

**Fiscal space and carbon sequestration in Ethiopia: a potential non-traditional source of development finance to meet the MDGs**

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**Abstract**

The financial and economic crisis accentuated an already challenging situation for Ethiopia. Coming in the heels of the food and fuel crisis from which Ethiopia was just beginning to recover, the slump in world trade from the financial and economic crisis tightened the fiscal space in Ethiopia in term of revenue from exports. This also followed a situation where revenue collection as a percentage of GDP had been declining for the earlier five years. The Ethiopia MDG Needs Assessments exercise conducted in 2004-2005 revealed that the cost of meeting the MDGs in Ethiopia is about US\$ 121 per capita per year , of which public sector costs are estimated at US\$ 91 per capita per year. On the other hand, revenue collection per capita increased from about US\$ 18 in 2001/02 to about US\$ 42 in 2007/08. Given this trend, revenue collection will reach the needs of meeting the MDGs by 2021/22, some six years after the 2015 deadline. Within this context, this paper looks at carbon sequestration and trading as an option for increasing fiscal space in Ethiopia. This, as one of the many other possible options of non-traditional source of development finance, could complement the traditional sources of Official Development Assistance and gains from efficiency in tax administration. Drawing from the REDD principles, the paper finds that within certain parameters of carbon trading, Ethiopia could increase its fiscal space by up to US\$ 140 million which is 0.4 percent of GDP (2009) or 3.4 percent of revenue and grants of the same year. Of course realizing this fiscal space calls for a complex policy interventions, some of which falls within the realm of the international carbon market.

Key words: carbon sequestration, fiscal space, MDGs, Ethiopia

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## **I. Introduction**

Ethiopia was hit by the financial and economic crisis just as it was recovering from the food and fuel crisis. As the fuel stabilization fund was used to shield the majority of Ethiopians from the rising oil prices international reserves were depleted from over three months of import cover in mid-2005 to about one month by end-November 2008 (IMF 2009), for a population of about 77 million. Like most African countries, Ethiopia also has to shrink its central government operation as the crisis deepened when most of the developed world was stimulating domestic demand. Prudence would have dictated that counter-cyclical measures were needed by Ethiopia as some authors argue (Degol (2009)). However, because reserves were not enough to stimulate demand, Ethiopia had to weather the crisis with pleas for non-reduction of official development assistance (ODA). An obvious lesson for Ethiopia is that just as the fuel stabilization fund was able to shield its citizens from the fuel crisis, a similar mechanism could have been helpful against the financial and economic crisis (FEC). Such a mechanism could have benefited from the latitude given by increased fiscal space. Ethiopia, supported by the International Monetary Fund, is working on increasing fiscal space through the traditional sources of tax management and administrative reform and the Economic Development Research Institute, supported by UNDP, WB and IMF, is also undertaking a comprehensive study on the tax system.

This paper looks at carbon trading as a non-traditional source of development finance to complement the above efforts. Trading in carbon invokes passion from both ends of the debate. Advocates see it as an inevitable reality to which African countries should be capacitated to effectively participate in, as they would do in the trade of any natural resource they are endowed with. Trading in carbon should be seen just like trading in diamonds or groundnuts. On the other hand, opponents such as Bond (2008) see it as immoral to pay someone for the right to continue to pollute the atmosphere. This paper is not a foray into this interesting debate for which the jury is still out, rather it looks at the prospects of creating fiscal space for Ethiopia within the existing framework of the Clean Development Mechanism (CDM).

This paper argues that current revenue per capita projections will fall short of meeting the levels needed to meet the MDGs by 2015. The latter level is anticipated to be reached by 2021/22, some six to seven years later. In this regard, the prospects of carbon trading as a candidate for increasing fiscal space is examined and the paper finds that Ethiopia can increase its fiscal space by about US\$ 140 million if it can reduce its deforestation rate by 50 percent. This represents about 0.4 percent of GDP in 2009 or 3.4 percent of revenue and grants in the same year. That said, the paper further argues that despite these prospects, Ethiopia, as is the case with many African countries, is yet to benefit from any scheme under the CDM and this needs to change. Confidence in carbon trading would require African countries seeing benefits in participating in

them which suggests that the current spaghetti-bowl of conditions for earning credits and benefits needs to be simplified and seen to also benefit all participants, especially those from Africa.

