




Study on the Environmental Pillar of the GBEP Sustainability Indicators

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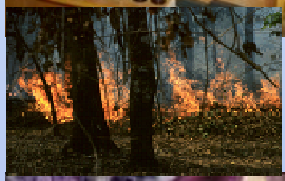







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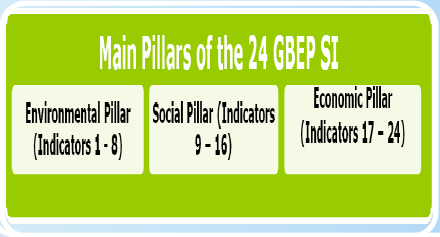
Introduction

There is an increasing trend in bio-energy and biofuels production and use worldwide owing to their multiple benefits.

Traditionally, biomass is mainly used for energy purposes in the ECOWAS region, but harvesting and utilisation are unsustainable.

Thus, there are negative impacts on the environment and local economy in the sub-region.



The 2012 GBEP Pilot Study on the sustainability of bioenergy use in Ghana was based on 3 main pillars.

CSIR-FORIG worked on the environmental Pillar of the SI.

Objectives

The broad goal of the project was to establish the feasibility of the GBEP Sustainability Indicators and enhance their practicality as a tool for policy-making.

This specific objectives of the Pilot study were:

- To collect the most appropriate available data to be used for the Indicators;
- To assess the usefulness, availability and quality of data;
- To provide recommendations for improved data collection and use; and
- To propose baseline values for the most important (sub) indicators.

Overview of work done by CSIR-FORIG

CSIR-FORIG was tasked with carrying out the study on the Environmental Pillar of the SI.

Owing to cost and time limitations the study involved the use of existing data; no actual measurements, tests or surveys were carried out.

CSIR-FORIG prepared a Plan of Action indicating the most feasible indicators among the 8 from the Environmental Pillar that data were readily available for.

In order of priority, the selected Indicators under the Environmental Pillar were:

- **Indicator 3**: Harvest levels of wood resources;
- **Indicator 8**: Land use and land-use change related to bio-energy feed stock production;
- **Indicator 1**: Lifecycle Green House Gas emissions (GHG); and
- **Indicator 2**: Soil quality.

Scope of Work under the Environmental Pillar

Indicators 1, 2 and 8 (Lifecycle GHG, Soil quality, Landuse change)

- Wood resources;
- Jathropha, Sunflower;
- Agricultural residues

Indicator 3 (Harvest levels of wood resources)

- Wood resources

Approach

Internet search; Desk Study/Existing research results

Interviews with relevant Ministries and Commissions, GSS, Industry Associations, NGOs, Individual bio-energy/Biofuel Companies, Research Institutions, etc.

Other relevant sources (personal contacts with experts, etc).

Difficulties encountered

- **Relevance to Ghana**:
  - The eight indicators under the Environmental Pillar are relevant to Ghana's Policy on bio-energy; however, there were limitations in the light of the GBEP methodology for data collection. But, by and large, there were commonalities, e.g. IPCC guidelines for GHG inventories and Good Practice Guidance and Uncertainties Management in GHG inventories.
  - In terms of priority, only four sub-indicators were considered feasible for the pilot study given the ready availability of relevant data within the limits of time and resources available for the study.
- **Adaptation of methodologies to local conditions**:
  - The GBEP methodologies are quite stringent.
  - Although they are adaptable to local conditions, gaps in data availability posed severe constraints to data quality.
  - Without carrying out actual measurements and surveys it was difficult to fully meet GBEP data requirements for all indicators and sub-indicators.

Difficulties encountered

- **Data availability gaps**:
  - Limitations in data requirements according to the GBEP criteria.
  - Data requirements were complex so partially met GBEP requirements; basic data were still missing even for the selected priority indicators.
  - Data availability for Indicator 3 (Harvest level of wood resources) was adequately sufficient relative to the other indicators.
  - The key constraint to data availability was the lack of focussed institutional studies in bio-energy since it is a recently emerging sector in Ghana.
  - The database from studies by scientists and other professionals interested in bio-energy was not systematically structured in consonance with the data requirements under the GBEP indicators.

