Driving Sustainable Development:  
Carbon Sequestration as a Vehicle for Multi-Stakeholder Participation in Realizing the Millennium Development Goals

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Abstract

Since the pre-industrial era, the combustion of fossil fuels, agriculture practices, and land-use changes have contributed to the harrowing atmospheric concentrations of greenhouse gases (GHGs) inducing global climate change. Climate change has the potential to most affect those in developing nations, as these areas of the world currently lack the resources to readily adapt to shifts in local weather patterns. The United Nations has consequently linked climate change with sustainable development in its Millennium Development Goals (MDGs) in an attempt to promote environmentally conscious economic growth in developing countries.

Of the many methods currently being pursued by private and public stakeholders to mitigate GHG emissions, carbon sequestration projects can act as a vehicle through which Multinational Corporations (MNCs) and developing nations can collaborate. Through such projects each party can meet its specific goals as well as achieve environmental benefits and sustainable economic development. MNCs can be significant drivers for (1) the improvement of carbon sequestration mechanisms, (2) building the capacities of African nations, and (3) paving the way for additional firms to participate in development-focused sequestration projects.

To date several barriers have prevented MNC participation in sequestration projects and in partnerships with African countries more generally. However, the same characteristics that drive success in the private sector put MNCs in a position to champion solutions to these challenges. Current geologic, forestry, and soil sequestration projects demonstrate the potential for MNC leadership in mitigating GHG emissions and promoting sustainable development in Africa. In this report we present a conceptual model highlighting the relationship between MNCs, project host countries and carbon sequestration mechanisms, and how this relationship can better funnel resources toward environmental protection and sustainable economic development.
## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAAC</td>
<td>Clean Air Action Corporation</td>
</tr>
<tr>
<td>CCS</td>
<td>Carbon Capture and Storage</td>
</tr>
<tr>
<td>CCX</td>
<td>Chicago Climate Exchange</td>
</tr>
<tr>
<td>CDM</td>
<td>Clean Development Mechanism</td>
</tr>
<tr>
<td>CERs</td>
<td>Certified Emissions Reductions</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>CO₂e</td>
<td>Carbon Dioxide Equivalent</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>DNA</td>
<td>Designated National Authority</td>
</tr>
<tr>
<td>EU ETS</td>
<td>European Union Emissions Trading Scheme</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>IET</td>
<td>International Emissions Trading</td>
</tr>
<tr>
<td>IFCD</td>
<td>International Soil Fertility and Agricultural Development Center</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GHGs</td>
<td>Greenhouse Gases</td>
</tr>
<tr>
<td>Gt</td>
<td>Gigatonne (equal to a million metric tonnes)</td>
</tr>
<tr>
<td>JI</td>
<td>Joint Implementation</td>
</tr>
<tr>
<td>LULUCF</td>
<td>Land Use, Land Use Change and Forestry</td>
</tr>
<tr>
<td>MDGs</td>
<td>Millennium Development Goals</td>
</tr>
<tr>
<td>MNCs</td>
<td>Multinational Corporations</td>
</tr>
<tr>
<td>MoWLE</td>
<td>Ministry of Water, Lands and Environment in Uganda</td>
</tr>
<tr>
<td>Mt</td>
<td>Million Tonnes</td>
</tr>
<tr>
<td>PMA</td>
<td>Plan for Modernisation of Agriculture in Uganda</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RMPs</td>
<td>Recommended Management Practices</td>
</tr>
<tr>
<td>SOC</td>
<td>Soil Organic Carbon</td>
</tr>
<tr>
<td>TIST</td>
<td>The International Small Group and Tree Planting Program</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
</tr>
</tbody>
</table>
1 Introduction

Climate change projections, as well as recent observations, point to an increase in the frequency, intensity, and duration of extreme climactic events. Warming temperatures and intense drought periods, for instance, will likely exacerbate the strain on clean water sources and fertile soil in already susceptible areas. Of note, 2005 holds the record for the warmest “global surface temperatures in over a century.” Unable to readily adapt to these threats, severely impoverished countries and the poor in all countries are expected to bear an inequitable burden of global climate change. Specifically, Sub-Saharan Africa is an area of particular risk as food production is low and unstable. Furthermore, there is heightened concern that a shifting climate will threaten the current efforts made to both alleviate poverty and reduce the rate of environmental degradation as outlined in the Millennium Development Goals (MDGs). Thus the issue of climate change is inextricably linked to the larger challenge of sustainable development.

The importance of integrating the goals of carbon abatement with those of local sustainable development has become apparent in ensuring the participation of developing countries in international environmental policy. Considering this integration, the Clean Development Mechanism (CDM) was established under the Kyoto Protocol (see Appendix 1). The CDM allows developed countries to invest in low-cost emission reductions or sequestration projects in developing countries. Despite being a nascent mechanism, as recently as December 2005 there were 40 registered projects with 500 more anticipated, and by May 2006 there are over 175 registered projects with another 600 anticipated. These projects must, among other requirements, contribute to the sustainable development criteria outlined by the host country’s Designated National Authority (DNA). Thus, the CDM encourages the transfer of financial and technological resources to developing countries in exchange for emissions reductions credits, known as Certified Emission Reductions (CERs). With the establishment of these credits, an international carbon market has emerged. Carbon markets and companion funding schemes have introduced new methods for governments and Multinational Corporations (MNCs) to participate in reducing atmospheric carbon dioxide (CO₂) concentrations. These new mechanisms present various opportunities for collaboration between developing countries and MNCs as they can work in tandem to achieve individual and shared objectives.

Building upon the intersection of mitigating climate change and working towards the MDGs, the United Nations Development Programme (UNDP) has established the MDG Carbon Facility. The primary objective of this agency is to identify, support, and encourage projects that aim to both reduce greenhouse gas (GHG) concentrations and assist the attainment of national MDGs. It is here, we posit, that there is great potential for MNCs to contribute to the MDGs of developing countries by adopting and enhancing carbon sequestration projects. Whether reporting to shareholders or voters, many corporate and governmental policy-makers acknowledge that a changing climate is not only an environmental concern, but an economic and social one as well. Furthermore, the respective goals of countries and MNCs tend to overlap, as both parties have interests in economic stability and growth, and natural resources.

In this report, we aim to convey the potential of carbon sequestration to link the priorities of MNCs and national governments, leading to enhanced resource allocation toward environmental protection and economic development. The stakeholder model presented herein illustrates the ability of carbon sequestration to be a point of common interest between host countries and MNCs (Fig. 1). Our hypothesis is that sequestration projects can be a vehicle to bring MNCs and host countries into collaboration with the benefit of moving

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1 Established by the United Nations, the Millennium Development Goals are a framework for addressing some of the world’s most pressing development problems, including poverty, human health and environmental degradation. <http://www.un.org/millenniumgoals/>. 
toward the MDGs and environmental protection. Further, MNCs can be drivers for the improvement of carbon sequestration mechanisms, in addition to building the capacities of developing nations and pave the way for additional firms to participate in development-focused sequestration projects.