The paper is divided into six parts including this introduction which is followed by a review of the literature. Then an overview of fiscal space and central government operations in Ethiopia is presented in section III followed by brief on the Clean Development Mechanism (CDM) and Reduced Emissions from Deforestation in Developing Countries in section IV. This is followed by an empirical assessment of potential fiscal space in section V and conclusions and recommendations in section VI.

## **II. Literature review**

UNDP estimates of the costs needed to address environmental issues that bear most directly on poverty reduction in developing countries range between \$60-\$90 billion per year against ODA of around \$3-5 billion for sustainable energy and environment – related activities. They argue that additional financing mechanism will be needed to fill the gap. Carbon trading offers itself as a potential option for filling this gap. Sireh-Jallow (2008) explored carbon trading potential that exist for Sierra Leone as it looks at ways of increasing fiscal space to meet the MDGs.

In the carbon trade, a market would exist comprising of polluters (industrialized countries) and non-polluters (mainly developing countries) with the latter trading their carbon sequestration potential for the right to continue to pollute by the former. Trading in carbon, therefore invokes passion from both ends of the debate. On one end are advocates who see it as an inevitable reality that developing countries should be capacitated to effectively participate in. On the other end, opponents such as Bond (2008) see it as immoral to pay someone for the right to continue to pollute the atmosphere. This paper do not foray into that debate, rather it looks at the prospects of creating fiscal space for Ethiopia within the existing framework of the Clean Development Mechanism (CDM).

The rising level of CO<sub>2</sub> in the atmosphere is no longer a debatable issue as mean annual concentrations in the Antarctic ice cores and monthly concentrations at Mauna Loa, Hawaii shows (Laurence 2007). The debate on what causes these rising levels still goes on, but of equal importance is what can be done to reduce CO<sub>2</sub> emissions or encourage sequestration. All the same, UNDP (2005) contend that Climate change has emerged as the one the most important issues facing the global community in the 21 century. It is expected to pose a serious threat to development and poverty reduction and the effects will be felt most strongly by the poorest people in the least developed countries, who rely on the natural environment for their livelihoods. In this regard, major new investment will be needed over the next 15 years to tackle

a wide range of environmental issues that are central to developing countries' ability to eliminate poverty and reach the MDGs.

One of the solutions was the introduction of trading in carbon such that market mechanisms will reward environmental management. For developing countries, the prospects for increased fiscal space that comes with trading a resource they already possess should be welcomed opportunity. However this has not turned out to be so. Out of 1138 CDM projects approved so far, only 27 of them originate from 7 African countries which represents average annual reductions of 7 million (3.2%) CER.

Intense discussion went into these deliberations in Kyoto where the Kyoto Protocol was signed and the Clean Development Mechanism (CDM) was born. Many proposals have been put forward including the Columbia, ton-year, change-in-stock (Kerr and Leining 2000) and now the Costa Rica proposal. The issues of permanence and sovereignty have also featured prominently in the debates. Advocating for active private sector role in the climate change mitigation, Nicole et al (2006) present a conceptual model highlighting the relationship MNCs project host countries and carbon sequestration mechanisms, and how this relationship can better funnel resources towards environmental protection and sustainable economic development.

Herzon, Caldeira and Reilly (2002) present a method to quantify the effectiveness of carbon mitigation options taking into account the "permanence" of the emissions reduction arguing although most commonly associated with 'leaky' carbon sequestration reservoir, it applies to just about all carbon mitigation options. Their results show that the value of relatively deep ocean carbon sequestration can be nearly equivalent to permanent sequestration if marginal damages (i.e. carbon prices) remaining constant or if there is a backstop technology that caps the abatement cost in the not too distant future. On the other hand, if climate damages require a fixed cumulated emissions limit and there is no backstop, then a storage option with even very slow leakage has limited value relative to a permanent storage option

