recorded from the survey in terms of the cooperatives contribution to better understanding of rights and entitlements. There were other similar initiatives in other projects. Even though cooperatives were not formed small groups that consisted 10-12 farmers were established,

for instance, in Tanzania to facilitate the participation of more than 20,000 community members in one given carbon-sink project (Jindal et al, 2006).

The bylaws are also contributing to the establishment of order in the community by outlining duties and rights of the members. They deal with issues ranging from the criteria for membership to the conditions of leaving the cooperatives. The respondents find that these bylaws in the cooperatives are helping in bringing order as 81% of the respondents confirmed that.

Women's participation is an important aspect of any society's development endeavor as they constitute half the society. However, in traditional societies like Ethiopia that is not the case where women's place is considered to be the domestic sphere in which they are denied the decision making sphere of the public arena. One of the measures of sustainable development is its contribution to women's better participation in decision making in their community. The Humbo project in that regard was not able to bring any change from the status quo. Women's participation in decision making has not improved in any significant way where 48% of the respondents claim that the project has not encouraged women's participation in decision making in matters that are affecting their lives. This is because in Humbo, just like in other rural parts of the country, women are still not encouraged to participate in public affairs for traditional and religious reasons.

In Humbo as is the case in Ethiopia illiteracy is prevalent with 29% of those in the survey falling under the illiterate category. The project has invested on education in the Woreda which is the reason why respondents agreed that the project has improved the literacy rate of the household members (70%).

One of the responsibilities of the cooperatives is to facilitate the distribution of costs and benefits among the members of the cooperatives according to their contribution. The benefit of this arrangement is to compensate and encourage

those that are participating in the regeneration and other activities accordingly. Unfortunately, mixed opinions are observed from the survey data where half of the respondents(47%) are claiming the existence of some form of unfairness in the distribution of costs and benefits while an equal percent providing agreement that there is fairness.

The newness of the project requires that the project proponents and the responsible government offices to provide appropriate and sufficient training to allow the community to better manage resources and participate in the project as a whole. In the case of the carbon sequestration project of Humbo there is an enormous agreement (98%) that trainings are effectively provided to allow better resource management and project participation.

The first carbon payment (\$34,000) is released from World Bank's Bio Carbon Fund marking the first ever carbon trading in Ethiopia. The Fund has agreed to buy a total of \$726,000 worth of carbon credit for \$4 per metric ton, from the total 880,000 metric tons of CO₂ equivalent CERs to be generated over 30 years of period. World Bank's Biocarbon Fund is an initiative with private and public contribution that buys emission reduction credits from afforestation and reforestation projects as well as from reduced emissions from deforestation and degradation (REDD) projects.

The question now is how the community uses this money. It has already been decided that the income should be invested on community development programs. According to World Vision Ethiopia's expert different activities are promoted with the income including bee keeping, petty trade, health services, brick production, pipeline, crop storing, and nursery and seedling distribution by providing with grants that have no interest or lower than commercial banks interest rates. The role of the Credit Committees in the cooperatives is to identify highly impoverished members of the community and provide them with the credit after appropriate trainings. This approach of distributing income

from carbon sequestration projects is also being practiced by similar projects in Africa except in some cases where “farmers groups receive quarterly payments on the basis of the number of trees they protect.”(Jindal et al, 2006).

In addition, investment on projects that are beneficial to the community as a whole like constructing schools, health centers and the like are among the community’s priority list. However, the survey respondents are not in complete agreement to this arrangement as 48% of them say that agreement how to use the income from the carbon trade has not yet been reached. Yet another 52% of the respondents are of the opinion that agreement has been reached.

To generalize the survey result, it is important to see whether the project has improved the livelihood of the community in general which 69% of respondents claimed has been achieved. This is fairly successful as compared to one research that found out that only “58% of [similar] projects pursue some kind of community development activity comprising environmental education programs, the construction of infrastructure such as roads, support of local schools and the improvement of health services.” (Burian, 2006). However, a study by Current et al (cited in Scherr and Smith, 2002) reviewed 56 such projects and found out that a majority of them were profitable.