Solutions to overcome difficulties encountered

- In the absence of actual measurements and surveys it was necessary to check and cross-check data obtained from various sources for accuracy.
- As appropriate, the GBEP methodology was simplified (e.g., use of fewer sub-indicators, etc.) in order to obtain relevant estimates of bio-energy sustainability indicators.
- Within the limits of available time and resources, consultations and interviews were as thorough and as extensive as possible to ensure relevant information capture.

Key results (Indicators 1, 3 and 8)

Indicator	Sub-indicator	Estimated values
1: Lifecycle GHG emissions from traditional bio-energy	**Bio-energy production** and use	**3.006 $MtCO_2e$**
	Residential sector contribution to total energy sector emissions	**1.89 $MtCO_2e$** (**32%**)
	Biomass contribution to residential sector energy	**1.69 $MtCO_2e$** (**~90%**)
	Industrial sector contribution to total emissions	**1.47 $MtCO_2e$ (25%)**
	Woodfuels component in **industrial energy** (in 2004)	**1.18 $MtCO_2e$**. (**80%**)
	Transport sector contribution to total energy sector emissions from fuel combustion	**2.53 $MtCO_2e$** (**43%**)
	Total CO_2 emissions in 2000	**5.9 $MtCO_2e$**.
3: Harvest levels of wood resources	**Annual harvest** by volume	**21,244,333 m^3/year**
	As **% of net growth** (baseline value = -5%)	**-106% net growth**
	As **% of sustained yield** (baseline value = 0.32%)	**6.9%**
	% used for **bio-energy** (baseline value = 4.71%)	**93.96%**
8: Land use and land-use change	Total **bio-energy feedstock** production (2006)	**1,185,000 ha**
	Compared to **national surface area**	**5%**
	Compared to **agricultural area** (baseline 0.0567%)	**11%**
	Compared to **managed forest area** (baseline 0.1584%)	**74%**

Key results (Indicator 2: Soil Carbon)

Total carbon stock (Mg C ha^{-1}) under various land-use systems in three ecological zones in Ghana. Figures in parentheses are standard deviations.

Ecosystem	Land-use type			
	Fallow	**Cultivated**	**Natural forest**	**Teak stand**
Savannah	39.36 (±3.86)	33.19 (±0.02)	**51.00** (±3.28)	**51.00** (±10.50)
Dry Semi-deciduous forest	64.08 (±0.35)	30.87 (±0.16)	**212.46** (±61.68)	**76.78** (±6.31)
Moist Evergreen forest	**95.46** (±3.72)	**75.12** (±0.04)	**326.75** (±43.89)	**138.33** (±7.35)

(Source: Adu-Bredu, *et al.*, 2008)

Lessons learnt

- The pilot study has shown the need for more care and detail in data gathering, especially for bio-energy stocks, soil carbon and Lifecycle GHG emissions.
- Although no actual measurements were taken, the data obtained were useful for practical purposes in 'learning' the GBEP methodology for assessing the sustainability of the bio-energy sector.
- The pilot provided useful insights to the complexity of the GBEP indicators, as well as their applicability and relevance to Ghana.
- It has also fostered closer links between relevant institutions. In future this will minimize the problem of uncoordinated and fragmented data gathering efforts and ensure better synergies in data gathering and information sharing among sectors.

Conclusion and Recommendations

- Piloting the GBEP sustainability indicators was a successful and useful exercise for Ghana.
- It has provided valuable insights and the lessons learnt will improve data gathering protocols across sectors to enhance data quality and usability.
- Given the gaps in data availability, it would be necessary to carry out targeted surveys and measurements to be able to meet the stringent requirements of the GBEP methodology.
- As a way forward, government must provide resources (funds, appropriate equipment, etc.) to relevant institutions to mandatorily gather and collate data at regular intervals to provide more accurate information for effective implementation of the bio-energy policy.
- Until resources become available to improve data quality, the GBEP methodologies may have to be used with limited scope and fewer sub-indicators, as appropriate.

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Thank you!
Merci!
Obrigado!