

Final Progress Report

Sustainability Science Program

September 1, 2007 – August 31, 2008

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Date: July 16, 2008
Field: Geosciences and Economics
Degree: Interdisciplinary Ph.D. program
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Host: Professor John Holdren, HKS and Department of Earth and Planetary Sciences

Description of SSP-related research activity:

Title: “Socio-economic valuation of Mangrove ecosystem and policy implications in the Niger Delta region of Nigeria.”

My primary SSP-related activity involves the estimation of economic and social values of the Mangrove resource in the Niger Delta region of Nigeria and the recommendation of policy options for the sustainable management of the resource.

- **Abstract**

The Niger Delta in the central part of Southern Nigeria is the region where the main channel of the River Niger reaches base level and branches into multiple distributaries, disposing off, the discharge and sediment load in the Atlantic Ocean. The Niger Delta is an area endowed with immense natural resources, especially hydrocarbon deposits. Crude oil production and export from the region, in the range of two million barrels a day, dominates the Nigerian economy, accounting for over 90% of the Nation’s total export earnings. The region is also home to the largest contiguous Mangrove forest in Africa and third largest in the world. The Mangrove ecological zone in the region depicts a classical case of Human-Environment interaction and its socio-economic consequences. Prior to the discovery of crude oil in commercial quantity in 1956, the major occupation of communities living within and adjacent the ecological zone was subsistence fishing. However, five decades of oil and gas exploration and exploitation by the oil industry has resulted in the degradation and in some cases outright loss of the Mangrove ecosystem in the region. To estimate the socio-economic impacts of the Mangrove loss in the region, neoclassical economic valuation and participatory social valuation approaches were adopted. Results from the economic valuation revealed that the net present value of future income stream discounted over a 30 year period at 20 percent discount rate in 2008 was between \$642.20/ha and \$2,852.62/ha. The study also established, for the first time, the high social value of the Niger Delta Mangroves.

- **Identification of the problem addressed**

Evidence from previous focus group sessions that we conducted in the Niger Delta region clearly indicates that the communities are inadequately compensated by the oil industry once mangroves are cleared or degraded. The oil companies currently compensate the communities with \$24 for each hectare of mangrove destroyed or degraded. A United Nations Development Program (UNDP) study found that this compensation rate was determined without adequate consultation or input from the host communities and so lacked the transparency and fairness required for peaceful and sustainable engagement. Furthermore, the communities are unable to seek adequate redress from the government because the oil industry in the country is operated by what Michael Watts called 'Petro-capitalism' (a joint venture between the multi-national companies and the Nigerian government). The local communities are completely isolated from the oil revenues and from the political power structures that determine resource allocation within the national economy. As a result, the communities have become restive and militant; culminating in mass actions against oil facilities, occupation of flow stations, sabotage of pipelines, and the increasing incidences of hostage taking of oil workers. These activities resulted in the reduction of Nigerian oil export by 250,000 barrels a day in March, 2006. The cut in daily oil output was partly responsible for the spike in global oil price to over \$70 a barrel in July, 2006.

- **Key question asked about the problem**

The key question asked was: what is the social and economic value of one hectare of Mangrove vegetation in the Niger Delta region of Nigeria?

- **Research method**

The economic value of Mangrove vegetation consists of three components: direct use value of the Mangrove resources; the indirect use of its ecological functions; and the non-use of its bequest and aesthetic characteristics. These components were estimated using the Neo-classical Utility Maximization (NUM) theoretical framework. The social value of Mangroves was also estimated using non-monetary measures of the value ascribed to the Mangroves by the local Niger Delta communities. This was determined using Participatory Economic Valuation (PEV) framework which emphasizes community based local-level knowledge and experience. The combination of NUM (quantitative) and PEV (qualitative) approaches provided for the harmonization of the various social, cultural, ecological, and economic values of the Mangrove ecosystem in the Niger Delta within a single valuation framework.

- **Principle literature upon which the research drew methodological**

Methodology for the research was drawn from environmental resource management literature as well as social research methods.

- **Description of empirical data acquisition**

Since the study was based on participatory principles (stakeholders' active involvement in the research), field survey research for primary data collection was

pertinent to the study. As a result, focus group sessions and household surveys were conducted in the Niger Delta from December 2007 to January 2008, and March 2008. The primary goal of the field research was to elicit the economic and social value ascribed to Mangroves by the local communities in the Niger Delta.

- **Geographical region studied**

Niger Delta region of Nigeria.

- **Recommendations that might be relevant for the research problem**

A major policy outcome from this study is an estimate of the compensation rate for one hectare of Mangrove in the Niger Delta. Given this information, communities are empowered to negotiate for equitable compensation when Mangroves are destroyed or degraded in their communities. In addition, the compensation rate can be adopted as a government policy to encourage the conservation of the Mangroves in the Niger Delta region.

- **A description of the final product(s) you have/are aiming to produce**

The final product of this study is the economic and social values of the Mangroves in the Niger Delta as well as the policy options for the sustainable management of the forest. These findings are currently being documented for publication in *Environment and Development Economics* journal, edited by Anastasios Xepapadeas and published by Cambridge University Press, UK.

- **Description of major other intellectual advancement**

My other intellectual activity is focused on my doctoral dissertation which is titled: “*Assessment of Environmental Change and its socio-economic impacts in the Mangrove ecological zone of the Niger Delta.*” Findings from the first phase of the dissertation work was published in the *Journal of Marine Geodesy* 30:249-267, 2007; titled: “Satellite-Based assessment of the extent and changes in the Mangrove ecosystem of the Niger Delta.” Results from the social-economic valuation component of the study have been presented at three international conferences:

(i) “International conference on the Nigerian state, the oil industry and Niger Delta”, held from 11th to 13th of March 2008 in Yenagoa, Bayelsa state, Nigeria (Url: <http://cas.umkc.edu/nigerdelta2008/>). Title of my presentation: “Socio-economic valuation, equity and justice in the Mangrove ecological zone of the Niger Delta”.

(ii) International symposium on “Coping with global change in marine social-ecological systems”, held from the 8th to 11th 2008 in Rome, Italy (URL: <https://www.confmanager.com/main.cfm?cid=846&nid=8635>). Title of my presentation: “Assessment of change in the mangrove ecological zone and its socio-economic impacts in the Niger Delta region of Nigeria”.

(iii) American Association of Geographers annual meeting and conference held in Boston from 15th to 19 of April 2008. Title of presentation: Impact of the

Petroleum Sector on the resilience of the Niger delta social-ecological system. This was a collaborative effort with Mike Burns (Giorgio Ruffolo Fellow). We are currently documenting our findings for a journal publication.

- **Professional advancement**
 - Completion of my doctoral program.
 - Job offer to head the environment and hazards unit of the Nigerian National Space Research and Development Agency, Abuja, Nigeria.
- **Principal collaborators outside Harvard**
 - Dr. Adegoke Jimmy (University of Missouri-Kansas City, Missouri)
 - Dr. Nwilo Peter (University of Lagos-Lagos, Nigeria)
 - Dr. Saba Ekechukwu (Map and Image System, Warri-Delta State, Nigeria)
 - Dr. Akinyede Joseph (Nigerian Space Research and Development Agency, Abuja-Nigeria).
 - Dr. Sylvester Osagie (Pennsylvania State University, USA)
- **The following grants were received for my field work**
 - (1) \$25,000 awarded by National Geographic Society's Committee for Research and Exploration
 - (2) \$43,000 awarded by the Nigerian Space Research and Development Agency, Abuja-Nigeria.
- **Contact information after leaving CID (title, postal address, phone, email)**
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