This paper highlights how the capacity of MNCs to utilize carbon sequestration technology can more effectively engage developing nations as equal partners. As the current status of African country MDGs is not only a timely but important issue, nations within this continent were considered the primary case study pool from which to choose. Geologic sequestration, forestry projects, and increasing soil organic carbon (SOC), especially in agricultural lands, are the developed carbon sequestration methodologies to date. This paper discusses these three types of sequestration and outlines varying levels of potential social, political, and environmental co-benefits (Fig 2). For example, soil projects have the greatest potential to mitigate social and economic issues such as hunger, malnutrition, and employment, in addition to providing environmental benefits such as preventing desertification, soil erosion, and habitat loss. This can be compared with geologic sequestration sites, where despite the ability to store and more easily monitor CO₂, the socio-economic and environmental benefits of these projects within host countries are relatively small.

**Figure 1:** This conceptual model highlights the ability of carbon sequestration projects to facilitate partnership between host countries and multinational corporations in order to drive resource allocation toward fulfillment of the Millennium Development Goals.

**Figure 2:** Co-benefits such as job creation, improved ecosystem services and increased crop yield can vary for different sequestration projects. However, in general the potential for co-benefits arising out of sequestration projects increases along the spectrum of project methodologies: geosequestration, forestry and soil organic carbon.
Section 1.2 explains inroads to MNC involvement in sequestration projects, including the influence of corporate social responsibility on corporate decision-making. To provide examples of MNC involvement with carbon sequestration projects in Africa, two case studies are presented in Sections 2 and 3: BP’s leadership with geosequestration at In Salah in Algeria, followed by a forestry project in Uganda led by the Clean Air Action Corporation. Additionally, though currently without such corporate project sponsorship, the potential for MNC leadership in soil sequestration is discussed in Section 4. Section 5 provides a thorough discussion of major findings and highlights pertinent issues from the case studies. Section 6 concludes and acknowledges areas where further research may contribute to the dialogue.

**Box 1: Carbon Markets.** The growing potential of the global carbon market, emerging from various carbon trading platforms, is indicated by the 850% increase in carbon emissions trading from 94 million tonnes (Gt) of CO₂ equivalent in 2004 to 799 Gt of CO₂ equivalents in 2005.8

<table>
<thead>
<tr>
<th>Regulatory Markets</th>
<th>Voluntary Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are mandatory regulations that legally-bind participants to reduction mandates based on each country’s respective target, as derived by the Kyoto Protocol.</td>
<td>Are elective initiatives with fewer stipulations for project development and are attractive to a wide range of stakeholders.</td>
</tr>
</tbody>
</table>

**Example**
- The Kyoto Protocol represents the most robust forum for international emissions trading, specifically through the project and market based provisions known as the Flexible Mechanisms:
  1. Joint Implementation (JI)
  2. International Emissions Trading (IET)
  3. Clean Development Mechanism (CDM)
- The European Union’s Emissions Trading Scheme (EU ETS), designed to transition EU Member States into the Kyoto Protocol compliance period 2008-2012, is the largest carbon emissions trading platform worldwide.7

**Example**
- The Chicago Climate Exchange (CCX) is a voluntary, legally-binding GHG trading venue for multiple sectors. Participants in the CCX market include: Ford Motor Company, American Electric Power, International Paper, DuPont, Motorola, IBM, Rolls Royce, Manitoba Hydro and the City of Chicago.

### 1.2 In-roads for Multinational Corporation Involvement

Emerging carbon markets have demonstrated rapid growth in recent years, as evident in an annual increase of 850% between 2004-2005 (see Box 1: Carbon Market).8 The largest volume of GHG emission reductions has been achieved chiefly via CDM projects under the Kyoto Protocol.9 Despite policy objectives within the Protocol designed to facilitate the equitable distribution of projects across all developing nations, China, Brazil, the Republic of Korea, and India currently house the majority of CDM-registered expected annual CERs.10 In May 2006, the UNEP Risø Centre announced updated potential CDM projects, yet the majority remains in Brazil, China, and India.11 African nations are largely uninvolved in the climate change-development nexus that can deliver immediate and long-term benefits.12 Furthermore, while the CDM approval process was designed to ensure quality control over project development, there appear to be issues in efficiency, streamlining the process of project approval, and implementation. Such has created a barrier for potential project participants. These barriers further result in high transaction costs associated with initiating these emissions reduction projects.
Outside of the stringent and protracted regulatory carbon markets, there are various other initiatives associated with voluntary markets. An example in the United States is the Chicago Climate Exchange (CCX), which has been established in the absence of any federal initiative. This emissions trading venue is open to multiple sectors including municipalities, oil and gas industries, agricultural production sectors, forestry, and power generation facilities; where participants vary from the Ford Motor Company to American Electric Power to the City of Chicago.

There are two predominant motivations for participation within voluntary carbon trading systems and initiatives: (1) anticipation of future regulations and (2) interest in environmentally sustainable business practices. Perhaps the most central impetus for involvement in voluntary GHG trading is the recognition by corporate executives that the global economy is veering towards carbon-restricted conditions. Anticipating increased costs associated with GHG emissions and the compliance with future regulations, some companies are positioning themselves for participation in carbon emissions reduction schemes and trading programs so as to prepare their firms for future regulatory frameworks and integration into the global emissions trading markets. Similarly, the profit potential in a carbon constrained global marketplace is driving some strategic participation in emissions reduction measures and trading programs.

In addition to the cost of complying with future regulations, some insurance companies and large emitters believe current emissions may put them at risk for future liability in light of potential legal suits related to the consequences of climate change. As a result, Swiss Re, one of the world’s largest reinsurers, has integrated sustainability principles into its corporate doctrines. This firm recognizes the link between greenhouse gas emissions and climate change, and the potential for liability associated with contributing to a global phenomenon that can create more weather-related risks across geographical locales and business sectors.

Another motivation for participation in carbon reduction strategies is to augment a corporation’s current Corporate Social Responsibility portfolio. Corporate Social Responsibility (CSR), as defined by the World Bank, is “the commitment of businesses to contribute to sustainable economic development by working with employees, their families, the local community and society at large to improve their lives in ways that are good for business and for development.” CSR policies fall within a broad ideological and programmatic spectrum; ranging from robust and sustained community centered initiatives to ‘green washing’ and other tactics designed to present a facade of concern while actually not embracing social responsibility as a goal.