From the above discussion of the three sustainable development criteria and their status in the Humbo project a conclusion can be reached that the project overall has improved the livelihood of the community although it is important that other forms of assessment that measure these criteria in terms their quantitative value is a complimentary to the present approach which used only attitudinal measure of the subject using the Likert scale.

In conclusion, the carbon sequestration of Humbo is a success story of its kind in bringing about sustainable development to an area that has been exposed to degradation. This success is mainly attributable to full-fledged involvement of the local people in the project through the FMNR method.

4.3. Potentials and Challenges for scaling-up CDM projects in Ethiopia

In Ethiopia there is only one carbon trade project that is registered by the UNFCCC. This also reflects on the low number of such projects in Africa as a whole which accounts for less than 2% of registered projects worldwide. The reason behind this low involvement in carbon trade of the continent in general and Ethiopia in particular is the low level of human and institutional capacity that is hindering participation in addition to the market oriented arrangement of CDM projects. On the other hand, project developers are also of limited capacity to come with viable project proposals that is able to earn the DNA's letter of no objection. Mohammed Ali who is the Ethiopian Federal EPA's Technological Transfer Directorate Director contends that international investors are more interested in projects that immediately generate credits like energy projects. He stated that "they are not interested in small scale projects from landfills, waste treatment and the like. We do not have large industries that emit significant amount of gases to attract investors like China and India do. The problem in Ethiopia is that projects are dispersed and it will make calculation and other aspects difficult."

Hydro Power is one of the areas where CDM CERs can be generated according to the Kyoto Protocol. Ethiopia as a country has ample hydro power capacity but it is not using this opportunity to register hydro power generating projects. This is because "Ethiopia is mostly engaged in large scale hydro power projects that in themselves are believed to contribute to emission of gases like methane", said EPA's director which, according to him, contradicts the very basic objective of CDM projects which is the reduction of these gases.

Another problem hindering the full engagement in CDM projects is the fate of the Kyoto Protocol which is expected to be decided next year in Durban as stakeholders claim that it is difficult at this point to fully engage in such projects without knowing what will happen to this Protocol which is the source

of these mechanisms. However, World Vision's Hailu does not agree as he believes that even if the Kyoto Protocol is not sustained beyond 2012 these mechanisms will still be there in other forms of agreements and commitments underlying the responsibility of developed states to climate change mitigation. He also has strong faith on the voluntary carbon markets like Chicago Carbon Exchange (CCX) and the Australian New South Wales Green House Gas Abatement Scheme which are not Kyoto-compliant and exist in countries that have not yet signed the Kyoto Protocol.

However, the problem with these voluntary markets is even though they are growing fast they constituted only a very insignificant amount of the whole carbon trade market in terms of volume: in 2005 the European Union Emissions Trading Scheme (EU-ETS) which is a Kyoto-compliant arrangement was by far the largest market (\$ 8.2 billion) while the above two voluntary markets (\$58.33 million) were tiny by comparison (Jindal et al, 2006). This leaves us with the notion that states should reach an agreement for a post-Kyoto regime for engagement in these mechanisms to be not hindered by fear of its termination.

In conclusion, countries like Ethiopia can assess their potential in this market based mechanism and use it to supplement their development endeavors.

Chapter Five

Conclusions and Recommendations

5.1 Conclusions

In Ethiopia to date there is only one CDM project that is operational. This Humbo Assisted Natural Regeneration Project has been considered as a success story of its kind while many CDM projects around the world are being criticized for not meeting the objective of bringing about any sustainable development benefits to the locality in which they are established. This study has assessed how the Humbo project managed in achieving this success.

The Humbo carbon sequestration project has a different story that uniquely presents itself in changing the lives of the community. Among the many reasons for its success is the engagement of the local community to regenerate the degraded forest area. This method, also called Farmers Managed Natural Regeneration, is a community based regeneration of indigenous species through pruning and tinning.