Roberts and Thumim (2006) argue that modeling to date of distributional impacts indicates that individual carbon trading is less regressive than carbon taxes (particularly if personal air travel is included) even if a carbon tax system manages to optimize the recycling of revenues through the benefits and tax credit systems to compensate those of lower incomes. They contend that individual carbon trading can be moderately progressive. They suggest a programme of system development and testing what they call "off-line" and the development of simulation games and trading systems games to see individual and group responses. These they argue will expose weaknesses and frustrations in any system and while also gather real world carbon emission data for individuals and households which will assist further modeling work. Tisdell and Grainger (2009) looked at how different emission trajectories and spots and futures

markets may affect an emissions trading scheme in terms of compliance and market efficiency. They find that markets are able to adjust to round by round declining permit stocks in terms of reducing aggregate production. Further, the rate of decline in permits does not appear to impact on the level of compliance. They also find that futures markets do not produce significantly better results than simple spot markets in terms of compliance and market activity. Arguing for the small farmer, De Pinto, Magalhaes and Ringler (2010) reviews the challenges of including agriculture in both the formal and informal carbon markets, and some of the proposed methods to ensure that smallholder farmers gain access to the markets that rewards climate change mitigation activities. They describe the opportunities and challenges for these farmers to access payments for environmental services, such as carbon markets.

### **III. Fiscal space in Ethiopia**

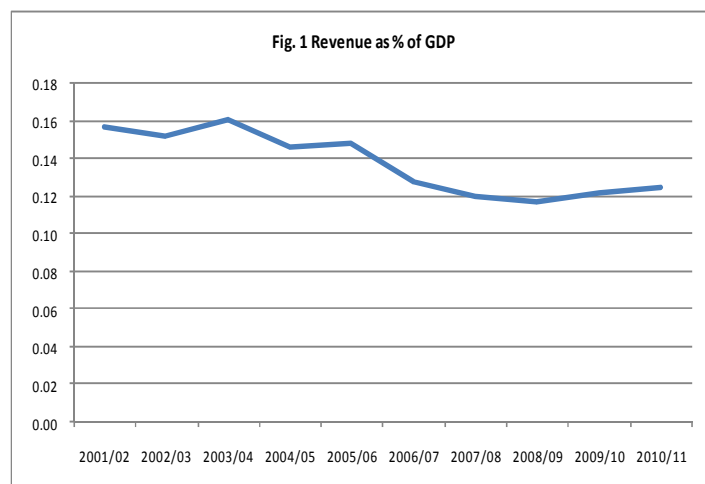
Ethiopia was among the original pilot countries where the MDG-based planning was espoused and MDG Needs Assessment (MDG NA) undertaken through technical support from the UN Millennium Project. As a result, it has had an exhaustive investment plan which informed the formulation of the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) which is MDG-based and whose implementation is fully supported by development partners. The Ministry of Finance and Economic Development plans to use the second phase of the Investment Plan to inform the formulation of the second phase of PASDEP (PASDEP II).

One of the fundamental features of MDG-based planning is embarking on an investment plan that delivers transformational rather than incremental changes to meet the MDGs. This was the basis for which the MDG NA studies determined the full cost complement to meeting the MDGs at the country level (using the unconstrained model). Results of the MDG NA study revealed that Ethiopia needs US\$ 121 per capita per annum to meet the MDGs of which public sector spending needs are US\$ 91 per capita per year. Ethiopia's population stood about 78 million by the end of 2009.

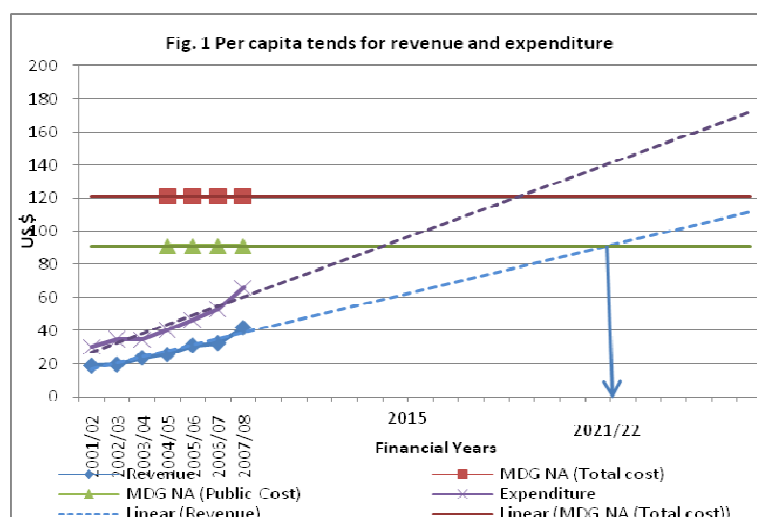
In the recent past, Ethiopia has embarked upon an ambitious public investment programme to address some structural challenges in energy, communications, housing and education sectors among others. It is currently constructing five dams (the Tekeze, Gilgel Gibe II, Beles, Gilgel Gilbe III and Fincha hydropower plants) with a total capacity of about 3000MW to address the chronic power shortage and also for export to augment its foreign exchange earnings. The road infrastructure is also being overhauled and extended. An extensive public housing scheme is being undertaken in which a number of condominium units are being built and so are a number of schools and hospitals. However, IMF (2009) argues that "Ethiopia's ambitious development programmes have delivered rapid economic growth, but also contributed to rising inflation and