Many firms have developed CSR policies based on the principles of sustainable development. Technology transfer to developing nations as part of a CSR policy can be a powerful engine for local capacity building and sustainable economic growth, as exemplified by BP in the oil and gas sector and Lafarge in the building materials sector. Some firms have highlighted the environmental aspect of sustainable development into their CSR policies, as reducing business-related environmental damage becomes a corporate concern. DuPont promotes sustainable growth for its operations and worldwide communities with environmental protection as one of its central CSR policies.

The Institute of Business Ethics states that corporations with a CSR policy earn nearly 20% higher profits. Additionally, investors can be willing to pay premiums on shares to invest in socially responsible companies, increasing the value of such programs to senior management. A firm’s decision to participate in voluntary emissions trading programs can be influenced by the desire to attract investors interested in environmentally responsible business practices. More specifically, CSR goals can drive a corporation’s participation in carbon sequestration projects that align with the MDGs, as such projects can augment a firm’s current CSR portfolio.

In 2005, 60,000 MNCs with nearly 800,000 foreign business partners developed, transported, and sold myriad products and services across the planet. However, MNCs frequently
compete for business in the developed world, bypassing markets for the poorest 4 billion people on the planet. There are thus many opportunities for MNCs to engage least developed nations and build mutually beneficial business markets that capture profits for firms while providing much-needed goods and services.

Despite the risks, developing economies are markets that may represent great long-term potential for forward-thinking corporations. While it is apparent that profits can drive MNC presence in developing nations, the private-public relationship between firms and host governments need not end there. MNC presence within a country presents key opportunities for partnership through product and service development as well as CSR policies. The MDGs can act as a guide for such social programs, encouraging sustainability and facilitating long-term social and environmental improvement. Specifically, sequestration projects present an opportunity for firms to pursue socially responsible initiatives that address both climate change and the sustainable economic growth of developing countries. The case studies presented below showcase two MNCs, BP and the Clean Air Action Corporation, that have chosen this path.

2 Algeria: Corporations Fueling Development

2.1 Multinational Corporation: BP

As one of the world’s largest energy companies, BP is uniquely positioned to lead the development of partnerships with various stakeholders, including governments, firms, and market-based regulatory bodies. As a global company, strength is in the numbers for BP: in 2005 the company employed over 96,000 people, paid dividends to shareholders valued over $7.3 billion and developed a market capitalization valued over $220 billion. BP is also unique for its concern with the impacts of its operations as a leading energy company on global warming. In 2005, BP reduced its total GHG emissions from 81.7 to 78 Gte (million tonnes CO₂ equivalent), and has proactively adopted reduction in emissions as a core value of the company. As evidenced by the development of BP Alternative Energy in 2005, an $8 billion investment over 10 years developing renewable technologies, BP has publicly recognized limits to the current hydrocarbon economy. More than simply a marketing scheme to attract investors, BP’s management firmly believes in taking responsibility for leading the reduction in GHG emissions by example. In addition to energy efficiency and renewable energy sources, BP is also leading research and development in the capture and geologic storage of carbon dioxide.

Responsibility as a corporate strategy for BP implies three different dimensions: the laws of each host country in which BP operates, the regulations of each host country in which BP operates, and the worldwide compliance of its own standards in its operations. For BP, this responsibility is not encapsulated by the oft-used term Corporate Social Responsibility; instead, this behavior is an extension of what the firm considers to be simply “the responsibility of the company.” BP’s management recognizes the long-term impacts of a lower carbon future and has linked its business strategy to the reality of a reduction in hydrocarbon production. BP’s corporate responsibility readily accepts a reduction in short-term profitability by investing in social issues that, in the end, will create a positive environment in which to operate in the future. Ultimately, BP has a long-term business strategy with a timescale of decades and a goal of creating value for shareholders. BP’s acknowledgement and implementation of sustainable business practices to ensure the company’s capacity for the long-term growth separates the firm from the traditional capitalist
modus operandi. This case study highlights BP’s In Salah CO₂ carbon, capture, and storage project as a means of demonstrating corporate leadership in driving climate-focused R&D.

2.2 BP’s Corporate Responsibility in Algeria

Energy companies, such as BP, can maximize profits through long-term business strategies. It has been argued that enhancing prosperity in the countries and communities in which they work can assist MNCs in building long-term, positive relationships that promote economic growth for a wide array of stakeholders. BP strives to promote responsible governance within the countries it operates, and actively supports human rights and advocates for transparency through its own operations in Algeria. Specifically related to MDG objectives, BP’s CSR plan in Algeria focuses on “minimizing environmental impact, encouraging enterprise and skills through capacity building and education, and supplying energy.” The programs associated with this focus are predominantly aimed at the Saharan communities near project areas (Table 1).

2.3 Host Country: Algeria

<table>
<thead>
<tr>
<th>Country Facts – Algeria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population size 37</td>
</tr>
<tr>
<td>Population growth rate 38</td>
</tr>
<tr>
<td>GDP (PPP) 39</td>
</tr>
<tr>
<td>GDP annual average % growth 40</td>
</tr>
<tr>
<td>Major industry 41</td>
</tr>
<tr>
<td>Proportion of population below $1 (1993 PPP) per day 42</td>
</tr>
<tr>
<td>Proportion of land area covered by forest 43</td>
</tr>
<tr>
<td>CO₂ Total Emissions: Including land use change 44</td>
</tr>
<tr>
<td>Energy use (kg oil equivalent) per $1,000 GDP (PPP)</td>
</tr>
<tr>
<td>Proportion of population using solid fuels 45</td>
</tr>
</tbody>
</table>

Algeria has a significant influence on the global energy market, possessing the seventh largest natural gas reserves globally, as well as important oil reserves. Yet such reserves have not afforded opportunity for many of the country’s citizens. The main development challenges that Algeria faces remain fostering socio-economic growth and fighting poverty. The World Bank Institute (the Bank) posits the careful development of oil and gas reserves and transfer the economic benefits accrued from such development to the citizens of Algeria in order to ensure long-term economic development is merged with social considerations. Fostering economic development in non-oil sectors will assist Algeria in building a sustainable economic base that will hopefully serve to alleviate poverty and build a bridge to the global economy. Government capacity-building is recognized by the Bank as a key part of the overall development equation as basic services, such as access to heath care, clean and safe water supplies, education, and other social services are essential in ensuring Algeria realizes its sustainable development potential, while meeting the MDGs. Yet, heavy reliance on the energy sector, in addition to governmental encouragement of foreign investment into other areas of the local economy, has done little to curb high rates of unemployment and improve standards of living.