Another important reason for the successful implementation of this particular project is the commitment of the stakeholders to integrate the resources and technical capacity at their disposal. This has been witnessed from both the government bodies including the DNA and the local agricultural office which provided the medium to effectively deal with the local community and other stakeholders.

The DNA (i.e. the Environmental Protection Authority of Ethiopia) has helped in integrating this concept which is new to Ethiopia through employing a multi stake holder approach in the formulation of sustainable development criteria to assess the PDD. The project proponent, World Vision, has also exploited its ample experience in the area to make this opportunity a fruitful endeavor in

helping the local community. In this regard other potential projects to come in the future can draw important lessons in handling such projects.

The outcome of the project in regard to its contribution to sustainable development in the area is enormous in most of the sustainable development indicators used in this study that included environmental, economic and social aspects.

All in all there were 35 sustainable development indicators that were categorized in to three categories. Among these variables in the environmental category water quantity and quality were not found to have been improved by this project while the other indicators have shown a significant improvement.

The biodiversity of the area is restored and air quality has improved. Soil erosion which was highly prevalent before the project has been reduced with the successful regeneration of the area. Rainfall variability has also decreased although it is not that significant. Another important success is the regeneration of endangered plant and animal species using the FMNR method.

As it has been projected in the monitoring plan prepared by the project proponent, economically the project has helped to increase the income of the local community along income diversification that intended to reduce the community's dependence solely on forest resources.

As should be the case from such projects there was employment opportunity created by this project although questions can be raised on its significance and permanence. The study has also found that new technology and innovative techniques are applied for resource management. An increase in income from timber and non timber products is also witnessed with the community being able to provide themselves with different forest products and other non renewable resources in a sustained manner.

In the social category the benefit of the project is highly felt in its clarification of property rights which in the past indirectly contributed to the resource degradation of the area. This has been alleviated with the community ownership of the reforested area. One of the reasons for the success of the project lies in the involvement of the community in the project before and after its implementation creating a sense of ownership and responsibility. Capacity building trainings along with education have an iterating effect in making the project a long lasting success and producing an ability to sustain the development of the area.

Yet with all this triumph there are areas that need proper reconsideration to claim a complete jubilation in all directions in regard to sustainable development. Among these weaknesses is the low participation of women in decision making which is the undeniable necessity to the overall success of this or other similar projects. The fairness in the cost and benefit sharing mechanism of the cooperatives is also a pressing issue as it is the motivating force behind active and responsible participation of the members in the project. The distribution of the income from the carbon trade presents yet another challenge that should be addressed early.

In conclusion, the Humbo Assisted Natural Regeneration Project has proved to be a plausible way of regenerating degraded resources and helping poor communities to survive resource degradation and climate change through income generation and resource management in a sustainable way that can also be reproduced in other areas.

5.2 Recommendations

To further enhance the contribution of CDM projects to Sustainable Development in Ethiopia and exploit what the international climate change mitigation regime has to offer in the future, the following recommendations are made.

In particular with the Humbo project:

1. The controversies surrounding carbon payments and benefit sharing need to be dealt early so as to create community consensus. This requires further empowering the cooperatives and the local community who eventually are the owners of the project.
2. Encouraging the sense of ownership of the community to resources and carbon generated income is vital. The success of this project mostly emanates from its full-fledged involvement of the community in the project indicating that sense of ownership is a significant factor in assuring the projects prolonged development contribution to the community.
3. In the Humbo area there are two groups in regard to the carbon project: those who are involved in the project and those who are not. The agreement is that both groups get the benefits of the carbon payment through community development investment of the income to be generated from the carbon sequestration project. This may lead to issues of conflicts of interest between these two groups. Therefore, the simplest way out is to include as many of the community members as possible to avoid the issue of unfair distribution of burdens and benefits.
4. There are still some unexpected problems that arose with the implementation of the project like wild animals whose successful regeneration was intended to be a positive side effect of the project. However, their regeneration has brought unanticipated negative effect on the people. All stakeholders should cooperate on such issues to make sure that the project does not end up in directions that it is not intended to.