strong import demand”. It argues that shocks emanating from the rise of international oil prices and fertilizer (by 150 percent and 75 percent respectively) have been responsible for pushing the balance of payments into a position of immediate and serious vulnerability, and that soaring food prices have adversely affected low-income households. The Fund projects that the adjustments to the shocks and domestic imbalances will lead to a significant slowdown in Ethiopia’s economic growth in 2008/09. It estimates the cost of the financial and economic crisis to the Ethiopian economy between US\$ 260 – 300 Million. In early 2009 the government revised its growth projection downwards as a result of the financial and economic crisis which also aggravated the power shortages that affect the manufacturing and construction subsectors of the industrial sector.

Recently, the Ethiopian government has embarked upon some tax reforms that have helped for increased domestic revenue in nominal terms, by 163 percent from US\$1.2 billion in 2001/02 to US\$ 3.2 billion in 2007/08. Similarly current expenditure has increased by 99 percent and capital expenditure by more than double (262 percent) relative to its 2001/02 levels. So is poverty reducing expenditure (287 percent). As a percentage of GDP, revenue collections over the period have averaged about 14.4 percent, of which tax and non-tax revenue collections averaged 11.1 percent and 3.3 percent, respectively. In as much as revenue has been increasing in nominal terms, tax receipts as a percentage of GDP has been declining over the period as shown in fig. 1 below partly because GDP has been growing. This level is below the sub-Saharan African average and even the increases in nominal terms have not been enough to meet the expenditures needed to meet the MDGs on per capita basis.



Revenue collections per capita increased from US\$18.77 in 2001/02 to US\$ 41.82 in 2007/08, whilst expenditures per capita increased from US\$ 30.08 to US\$ 65.85 in the same period. This is below the US\$ 91 per capita needed as public sector cost to meet the MDGs (total cost is US\$ 121). When the per capita revenue is projected linearly, under the current status quo, Ethiopia will reach the revenue levels needed to meet the MDGs by 2021/22, some six to seven years after the MDGs 2015 deadline, as shown on Fig. 2 below. If the current trend for expenditure is maintained, it could reach the target before 2015. However, because it is growing at a faster rate than revenue, this could put inflationary pressures on the economy which needs additional revenue to relieve this pressure. Additional resources from non-traditional sources of development finance can offer this. In this regard, Ethiopia needs to mobilize more resources to enable it meet the MDGs in a sustainable environment.



On official development finance, the international community has been relatively generous with Ethiopia. Disbursements of ODA increased from US\$ 1.1 billion in 2001 to US\$ 1.7 billion in 2008. In per capita terms, ODA commitments have also been increasing from US\$14 in 2001 to US\$ 42 in 2007, whereas actual disbursement per capita has increased from about US\$17 to US\$ 24, respectively, having peaked in 2004 at about US\$ 26 per capita. If this is added to revenue collections per capita, it still fall short of the amount needed to meet the MDGs by about US\$ 23 per capita per year.