A lower middle-income country, wages and rents are comparatively less than in developed nations, lowering the cost of doing business here for many MNCs. However, the Bank ranks the Algerian economy poorly in its ‘ease of doing business’ indicators, as compared to 155 other countries. This suggests Algeria may not be a prime candidate for MNC investment.
Despite this, the Algerian government continues efforts to encourage both foreign and domestic investment across its economy.\textsuperscript{54}

The Bank’s strategy for Algeria addresses the country’s main development challenges through targeting economic growth.\textsuperscript{55} To this end, the Bank aims to assist Algeria in designing financial foundations that will protect the institutional and economic longevity of the country, as well as building governmental capacity to manage its oil revenues so that these funds can be channeled into local communities.\textsuperscript{56} Since unemployment is a significant impediment to the long-term economic growth potential of Algeria, the Bank is encouraging the Algerian government to foster a more business-friendly atmosphere in the country by dismantling policy-based barriers that stifle small and medium-sized enterprises that could serve as a significant source of economic development.\textsuperscript{57} This integrative approach to economic development in Algeria carries the undertones of the MDGs, in that education, health care, poverty alleviation, and environmental sustainability are all part of the overall formula that Algeria will need to utilize in order to solve its global development woes.\textsuperscript{58,59}

While international institutions and governments are often responsible for designing economic and social policies and projects, such initiatives are ripe with opportunities for MNC leadership. In fact, corporations are a primary stakeholder in many of the World Bank’s strategies for Algeria, including infrastructure development and private sector growth.\textsuperscript{60} MNCs must ensure their participation within public-private partnerships are transparent and in the best interest of both shareholders and local residents, and as a proponent of transparency in operations, the largest foreign direct investor in Algeria, BP, is well suited to exemplify this corporate belief.\textsuperscript{61}

### 2.4 Geosquestration Project

<table>
<thead>
<tr>
<th>Algeria – In Salah Geosquestration Site</th>
<th>Timescale\textsuperscript{62}</th>
<th>2004-2029</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected CO\textsubscript{2} Sequestered</td>
<td>25 Mt CO\textsubscript{2}</td>
<td></td>
</tr>
<tr>
<td>No. Local Jobs Created\textsuperscript{63}</td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

The In Salah natural gas field is an example of FDI with both strategic and environmental intentions. The In Salah CO\textsubscript{2} geosquestration project, located in the central Algerian Sahara, represents the collaboration between BP, the Algerian state oil company, Sonatrach, and a Norwegian oil and gas company, Statoil. The target market for the Algerian natural gas is Europe, where the market requires incoming natural gas to contain no more than 0.3% CO\textsubscript{2}. As the carbon content in the natural gas pumped from the In Salah project ranges from between 4 – 9%, BP is required to separate the carbon before export. The industry norm is to first separate the carbon from the natural gas and then vent the resultant CO\textsubscript{2} into the atmosphere. However, at the In Salah site BP captures and sequesters this CO\textsubscript{2} by injecting it into a large underground aquifer where it should remain indefinitely. The project currently sequesters one million metric tonnes (Gt) of CO\textsubscript{2} a year, thus not representing a significant portion of national GHG emissions. However, the In Salah project is significant as an example of MNC leadership in sequestration technology and public-private partnerships.

The limitations of geologic sequestration in achieving socio-economic co-benefits are a hurdle to linking its application toward achievement of the MDGs. However, the sequestration of CO\textsubscript{2} contributes toward addressing climate change mitigation as a part of MDG 7, Target 9, Indicator 28: reducing a country’s CO\textsubscript{2} emissions. The partnership between Algeria’s state-owned Sonatrach and BP, as seen through the In Salah project, similarly works toward MDG 8, which calls for developing a global partnership for development and technology transfer. Despite geologic sequestration’s relatively low potential for direct co-benefits when compared to others forms of carbon sequestration, this methodology represents an opportunity for sustainable MNC leadership in mitigating climate change and promoting socio-economic growth.
Table 1: A summary of BP’s projects in Algeria. (Source: BP, 2006<sup>a</sup>)

<table>
<thead>
<tr>
<th>Project</th>
<th>Site</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Desalination</td>
<td>In Salah</td>
<td>Four water treatment stations that provide potable water to the 35,000 residents of In Salah. BP created a micro-enterprise – “Saharan Water Company” – to run and manage the project, providing jobs for local residents.</td>
</tr>
<tr>
<td>Community Resource Centre</td>
<td>In Salah</td>
<td>As an extension of the above mentioned clean water project, BP have partnered with the Mayor and local residents to establish and kit-out a community resource centre in In Salah. BP provides the resources and trains local groups to provide on-site training and assistance, and centre the BP’s English language training there as well.</td>
</tr>
<tr>
<td>Production and marketing of native products</td>
<td>Across Algeria</td>
<td>Illizi Home entails the production and marketing of Algerian artisans - most of whom live in the desert south - products that are specifically designed and targeted for the UK consumer market.</td>
</tr>
<tr>
<td>English Language Training</td>
<td>Several desert communities, including In Salah</td>
<td>In collaboration with King’s College in London, BP trains English language instructors from several Algerian communities and also acquired requisite instructional materials.</td>
</tr>
</tbody>
</table>

Despite the numerous CSR projects undertaken by BP in Algeria, none are a direct result of the geologic carbon capture and storage initiative. These projects are instead part of the firm’s long-standing and robust presence in the country, in addition to management’s commitment to corporate responsibility. Looking through the lens of the MDGs, geosequestration technology can address CO₂ emissions targets, however in and of itself this technology does not have readily apparent environmental or socio-economic co-benefits.
3.1 **Multinational Corporation: The Clean Air Action Corporation**

The Clean Air Action Corporation (CAAC), based in Tulsa, Oklahoma, develops and implements low cost strategies to mitigate air pollution and provides a number of services to businesses interested in institutionalizing environmentally sustainable practices. The company of nine employees prides itself in being a leader in a number of air emissions compliance fronts, including involvement in the first international transaction of NOx reduction credits. With offices in North America, Tanzania, and the United Kingdom, the firm’s clients and partners range from Fortune 500 companies to government regulators. In realizing the investment potential for trading certified emissions reduction units under the Clean Development Mechanism, managing officers at CAAC have invested in small-scale forestry projects in Africa. However unlike most of CAAC’s air quality compliance projects, these forestry projects marked the beginning of a new business and social development venture for CAAC president Ben Henneke, when he embarked on a religious mission trip to Tanzania in 1998. In meeting with local subsistence farmers, he identified opportunities to improve their quality of life by restoring local deforested areas and adopting sustainable agricultural practices. Shortly thereafter The International Small Group and Tree Planting program (TIST) was created as the sustainable development branch of CAAC. TIST was developed as an implementation vehicle to involve larger firms, like Dow Chemical for example, in reforestation projects that address the needs of subsistence farmers in Tanzania, Kenya, and Uganda. The countries themselves will further benefit from the foreign direct investment, technical assistance, and spurred economic growth.