5. Sustainable development encompasses different issues. As it is the case there are areas in which the project should still be working like the encouragement of women to participate in decision making.

In general in regard to Carbon-related/CDM projects:

1. In Ethiopia, there is no legal instrument that gives guidance as to how to engage in such projects. To date the DNA is using related and appropriate legal instruments of the country to deal with proposed CDM projects. There is a draft regulation on the way that is expected to be passed soon which will be a major step in institutionalizing and structuring the whole process of establishing CDM projects in Ethiopia. Therefore, it is important to build the capacity of involved institutions and stakeholders to maximize the benefits of this arrangement.

2. Ethiopia is on the verge of issuing a regulation for licensing carbon finance related activities and projects. Even though this is a major step forward from the past in which there was no regulatory framework, yet again there are improvements still to be made in regard to the proposed draft regulation which has some stringent propositions particularly in regard to the requirements for establishing the different offices related to CDM projects and personnel qualifications and experience which bypasses the newness of the concept in Ethiopia.

3. The active participation of the government in climate change regimes implies the commitment that the country has towards climate change issues thereby attracting investors from the west.

4. Incentives for private developers along the development of appropriate instruments and institutional arrangements are other areas where the DNA and the government as well should focus to encourage the involvement of investors and developers.

5. Capacity building is important to meet international requirements and standards. In this regard the newness of the carbon trading concept requires experience sharing with those countries that have exploited the potential in an extensive way. An important way to build capacity is the inclusion of this concept in the curriculum of the country along issues of climate change.
6. Using different mechanisms like bundling of small projects to reduce transaction costs and accommodate for the problem of small projects lacking to attract investors.

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Appendix I

Addis Ababa University
College of Development Studies
Department of Environment and Development

Questionnaire for sampled households.

The purpose of this questionnaire is to assess the contribution of the CDM project to Sustainable Development in Humbo Woreda, Welayta zone of SNNPR.

I. Personal and Household Profile

Respondent No _____

Cooperative Name _____

1. Sex of Respondent _____ 1. Male 2. Female
(Household Head)
2. Age of Respondent _____
3. Marital status _____
1. Married 2. Never married 3. Divorced
4. Separated 5. Widowed
4. Educational Level _____
1. Illiterate 2. Grade 1-3 3. Grade 4-6
4. Grade 7-12 5. Above Grade 12
5. Family size Male _____ Female _____ Total _____
6. Major source of income _____
1. Sale of crops
2. Sale of livestock and livestock products
3. Labor
4. Sale of forest products

5. Sale of honey
6. Sale of fruit and vegetables
7. Sale of fuel wood
8. Others

II. The contribution of the project to Sustainable Development. Please mark your choice in the box.

Scales

1= Strongly Disagree

3= Agree

2= Disagree

4= Strongly Agree

	Criteria: Environment	Scales
1	The project has improved the quality of water in your locality	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
2	Access to water has increased	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
3	Air quality has improved after the implementation of the project	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4
4	The project has improved the areas species richness (biodiversity)	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4

5	Soil-erosion has decreased	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Waste disposal has improved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Rain fall variability has decreased	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Illegal deforestation has decreased	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Endangered plant species have been restored	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Endangered animal species have been restored	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Criteria: Economic				
11	Income has increased per household	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Income sources have been diversified	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	The project has created new employment opportunities for the local community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	There is income increase generated from timber products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	There is income increase generated from non timber forest products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	New technology has been adopted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	The resource management has been supplemented by innovative techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18	Market access has been created for products	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
19	Renewable resources are being used in a sustainable way	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
20	Non-renewable resources are being used in a sustainable way	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
21	Access to resources has been improved	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
Criteria: Social					
22	The project has contributed to clarification of property rights (i.e. land and forest)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
23	The poorest households access to forest resources has been improved	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
24	The community has been involved in project design and implementation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
25	The project has contributed to capacity building in the community through trainings and workshops	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
26	There is investment in education	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
27	There is investment in health services	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
28	The formation of cooperatives has helped to better understand rights and entitlements	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
29	By-laws are helping in maintaining order	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
30	Women are encouraged to participate in decision making	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