**Table 1 - ODA Commitments and Disbursements, Ethiopia**

Year	ODA		Population Million	ODA per capita	
	Commitments US\$ Million	Disbursements US\$ Million		Commitment US\$ Million	Disbursement US\$ Million
2001	915.45	1142.63	65.41	14.00	17.47
2002	1202.76	1367.84	67.22	17.89	20.35
2003	1721.65	1691.38	69.1	24.92	24.48
2004	2054.53	1892.37	71.04	28.92	26.64
2005	2104.6	1524.8	73.03	28.82	20.88
2006	2243.2	1381.6	75.07	29.88	18.40
2007	3315.2	1822.7	77.17	42.96	23.62

Source: OECD Database, own calculations, national ;

#### IV. The CDM and REDD

##### *The Clean Development Mechanism (CDM)*

Proponents argue that the carbon market is the most tangible result of efforts to mitigate climate changes. By creating a market for emission reductions, in effect paying people and business to reduce greenhouse gas emissions, they argue that the carbon market provides a financial incentive to invest in clean energy projects, in energy efficiency, in fuel-switching, in waste management and in forestry. The carbon market is estimated to be worth about \$64 billion according to the World Bank.

The Kyoto Protocol encouraged most developed countries to limit or reduce their emissions of greenhouse gases relative to a baseline year (in most cases, 1990) using a number of market-based mechanisms, based on the concept of carbon trading (UNDP/UNEP 2008). One of these is the Clean Development Mechanism (CDM) which permits project-based carbon trading between developed and developing countries. The CDM allows carbon projects' to be undertaken in developing countries that reduces or avoids the emissions of greenhouse gases into the atmosphere. Six greenhouse gases, or families of gases, are eligible: carbon dioxide, methane, nitrous oxide, perfluorocarbons (P F C s), hydro fluorocarbons (HFCs) and sulphur hexafluoride. Joint implementation (JI) is another Kyoto mechanism that permits project-based carbon trading between developed countries,

Examples of carbon projects include the use of renewable energy (such as wind, hydro or solar), the use of biomass residues (such as bagasse for electricity generation in a sugar factory), the

implementation of energy efficiency measures (such as the introduction of compact fluorescent light bulbs or more efficient cook stoves), and waste management practices (such as capturing the methane emissions from wastewater treatment plants, landfill dumps or animal waster). For every tonne of greenhouse gas that is reduced, the carbon project is awarded a carbon credit, known as a Certified Emission Reduction (CER). CERs can then be sold by the project developer, thereby generating a monetary revenue stream. The magnitude of this revenue stream is determined, among other things, by the price of the tone of Green House Gas sequestered. The carbon revenue stream exists in addition to any other revenues the project may deliver. For example, the primary revenue stream of a hydro-power project may be the sale of electricity; the primary revenue stream from a reforestation project may be the sale of timber, and the economic rationale for undertaking energy efficiency measures may be the cost savings that follow.

The intention of the CDM is to add to these revenue streams, thereby enhancing the economics of 'clean projects and incentivizing more such projects to be undertaken. The basis of the CDM lies in the fact that the climate impact of greenhouse gases on the atmosphere is the same irrespective of where they are emitted. Reducing a tone of carbon dioxide emissions in Africa, for example, has exactly the same (beneficial) impact on the climate as reducing a tone of carbon dioxide emissions in Europe. Opponents of carbon trading points to this as immoral. Developed economies should not be allowed to pay their way through polluting. China and India insists that developed economies should, in addition, to paying also reduce their Green House Gases.

The CDM therefore offers developed countries the opportunity to reduce emissions cost-efficiency, since emission reductions can generally be achieved at lower cost in developing countries. The World Bank estimates the primary CDM market – the income earned by project developers - was worth \$7.4 billion in 2007, whilst the secondary market - the income earned by market aggregators, brokers and other 'middle men' - was worth a further \$4.5 billion (World Bank, 2008).

Despite this large revenue stream, UNDP and UNEP argue that the CDM has, to date, largely overlooked sub-Saharan Africa. The region currently accounts for little more than 1% of world wide CDM projects and 2% of the carbon credits, the CERs, expected by 2010. In this regard, building the capacity of African countries to engage with the CDM and catalyzing the economic, social and environmental benefits associated with doing so, is central to the UNDP-UNEP CDM capacity development programme. Ethiopia is one of the beneficiaries of this exercise.