3.2 **Host Country: Uganda**

<table>
<thead>
<tr>
<th>Country Facts – Uganda</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population size</td>
<td>27,269,482</td>
</tr>
<tr>
<td>Population growth rate</td>
<td>3.31%</td>
</tr>
<tr>
<td>GDP (PPP)</td>
<td>$45.97 billion</td>
</tr>
<tr>
<td>GDP annual average % growth</td>
<td>5.9%</td>
</tr>
<tr>
<td>Major industry</td>
<td>Agriculture (major export: coffee)</td>
</tr>
<tr>
<td>Proportion of population below $1 (1993 PPP) per day</td>
<td>85%</td>
</tr>
<tr>
<td>Proportion of land area covered by forest</td>
<td>21.3%</td>
</tr>
<tr>
<td>CO₂ Total Emissions: Including land use change</td>
<td>41,033 thousand metric tons of CO₂</td>
</tr>
<tr>
<td>Energy use (kg oil equivalent) per $1,000 GDP (PPP)</td>
<td>-</td>
</tr>
<tr>
<td>Proportion of population using solid fuels</td>
<td>&gt; 95%</td>
</tr>
</tbody>
</table>
Uganda is ranked as the 46th Least Developed Country by the United Nation’s Committee for Development Policy based on its (1) low-income rate, where 85% of the population live below a dollar a day, (2) human resource weakness, indicated by low nutrition, health, and adult literacy rates, and (3) economic vulnerability as seen, for instance, in the instability of exports of goods and services.79 Seeking to address these issues Uganda’s Country Programme Action Plan for 2006-2010, as outlined by the UNDP, is focused on three key priority areas: poverty reduction and the Millennium Development Goals, democratic governance, and crisis prevention and recovery.80

As environmental degradation is both a cause and a consequence of poverty, members of the Ministry of Water, Lands and Environment and the Ministry of Finance, Planning and Economic Development hold the degeneration of the environment as a major national concern.81 One particular strain on the environment is the uncontrolled expansion of agricultural land. Subsequently, the poorly managed land use strategies have resulted in intensive deforestation of both national forest reserves and local tree lots.82 In light of Uganda’s rapidly growing population, which is set to double in the next ten years, current pressures on the land-based resources will likely compound and further hinder poverty reduction efforts.83

Ideally, however, a healthy forest sector can contribute positively to the economic development of Uganda, by providing environmental services in terms of climate regulation, soil conservation, and carbon sequestration.84 Furthermore, the forestry sector has multiple socio-economic benefits by offering significant employment, providing raw materials for the construction industry and the national energy demand, as well as contributing medicinal, cultural, and spiritual values held by rural communities.85

In effort to enhance the role of sustainable farm forestry, the government of Uganda has outlined a Plan for Modernisation of Agriculture (PMA) with the overarching goal of poverty eradication. The vision of the plan is “poverty eradication through a profitable, competitive, sustainable and dynamic agricultural and agro-industrial sector.”86 Building upon the 1998 Land Act which provided the basis for development of sound land-use policies, the 2000 PMA aims to: increase incomes and improve the quality of life of poor subsistence farmers, improve household food security, provide gainful employment, and promote sustainable use and management of natural resources.87

Within the government of Uganda’s goals, and ultimately the Millennium Development Goals, lies an opportunity for multinational corporations to invest in carbon sequestration through sustainable afforestation and reforestation projects. The Clean Air Action Corporation’s presence in Uganda, as managed by TIST, is an example of how sequestration projects, and their multiple co-benefits, can act as a vehicle to bring MNCs and developing nations together with a mutually beneficial project.

3.3 Reforestation Project

TIST has three sites in the southwest corner of Uganda: Bushenyi, Kabale, and Kanungu. Across the three sites the total number of trees planted is 418,319 to date, which are divided amongst 785 Small Groups for maintenance.88 Eucalyptus and Pinus Patula are the predominant species used in these tree plantations. The project will sequester nearly 1.5 Gt of carbon dioxide equivalents (CO₂e) by 2012 and 2.3 Gt CO₂e by 2017 over the 14 years of implementation in a conservation scenario limiting the project to those farmers already participating and assuming no more planting (2,000 mature trees account for about 1,000

<table>
<thead>
<tr>
<th>Uganda – TIST Small Scale Forestry Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timescale</td>
</tr>
<tr>
<td>Expected CO₂ Sequestered</td>
</tr>
<tr>
<td>No. Local Jobs Created²</td>
</tr>
</tbody>
</table>

² Jobs were not officially created, however this number represents the number of subsistence farmers who are receiving supplemented income from carbon sequestration revenues.
metric tonnes $\text{CO}_2\text{e}$.\textsuperscript{89} Leakage from the project activities is considered negligible since planting is integrated to the farmers’ other activities. Furthermore, the cash stipend paid to local farmers acts as an incentive to sustain tree growth, thus reducing the risk of non-permanence in the CO$_2$ reduction credits generated.\textsuperscript{90} While increased crop yields resulting from conservation farming techniques introduced through TIST programs may generate USD $250 per year for local farmers, farmers also receive a direct quarterly cash stipend from CAAC based on the trees’ future sequestration. This tangible benefit to a healthy forest can spur economic and social development at the village level, as a typical small group of farmers planting and maintaining 2,000 trees earn around USD $40 per year from the stipend alone.\textsuperscript{91}

Within each site there are several community group centers usually located in key local villages. These group centers act as focal points for the numerous small community groups, and are to submit monthly reports on their tree planting achievements to TIST.\textsuperscript{92} TIST auditors then make visits to the small groups to share information as well as to survey the group’s project sites.\textsuperscript{93} By providing regular accounting of the location, size, and species of trees being planted, as well as assessing the impact of the program on food supply, health, and other social factors, TIST auditors continually identify opportunities for improving the program’s operations. For instance as the program grows, TIST is building local monitoring capacity by training increasing numbers of farmers to use GPS and 3-Com’s Palm-Pilot technology to monitor sequestration projects.\textsuperscript{94} Therefore, by organizing participation and sharing expertise at the Small Group level, TIST encourages the sustainability of these projects funded by the Clean Air Action Corporation.