31	The project has contributed to increasing the literacy rate of the household members	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
32	Costs and benefits are equally distributed in the cooperatives	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
33	Trainings are effectively provided to allow better resource management and project participation	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
34	How to use the income from the carbon trade is agreed upon	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
35	There is improvement in the livelihood of the community	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

Appendix II

አዲስ አበባ ዩኒቨርሲቲ ኮሌጅ አፍ ዲቪዥን (የልማት መካነ ጥናት) የኢንቫይርመንትና ዴቪሎፕመንት ትምህርት ክፍል በነዋሪዎች የሚሞላ መጠይቅ

የዚህ መጠይቅ አላማ ሲዲኤም ፕሮጀክቱ በወላይታ ዞን ሁምቦ ወረዳ ላይ ያመጣውን ዘላቂ ልማት ለመገምገም ነው።

I. ግላዊና ቤተሰባዊ መረጃ

የመላሽ ቁጥር -----

የህብረት ስራ ማህበር ስም -----

1. የመላሽ ፆታ ----- 1. ወንድ ----- 2. ሴት -----

(የቤተሰብ ሃላፊ)

2. የመላሽ ዕድሜ -----

3. የጋብቻ ሁኔታ -----

1. ያገባ/ች 2. ያላገባ/ች 3. የተፋታ/ች

4. የተለያየ/ች 5. በሞት የተለየ/ች

4. የትምህርት ደረጃ -----

1. ያልተማረ/ች 2. ከ1ኛ-3ኛ ክፍል 3. ከ4ኛ- 6ኛ ክፍል

4. ከ7ኛ- 12ኛ ክፍል 5. ከ12ኛ ክፍል በላይ

5. የቤተሰብ ብዛት ----- ወንድ ----- ሴት ----- ጠቅላላ -----

6. ዋና የገቢ ምንጭ -----

1. እህል በመሸጥ

2. እንስሳትና የእንስሳት ውጤቶችን በመሸጥ

3. የጉልበት ስራ በመስራት

4. የደን ውጤቶችን በመሸጥ

5. የማር ምርት በመሸጥ

6. የጓሮ አትክልትና ፍራፍሬ በመሸጥ

7. የማገዶ እንጨት በመሸጥ

8. ሌላ የገቢ ምንጭ

II. ፕሮጀክቱ ያመጣው ዘላቂ የልማት ውጤት። ምርጫዎን ሳጥኑ ላይ የ “✓” ምልክት በማድረግ ያሳዩ።

ስኬል (መለኪያ)

- 1. በጣም አልስማማም
- 2. አልስማማም
- 3. እስማማለሁ
- 4. በጣም እስማማለሁ

	መደብ: አካባቢያዊ	ስኬል (መለኪያ)			
1	ፕሮጀክቱ የአካባቢውን የውሃ ጥራት አሻሽሏል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	የውሃ አቅራቢት ጨምሯል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	ከፕሮጀክቱ በኋላ የአየሩ ንፁህነት ጨምሯል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	ከፕሮጀክቱ በኋላ የአካባቢው ብዝሃ ህይወት ተሻሽሏል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	የአፈር መሸርሸር ቀንሷል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	የቆሻሻ አወጋገድ ስርዓት ተሻሽሏል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	የዝናብ መዋገር ቀንሷል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	ህገ ወጥ የደን ጭፍጨፋ ቀንሷል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	በአደጋ ላይ የነበሩ የእፅዋት ዘሮች ብዛታቸው ጨምሯል	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10	በአደጋ ላይ የነበሩ የዱር እንስሳት ዘሮች ብዛታቸው ጨምሯል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
	መደብ: ኢኮኖሚያዊ				
11	የቤተሰቡ ገቢ ጨምሯል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
12	የተለያዩ የገቢ ምንጮች ተፈጥረዋል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
13	ለአካባቢው ህብረተሰብ አዳዲስ የስራ ዕድል ተፈጥሯል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
14	ከዛፍ የሚገኘው ገቢ ጨምሯል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
15	ዛፍ ካልሆነ ምርቶች (ምሳሌ ንብ እርባታ) የሚገኘው ገቢ ጨምሯል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
16	አዳዲስ ቴክኖሎጂዎች ጥቅም ላይ ውለዋል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
17	የተፈጥሮ ሃብት አጠባበቁ በፈጠራ የታገዘ ነው	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
18	ለሚመረቱ ምርቶች የገበያ አማራጮች ተፈጥሯል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
19	ታዳሽ የሆኑ የተፈጥሮ ሃብቶች ዘላቂ በሆነ መልኩ ጥቅም ላይ እየዋሉ ነው (ምሳሌ የደን ሃብት)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
20	ታዳሽ ያልሆኑ የተፈጥሮ ሃብቶች ዘላቂ በሆነ መልኩ ጥቅም ላይ እየዋሉ ነው (ምሳሌ የደን ማዕድናት)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
21	ለተፈጥሮ ሃብቶች ያለው ተደራሽነት (access) ጨምሯል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
	መደብ: ማህበራዊ				
22	ፕሮጀክቱ የኅብረት መብትን (እንደ መሬት ና ደን የመሳሰሉትን) ግልፅ አድርጓል	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