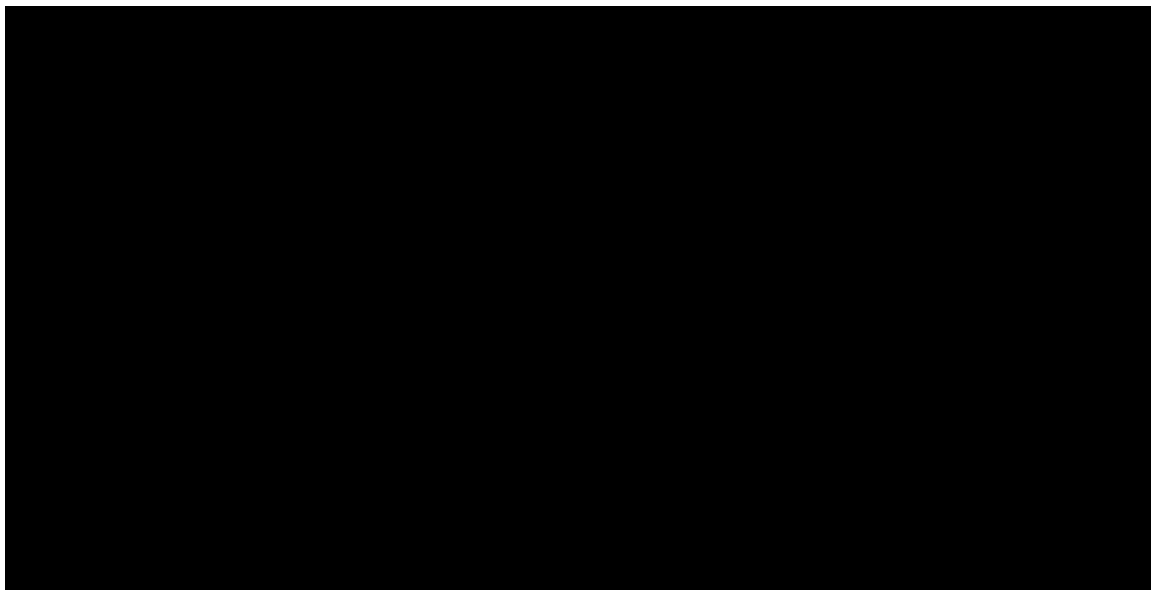
### ***Reduced Emissions from Deforestation in Developing Countries (REDD)***

When the Kyoto Protocol was signed in 1997, policies related to deforestation and degradation were excluded. (Sireh-Jallow (2008). However estimates from recent works by (Myers 2007) and later by (van der Werf, et al 2009) show significant greenhouse gas emissions from deforestation and forest degradation of at least 15 percent of emissions similar if not more than those from transport. Furthermore, The Intergovernmental Panel on Climate Change (IPCC) estimates that the cutting down of forests is now contributing close to 20 per cent of the overall greenhouse gases entering the atmosphere. Forest degradation also makes a significant contribution to emissions from forest ecosystems. The need to make significant progress in reducing deforestation, forest degradation, and associated emission of greenhouse gases has been vigorously pursued by proponents in recent climate conferences. At the 11th Conference of the Parties (COP-11) in 2005, the Coalition of Rainforest Nations initiated a request to consider 'reducing emissions from deforestation in developing countries' and in 2007 the Bali Conference (COP-13), agreed to the Bali Action Plan directed at forest conservation, sustainable forest management and the enhancement of carbon stocks. (Forest Dialogue 2009). Relatively recently, **REDD-plus** has been advanced calling for activities with serious implications directed towards the local communities, indigenous people and forests which relate to reducing emission from deforestation and forest degradation. In 2009, at COP-15 in Copenhagen the crucial role of REDD and REDD-plus and the need to provide positive incentives for such actions by enabling the mobilization of financial resources from developed countries were recognized. (Copenhagen Accord 2009).