3.4 The Current Project State

While TIST has seen much success in planting millions of seedlings, the project in Uganda has yet to earn net carbon credits that CAAC can trade on carbon markets. However, the project has benefited local participants, who receive quarterly cash stipends based on the carbon sequestered by tree growth. Therefore, despite the benefits accrued by the communities in Uganda, TIST and its small-scale projects have proven to be costly for CAAC as the project has not gained revenue from regulatory carbon markets and have been unable to progress without certification by a carbon market.\textsuperscript{95}

The first barrier in the project’s success is a result of the high investment costs of these community-based land use and forestry projects and stringent certification process of the Clean Development Mechanism. TIST awaits regulatory markets such as the European Union ETS to accept carbon credits generated by these sustainable land use projects. In the meantime, TIST collects a small portion of revenues from the carbon credits traded on voluntary markets. While voluntary markets require less stringent environmental regulations on the certification of credits, they make community-based carbon projects more viable to implement for both the host countries and MNCs.\textsuperscript{96}

The second greatest hindrance to the projects’ implementation, success, and thus profitability has been the apparent lack of full and steady consent from the host country’s Designated National Authority, particularly in the case of Tanzania.\textsuperscript{97} The DNA appears to have grown more dubious of the projects’ good standing because the CDM Executive Board has not yet accredited these forestry projects. While this is more a result of the slow methodology approval process of the CDM, and less of the credibility of the project itself, the DNAs misapprehension and doubt have slowed the projects’ growth. Consequently, CAAC has learned a valuable lesson of maintaining strong relations with the host country’s DNA in order to foster project growth.\textsuperscript{98} By involving the DNA at the inception of the Project Design Documents, CAAC can ensure the openness of their intentions and plans for development. Furthermore, by increasing the capacity of DNAs and thereby reducing the risk of projects coming to halt, corporations like CAAC may be more willing to invest in sequestration projects in these least developed countries. It can be said that a strong, transparent alliance between the host country’s DNA and the MNC is vital to the growth and success of small-scale forestry projects, as well as to maximize the resulting environmental and economic benefits for all project participants.
Soil Carbon Sequestration

Of the three general carbon sequestration techniques in this study, it has been argued that soil carbon sequestration has the greatest potential for numerous social and environmental co-benefits. There is mounting evidence that with proper implementation, the ecologic and economic benefits of soil carbon sequestration can work within emerging carbon markets to achieve tradable international soil carbon credits.

Declining soil organic carbon (SOC) content, and the resultant declines in soil fertility, are problems for many of the world’s agricultural production systems, most notably in Sub-Saharan Africa. It is generally recognized that the reduction in soil fertility is the main biophysical limit to the level of food production on most small African farms. Farmers in Sub-Saharan Africa face a myriad of distinct economic and cultural disadvantages that prevent them from being able to implement many of the production enhancing techniques common in other parts of the world. Farmers comprise 70% of Africa’s economy, but most remain in abject poverty and many farmers cannot rise above subsistence levels of production. Consequently, most farmers in this region are economically prohibited from using fertilizer as low availability, high transportation costs, and lack of access to capital makes fertilizer unavailable or not cost effective. Furthermore, farmers have traditionally depended on fallow seasons to restore fertility to the soils. However, increased population pressure and poverty have resulted in the abandonment of this practice in favor of permanent cultivation. Additionally, low resource availability in the already degraded areas has led to overgrazing by livestock, and has produced economic incentives for farmers to remove all crop residues in order to sell them as fodder and cooking fuel. These practices, along with farmers’ traditional reliance on tillage-intensive practices, have resulted in dramatic decreases in SOC concentrations. Under these social, economic, and environmental conditions, many farmers place relatively little value on future returns on investment, instead preferring short-term yields to satisfy immediate concerns. Lastly, adverse government policies, low commodity prices, market imperfections, and insecure property rights have similarly created disincentives for African farmers to invest in better land stewardship.

Over time, this combination of factors has resulted in a reduction of SOC levels by 50-70% of what they were 100 years ago. Scientists and agriculturalists concerned with increasing food production in the region are focused on increasing SOC, and have compiled recommended management practices (RMPs) with this specific aim. If properly implemented, not only can these practices produce an immediate boost in yield, they can continue to improve soil quality over time. The most effective RMPs include efficient use of fertilizer and conservation tillage, as well as crop residue incorporation. Currently, these practices are not being implemented because of economic and cultural barriers. However, an accredited soil carbon market has the potential to provide financial incentives to farmers so that they can adopt these new management practices as well as bring MNCs into the picture as project sponsors, increasing the potential for shared expertise and resources.
4.1 Soil-Based Sequestration and Potential Co-Benefits

When considering SOC sequestration as a climate mitigation strategy, there are a number of co-benefits in addition to increased soil fertility and productivity, and the resultant increase in food security. SOC sequestration can reduce pressure to decrease forested land by increasing the productivity of current agricultural land. Similarly, increased soil organic carbon from RMPs can mitigate soil erosion and combat desertification by retaining natural resources. Following RMPs can also increase the amount and variety of economically valuable plants, in addition to restoring biodiversity; providing communities with both cash crops as well as enhanced ecological services. Increased vegetation and soil health captures more water, which in turn reduces nutrient run-off, resulting in sustainable positive feedbacks. It is thus apparent that the co-benefits to soil-based carbon sequestration can have significant effects on the socio-economic position of farmers in the area and local ecosystems.

4.2 Project Development

The combination of several factors give drylands, especially those of Sub-Saharan Africa, a competitive advantage for SOC sequestration projects. First is the size of their potential as carbon sink, which is 50 to 66% of the historic carbon loss of 42 to 78 Gt of carbon. Despite lower sequestration per hectare, the extensiveness of suitable agricultural land indicates a larger capacity than forests by 25%. Carbon sequestration has the potential to offset fossil fuel emissions by 0.4 to 1.2 Gt per year, or 5 to 15% of global fossil fuel emissions. Because land in Africa is so degraded, it has a naturally large capacity to store more carbon. Moreover, the fact that farmers in the region are not currently utilizing any of the RMPs means that the soil will be particularly responsive to fertilizer and other inputs.

While the potential for SOC sequestration to store carbon and provide multiple benefits is high, and monitoring feasible, there are other socioeconomic considerations that must be taken into account when determining this methodology's market potential. Markets must be attractive to both buyers and sellers in order to build the infrastructure necessary for implementation. There is research underway in Sub-Saharan Africa to understand community interest, incentives, and capacity to implement recommended land management practices in small farming communities. Some econometric models, however, suggest that only the most intensive land management improvements had significant carbon increases, and only very high carbon trading prices ($180 per tonne) were enough to drive adoption of this practice by farmers, but others have estimated significantly lower thresholds. Buyers of carbon offsets on the other hand, are responsive to a different set of variables when considering market involvement. Obstacles for buyers interested in purchasing soil-based sequestration carbon credits include the lack of international tradable standards, criteria for local institutional transparency and national policy performance ratings. Buyers are also wary of the risks involved if the farmer does not achieve the offsets, or the potential for land use changes to release carbon and thus nullify previous offsets.