Appendix III

Interview guide for the project proponent (World Vision Ethiopia), the DNA (Environmental Protection Authority of Ethiopia) and the Woreda Agricultural Office.

I. Questions addressed to World Vision Ethiopia

1. What do you think is the impact of climate change to countries like Ethiopia?
2. How do you assess the CDM as a mechanism to achieve both objectives of emissions reductions and promotion of sustainable development?
3. Do you think that at the international level there is a conducive environment to establish and get register CDM projects in countries like Ethiopia?
4. How do you see the CDM establishing process in Ethiopia?
5. Do you think you have satisfactorily involved all the stakeholders?
6. How did you manage local community conflicts, if there were any?
7. What was the role of the World Bank in the project set up and afterwards?
8. Was there any other international NGO involved? What was its role?
9. How did you find the sustainable development criteria and indicators set by the DNA (EPA)? Do you think that they are up to international standards? Is it acceptable to you that host countries assess CDM projects in terms of sustainable development criteria?
10. What was the role of the local agricultural office in the project?
11. Do you think that the CDM project has contributed to local sustainable development? If so, what are these contributions?
12. What were the challenges you faced in convincing the local community to participate in the project?
13. What was the source of funding to kick start the project?
14. Have you taken measures to achieve equity in regard to cost benefit distribution, gender issues and addressing the most vulnerable?

15. What is the view of the community in conserving natural resources?
Are there any contrasting views?
16. What are the advantages and disadvantages of FMNR?
17. Are the cooperatives functioning according to the bylaws? Are there any violations?
18. How do you intend to distribute the income earned from the sale of carbon credits?
19. How is the income expected to bring changes in the lives of the community members?
20. Is the income to be distributed collectively or individually at a household level?

II. Questions addressed to EPA (the Designated National Authority)

1. How are the sustainable development criteria and indicators developed?
2. Is the Humbo carbon sequestration project meeting these criteria and indicators as outlined in the Project Design Document?
3. Why is not Ethiopia exploiting this opportunity by establishing more CDM projects?
4. As a DNA what are the measures you are taking to promote CDM projects in Ethiopia?
5. To what extent do you think sustainable development can be promoted by CDM projects?
6. What are the challenges in promoting sustainable development using such projects?
7. Is there any effort so far to set up regulatory frameworks and procedures regarding the CDM process in Ethiopia?
8. How is the approval process working? Who are involved in the approval of CDM projects?

9. How do you maintain the link with different stakeholders (the Project Proponent, the Rural Agricultural Office and the community)?
10. Do you have any monitoring plans as to whether the sustainable development criteria are met or not?
11. Since sustainable development is a contesting subject how did you manage to make a compromise in criteria selection?