A number of REDD initiatives exist including the World Bank's Forest Carbon Partnership Facility, Norway's International Climate and Forest Initiative and the UN REDD which is a collaborative programme between FAO, UNDP and UNEP. This latter initiative is aimed at aimed at tipping the economic balance in favour of sustainable management of forests so that their formidable economic, environmental and social goods and services benefit countries, communities and forest users while also contributing to important reductions in greenhouse gas emissions. The aim is to generate the requisite transfer flow of resources to significantly reduce global emissions from deforestation and forest degradation. The immediate goal is to assess whether carefully structured payment structures and capacity support can create the incentives to ensure actual, lasting, achievable, reliable and measurable emission reductions while maintaining and improving the other ecosystem services forests provide (UNDP REDD website)

## **V. Empirical assessment of potential fiscal space**

Ethiopia had a total forest cover of 13 million ha in 1990. However by 2005, it has lost about 2.1 million hectares representing an average annual loss of about 141,000 hectares (or 1.1percent), as shown on Table 2 below. Using Laurence (2007) assumptions of the price of a ton of CO<sub>2</sub> of US\$ 10 (although it varies considerably around the world) and that a hectare of forest saves about 200 tons of CO<sub>2</sub> per annum, it means that the 141,000 hectares lost could have sequestered about 28 million tons of CO<sub>2</sub> per annum valued at US\$ 280 million. Within the current CDM regulations, if Ethiopia can reduce its deforestation rate by about 50 percent, then it stands to enjoy potential a fiscal space of about US\$ 141 Million which is about 0.63 percent of GDP. The potential fiscal spaces that can accrue from different rates are also described below.



Source: [www.Mongabay.com](http://www.Mongabay.com) and own computations

According to the rural development and food security sector MDG needs assessment summarized in Table 3 below, the cost of meeting the environment component is approximately US\$ 3.8 billion of which forest resource management costs are US\$ 525 million per annum, while rural energy and rural roads costs are US\$ 3.3 million and US\$ 20.7 million per annum respectively. These latter two are within the realm of the potential fiscal space but the first far exceeds the potential fiscal space created.

**Table 3 - Cost summary by category**

<b>Environmental sustainability</b>	
<b>Watershed based natural resource management</b>	<b>1,916.09</b>
Proper land use	606.74
Water resource management	781.34
Forest resource management	525.17
Wildlife utilization and conservation	0.24
Biodiversity utilization and conservation	2.61
<b>Rural Infrastructure</b>	<b>23.96</b>
Rural energy	3.31
Rural roads	206.50
<b>Total</b>	<b>3,880.10</b>

Source: Millennium Development Goals Needs Assessment:  
The Rural development and food security in Ethiopia

## VI. Conclusion and Policy Recommendations

As can be seen from above, carbon trading offers Ethiopia a non-traditional source of development finance especially at a time when revenue collection as a percentage of GDP continues to decline. By reducing its deforestation rate from 1.1 percent per annum to 0.55 percent could result in fiscal space of about US\$ 141 million. This fiscal space accrues only within the current CDM guidelines. If Ethiopia were to be compensated for the carbon that is being sequestered now by the remaining 9.8 million ha of forest land, the fiscal space would have been more. However, reducing the current deforestation rate by fifty percent will come with its attendant costs. The reasons for deforestation include agricultural cultivation, housing and/or fuel wood consumption. Implementing a policy change to reduce the deforestation rate could therefore further deepen the poverty being experienced by some of the stakeholders. It is, therefore essential that part of the fiscal space created is used to buffer the communities against the effects of the policy change. For example, part of the space could be utilized to subsidize the cost of kerosene or Liquefied Petroleum Gas (LPG) so that poor households are weaned off firewood use.

Despite the lucrative potential that can accrue from carbon trading, skeptics (many from Africa) about the actual benefits that can accrue from such a trade, abound. A case in point is that of Ethiopia. Even though it hosted the Regional CDM project for one and half years now, it has not

yet been able to benefit from the mechanism despite the many opportunities that exist. A number of potential projects have been identified, but the huge upfront (non-ODA) costs involved are prohibitive for domestic private ventures. The mechanics of the CDM should be unbundled and simplified to enable developing countries such as Ethiopia, effectively participate in the carbon market.

It is of crucial importance that carbon trading is seen as an integral part of clean and inclusive growth. Communities that live by or in the forests must also benefit from carbon trading even if they are not adversely affected by the policy change noted above. Setting aside parts of the proceeds for these communities could be part of the national development strategies. In this regard, PASDEP II should articulate carbon sequestration as both a clean growth strategy as well as a source of financing.

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