4.5 Role of MNCs

A review of the burgeoning soil carbon market in the United States suggests that some corporate interest exists. While the United States has not signed the Kyoto Protocol and U.S. companies are not subject to mandatory carbon emissions reductions, there are still strong domestic drivers for the creation of voluntary carbon markets that trade in soil-based sequestration credits. As in Sub-Saharan Africa, SOC sequestration's co-benefits make it appealing as a global warming mitigation strategy in the U.S. Co-benefits to farmers in the U.S. are similar to those in Africa, but U.S. farmers have higher levels of education, greater access to capital and, most importantly, significant political institutional power. Government representatives in agriculture-dominated states, such as Senator Brownback of Kansas, have worked to develop carbon-trading standards in order to increase the income and net worth of their constituents.
Looking at SOC projects included under the Chicago Climate Exchange, there are several basic contract specifications detailing acceptable RMPs, project duration and eligibility. To date, over 350,000 acres of land are included in the program. Benefits include annuals offsets of approximately 175,000 metric tonne C/yr and motivation for increased stewardship of the land due to improved soil fertility and higher yields. As this is a voluntary program, prices have remained significantly lower than mandatory European markets.

5 Discussion

Carbon sequestration projects can act as a vehicle through which MNCs and developing nations can collaborate to attain each party’s specific interests as well as achieve environmental protection and sustainable economic development. MNCs can be significant drivers for: (1) the improvement of carbon sequestration mechanisms, (2) building the capacities of African host countries to act as equal partners, and (3) paving the way for additional firms to participate in development-focused sequestration projects. Intuitively, not all businesses place sustainable development high on their list of priorities. It is recognized that the success of private firms is most often measured internally as well as externally by such factors as net revenues, efficiencies, and returns to investors. Corporations indeed have a mandate to make profits; ensuring operations will survive in a competitive marketplace. However, while some argue that businesses have no obligation outside of these aims, the same characteristics that drive success in this sector position firms to contribute in assisting least developed nations, specifically through sequestration project-based partnerships. Due to key attributes, including experience in identifying operational efficiencies, facilitating international partnerships, as well as ascertaining market demands and public sentiment, MNCs are uniquely positioned to lead the exchange of resources and ideas between the three main stakeholder groups highlighted in the conceptual model presented in this paper: MNCs, developing ‘host’ nations, and carbon sequestration mechanisms.

There are specific challenges that MNCs face in taking a vanguard position in sequestration project development. The lack of successful models in sequestration implementation to date, along with various types of risk associated with engaging developed nations, can be perceived as steep barriers for many firms. The CDM itself has been criticized for creating several perverse compliance incentives. For example, by not delineating specific requirements for national ‘sustainable development criteria’ DNA’s have an incentive to promote less stringent policies in an attempt to attract MNC involvement by offering a market for low-cost, less rigorous projects.

Much like the concept of sustainable development, carbon sequestration can mean different things to different stakeholders. An opportunity to offset carbon from industrial emissions is similarly an opportunity to protect a riparian corridor. MNCs and governments may have unique motivations for participating in a sequestration project. However, such a project can be a powerful vehicle for collaboration, leading to sustainable development as measured in the MDGs. Cutting across the three types of sequestration examined in this report is the ability of MNCs to be leaders in using GHG mitigation strategies as catalysts for sustainable development (Fig. 3).
5.1 Pursuing Carbon Sequestration Projects

MNCs currently participating in sequestration projects are at the forefront of what seems to be a budding global industry. The best practices and noteworthy challenges identified by these firms can serve future project managers and investors, as well as DNA's and development specialists in designing and implementing increasingly efficient sequestration projects with socio-economic co-benefits built into methodologies. The BP and CAAC case studies presented in this report demonstrate that corporate participation in sequestration projects is neither a product of a firm's size nor its assets. While these factors may influence the size and type of project, it is apparent that participation in carbon sequestration can be a part of myriad business models.

The BP and CAAC examples also highlight two of the various factors that can bring corporations to the carbon sequestration table: anticipation of a carbon-constrained economy and Corporate Social Responsibility. BP's interest in geologic sequestration is rooted in researching and developing strategic profit-making technologies in anticipation of a carbon-constrained economy. The ongoing development of SOC sequestration methodologies has similar sources of motivation, as owners of farmland stand to gain much from the co-benefits of this process. Sequestration projects can thus be an investment in strategic positioning and profit maximization for firms perceiving a global marketplace with emissions caps.

Finally, a firm's Corporate Social Responsibility policy can influence involvement in carbon sequestration. As displayed in Figure 2, forestry and soil sequestration projects have great potential for economic and environmental co-benefits. Ranging from job creation to improved ecosystem services, these project benefits are similar to those found in the CSR portfolios of many companies. Therefore, even if a firm's management lacks direct concern for GHG emissions, sequestration projects present MNCs with an avenue through which CSR interests and obligations can be met, combining climate change mitigation with sustainable development.

Motivations need not be mutually exclusive, as demonstrated in this report's case studies. CAAC can certainly benefit from the strategic and profit oriented benefits related to the creation of TIST. However, the prime motivation for establishing projects in Uganda was
driven from the personal conviction of CAAC’s president to improve the conditions of impoverished people. The sustainable development goal of the TIST program is realized in “empowering subsistence farmers to restore their natural environment, increase soil fertility, create jobs, strengthen the local community, and move from famine to surplus.” The project provides a sink for greenhouse gases as well as promotes sustainable land-use practices, while helping to ensure it’s success through the involvement of local communities that directly depend on forest resources.

It is apparent that MNCs have myriad avenues through which they can pursue sequestration projects, regardless of their primary business interests. Whether through fulfilling regulator requirements, investing in for-profit ventures, or demonstrating corporate responsibility, leadership from MNCs is necessary to build the base of experience, partnerships and comfort necessary for sequestration to have a significant impact on mitigating climate change as well as contributing to the sustainable development of least developed nations.

5.2 Creating a Cycle of Sustainable Growth

Corruption, lack of resources, civil unrest, and poverty can directly affect a firm’s business interests not only within a troubled country, but also within a region or even the global marketplace. Such factors are embodied in the concept of ‘country risk,’ and can present barriers to firms otherwise interested in certain markets. However, MNCs can be drivers in building collaborative partnerships with developing nations via sequestration projects in an effort to promote both environmentally and economically sound development as well as provide for better business opportunities. BP’s partnerships within Algeria have led to benefits such as community projects and enhanced environment-centered research. With multiple benefits to pique the interest different stakeholders, sequestration projects create a collaborative partnership through which information, technology, and expertise can be shared. The benefits to both parties extend beyond the direct co-benefits of sequestration and filter into sustainable government policies and equitable corporation strategies.

Sequestration projects are relatively few in number among the current projects registered by the United Nations Framework Convention on Climate Change, highlighting the challenges and opportunities present in this sector. The disproportional concentration of CDM projects in China, Brazil, the Republic of Korea, and India indicates that the national capacity, or lack there of, to engage in such endeavors remains a primary hurdle to creating climate change mitigation projects in previously uninvolved countries. Institutional capacity, local expertise, DNA experience, and funding are just a few issues developing nations must overcome However, many of these are areas in which MNCs can provide leadership, as demonstrated by BP and CAAC.