III. Questions addressed to Agricultural Office of the Woreda

1. What was your office's role in the design and implementation of the project?
2. How do you see the advantages and disadvantages of community ownership of forest resources?
3. Is the project changing the livelihoods of the local people?
4. Is there improvement in regard to natural resource conservation in the area after the project?
5. What were the major challenges that you have faced when designing and implementing the project?
6. What sort of support is your office providing to the project?
7. Are you involved in monitoring the project?
8. What would you consider as the strength and weakness of the project?
9. Does the income to be generated from the carbon have any incentive for those involved in the project to protect the forests in a better way from those who are not?
10. What is the response of the households that are participating in the project?
11. What is your office's relation to other stake holders like the DNA?

Appendix IV

Definition of Sustainable Development Indicators

Environmental Indicators

Increase in water quality- this measures reduction in the concentration of main pollutants in the water after the project as compared to the baseline.

Increase in water quantity- the projects contribution to better availability of and access to water in the area.

Improvement in air quality- decrease in the amount of pollutants in the air after the project as compared to the baseline scenario.

Reduction in soil erosion- decrease in the washing away of mineral rich particles as a result of the deforestation of the area.

Improvement in waste disposal- measures handling of household byproducts through burial or burning appropriately.

Decrease in rain fall variability – as a result of the effect on the micro climate of the area rain fall variation decreases or increases after the project.

Decrease in illegal deforestation – this is the reduction in access to the project area's forest resource illegally.

Restoration of endangered plant species- indicates whether the project has restored the plants that have been endangered because of deforestation.

Restoration of endangered animal species- indicates the restoration of different wild animals like baboons and lions to the area after the project activity.

Economic indicators

Increase in income – this is measured in terms of the income increment in the households after the project.

Diversification of income source- the broadening of economic activities after the project allowing more income to be generated.

Creation of new employment opportunity- it is the increase in the number of employed people after the project.

Income from timber products – the income extracted from different tree products like construction materials and household utensils.

Income from non timber products- this implies the income generated from non timber products of the forest like honey.

Adoption of new technology – the introduction of new technology like sewing machines and irrigation pumps with the project.

Innovative resource management – the management of resources that is cost and time effective as well as avoids negative consequences of the practice.

Creation of Market access- it is the projects contribution to opening new ways of marketing products.

Sustainable use of renewable resources- it is the efficient use of renewable resources like water after the project.

Sustainable use of non renewable resources- it is the efficient use of non renewable resources like minerals after the project.

Improvement in access to resources-it is the projects contribution to availability of resources.

Social indicators

Clarification of property rights – whether the project has cleared up controversial user rights for instance in terms of land and forest resources.

Improvement of poorest households' access to resources- this measures whether the project is helping poor households in gaining more access to resources.

Community involvement in project design and implementation- assesses the level of community participation in the project at different stages of the project.

Community capacity building- it measures whether the project has employed different mechanisms like trainings and workshops to build the communities' capacity.

Investment in education- whether or not the project has improved access to different levels of education in the community by investing in the construction of schools.

Investment in health services- whether the project invested in health provision through the construction of health facilities.

Cooperative formation – measures whether the formation of the cooperatives helped the community to better understand rights and entitlements.

Bylaws – the contribution of bylaws in maintaining order in the community after the project.

Women's participation – it measures whether the project has encouraged women in decision making.

Increase in literacy rate- measures the project's contribution to improving the level of literacy at the household level.

Distribution of costs and benefits- it indicates how the members share the resources in the cooperatives.

Provision of trainings – measures whether or not trainings are provided to allow better resource management.

Agreement on carbon payment – it indicates whether agreement has been reached as to how to use the income from the carbon trade.

Improvement in the livelihood of the community- indicates the overall well being of the community as a cumulative effect of improvement in livelihood.

DECLARATION

I hereby declare that this thesis is my original work and has not been presented for a degree in any other University. All sources of materials used in this work have been duly acknowledged.



BEKRI MOHAMMED

This thesis has been submitted for examination with my approval in my capacity as an advisor.

Dr. FEYERA SENBETA