Africa requires substantial assistance from a range of sources to achieve the MDGs, and if the past is an indicator, relying on foreign development assistance alone is not a dependable solution. MNCs can drive sustainable development via sequestration projects through increased technology transfer, training, and funding. Designated National Authorities are a direct avenue through which MNCs can partner with governments to build capacity and develop sequestration projects that meet CER demands. Specifically, DNAs can benefit from corporate-led training in the economic issues and certification processes related to carbon markets. The partnerships BP and CAAC have developed with local officials demonstrate the ability of firms to engage developing nations through sequestration projects. Such projects thus represent an opportunity for matching national needs, local concerns and MNC goals. Integrating carbon sequestration strategies and capacities across governmental agencies broadens the pool of potential country-based stakeholders, shifting sequestration from an ‘environmental’ issue to one of interest for those involved in other governmental departments including social development, public health, and agriculture. Such partnerships can similarly mitigate the factors of ‘country risk’ that have, to date, kept some MNCs from moving forward with projects in the region; opening new business opportunities and potentially creating a cycle of sustainable growth.
5.3 Contributing to Sustainability-Focused Systemic Changes

As the conduit through which MNCs and nations must pass in order to attain CERs and payment, carbon sequestration mechanisms hold great promise for promoting sequestration methodologies as a tool for emissions mitigation as well as sustainable development. However, these nascent mechanisms are currently driving neither in many African nations. To date only five countries in sub-Saharan Africa have registered CDM projects, and none are afforestation/ reforestation projects. In fact, sequestration methodologies have been largely bypassed in the CDM process for other methodologies including energy efficiency and solid waste projects. Maximizing opportunities for improvement within project development, accreditation and implementation of sequestration projects can increase the type and number of MNCs involved. Similarly, these adjustments can present more opportunities for African nations to collaborate and promote the sustainability of sequestration projects, leading to greater progress in achieving the MDGs.

MNCs can contribute to the improvement of carbon trading mechanisms and sequestration implementation through the identification of best practices, market failures, and opportunities for improvement within each segment of the project and trading cycles. Carbon sequestration methodologies are more likely to achieve environmental protection and economic development when co-benefits are a primary part of the planning process, rather than a tangential concern. However, the current structures such as the CDM and other carbon markets fail to create such an incentive- thereby not maximizing resources.

Approved forestry accreditation schemes could be adjusted to include smaller projects that are tailored to deliver benefits to host communities through various ecosystem services. SOC sequestration projects have great potential co-benefits that should similarly be investigated by MNCs and the scientific community. However, current demand outweighs current supply of accredited carbon credits and companies are focusing on projects that will deliver the largest tonnage of sequestered carbon in the shortest timeframe. This puts smaller forestry projects and SOC sequestration projects at a disadvantage. A major hurdle for the inclusion of SOC projects is the fact that soil carbon sinks have relatively small annual offsets and require roughly twenty years to reach their full capacity, which is beyond the preferred timeline of many stakeholders. Furthermore, the issue of permanence, creates sufficient risk to keep forestry projects at the periphery, and prevents soil projects from entering the market.

Carbon markets and their project approval and implementation schemes are continually assessed by internal and external agencies to identify areas for improvement. The growing market for CERs suggests this field is still in its infancy, and that much profit can be made in mitigating GHG emissions. Linking sustainable development with climate change has created an opportunity for MNCs to contribute to both processes. While many firms do not specialize in climate science, the carbon cycle, or international development, many MNCs are uniquely qualified to act as leaders in the ‘business’ side of carbon trading. In fact, MNC leadership in the ongoing creation of carbon-mitigation strategies will be an important factor in the success of these programs.
6 Conclusion

With the deadline for achievement of the Millennium Development Goals of 2015 quickly approaching, avenues for participation beyond donations from rich nations must be nurtured. In low-income countries, particularly in Africa, domestic resources alone will not be enough to achieve any measurable results toward the MDGs. One mechanism to mitigate climate change, contribute to achieving the MDGs, and encourage additional investor involvement in Africa is carbon sequestration. Geologic storage, forestry, and soil methodologies have the ability to bring together host countries that require further financial support and multinational corporations seeking investment opportunities and CSR project partners.

MNCs are traditionally known for demonstrating the ability to discover and exploit market efficiencies in the private sector. When applied to carbon sequestration projects this attribute has the potential to drive resources through such projects, and toward the sustainable development of African nations. BP and the Clean Air Action Corporation have demonstrated leadership in pursuing socially responsible business practices and promoting carbon sequestration initiatives. As the model presented in this paper demonstrates, the necessary interest and resources are present in developing nations and MNCs, but these parties’ interests are currently not aligned in a way that can maximize benefits to the environment or society. Further leadership is needed from the corporate community if the potential of sequestration methodologies to mitigate GHG emissions and foster sustainable development is to be realized.
Appendix 1: Clean Development Mechanism Summary

The Kyoto Protocol, adopted in 1997, was the first-ever legally binding commitment to reduce greenhouse gases, requiring industrialized countries to reduce anthropogenic emissions by 5 percent below 1990 levels by 2010.\(^{129}\)

The Kyoto Protocol established a set of market-based “flexible mechanisms,” one of which is the Clean Development Mechanism (CDM, Article 12), in order to reduce the costs of compliance. The CDM allows developed countries to invest in low-cost emission reduction or sequestration projects in developing nations that will result in emission reduction credits. CDM credits are known as Certified Emission Reduction (CERs) units, where one CER is equivalent to one ton of \(\text{CO}_2\) equivalent. An international carbon market has thus emerged; for example, the European Union’s emissions-trading system allows for the transfer of CERs between EU countries, providing a large potential market for CERs and demand from European investors for CDM projects. To date, there are 166 CDM projects in 36 countries that have collectively generated 328,701,797 CERs.\(^{130}\) Under the Protocol, all CDM projects must:

1. Result in real, measurable, and long-term benefits related to the mitigation of climate change.
2. Result in reductions of emissions that are additional to any that would occur in the absence of the certified project activity.
3. Assist developing countries in achieving sustainable development.\(^{131}\)

As outlined by the United Nations Environmental Programme, the CDM may contribute to several developing country sustainable development objectives, including:

- Increased energy efficiency and conservation.
- Transfer of technologies and financial resources.
- Local environmental benefits, e.g. cleaner air and water.
- Poverty alleviation and equity concerns through income and employment generation.
- Sustainable energy production.
- Private and public sector capacity development.\(^{132}\)

However, the CDM has seen limited success due to the slow approval process for project methodologies, as well as the uncertainty involved in establishing baselines, monitoring and certifying these projects. Furthermore, despite policy objectives within the Protocol designed to facilitate social and economic progress in many developing nations, the majority of CDM projects are concentrated in India, China and Brazil.\(^{133}\) Of note to date, many least developed countries in Africa have not been the beneficiaries of most carbon sequestration trading schemes.
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