

Assessment of Forest Valuation to GDP Contribution in Sierra Leone

Jackson EA*

Doctoral Scholar, University of Birmingham, UK

Abstract

This paper provided a critique of GDP data computed for forest division in Sierra Leone between the periods 2013-14 (a sub-set of the aggregate computation from all accountable divisions within the agricultural sector). The analysis has raised concerns about the validity of data used, and particularly method(s) on which the valuation was computed.

Efforts were made in discussing valuation methods with their merits and limitations, and their applicability in the context of forestry division in the country. The conclusion highlighted a justified explanation for the 'stated preferences' technique, and with recommendations for addressing issues in a bid to improving forest valuation techniques in generating higher GDP revenue for the division, and the national accounting as a whole.

Keywords: GDP; Forest management; Governance; Market and Non-market forest products; Forest valuation; Forest methods

Introduction

Sierra Leone is a former British colony which lies in the west coast of the African continent, and based on 2004 census statistics, the country reported a 4.5 million population with a projected increase of up to 6.5 million expected by 2018 (The Sierra Leone Government, 2013). A naturally endowed economy with abundance of natural resources such as precious minerals like Diamonds, Bauxite and forest reserves, and for which, up to the emergence of the Ebola epidemic, recorded steady growth in her GDP index, mainly as a result of increased level of productivity in mineral extractions (IMF, 2013). Appendix 1 provides a summary of employment statistics from the entire agriculture sector to the Sierra Leone economy and for which Forestry's share was up to 2.3%. This is an indication of the relevance of the forest division in relation to its contribution to productivity and employability, particularly for residents around forest communities.

This report will seek to address the following objectives:

Critical analysis of GDP data with a view of proposing recommended strategies on ways to improve productivity in the forest sector.

Assess governance approaches to strengthening effective forest valuation for its benefit to national revenue contribution.

Investigate methodology and techniques applicable to improving productivity and managing forest productivity process (es).

Overview of Forest Resources and Valuation Components

As explained in Emerton's study [1], the diversity in human situation (social, political and economic), has brought about changes in high level demand for forest resources in general. This has come about as a result of exploitation perpetrated by forest community dependants, fending for their daily livelihood (for example, wood fetching and bush-meat hunting).

From an economic point of view, 'forest' has intrinsic economic value, which must be preserved in order to ensure it serves its purpose in meeting the needs of those who depend on it, so as to allow economic choices to be made about its usage.

Appendix 1: There is no specific definition that can be assigned

to the word Forest. In most situations, this is based on the situation and the purpose for which a study is to be carried out. "As explained in an article by UNEP (n.d), the concept can either be based on an assessment focusing on the availability of timber for commercial or industrial purposes may exclude small wooded areas and types of forest not considered to be of commercial value. A definition based on physical characteristics such as the canopy cover, will most likely be used for an assessment of the forest extent, whilst a definition based on botanical characteristics, i.e. variety of tree species, will be used for assessing various classes or types of forest".

According to Zhang and Pearse [2], forest value can be classified into two categories: extractive and the non-extractive values; the former deals with the physical removal of resources like timber from forest for the purpose of processing into intermediary products (for example, timber and other wood products like poles), whilst the later, is concerned with the non-removal of forest resources which can also be sub-divided into two categories, namely ecosystem services (for example, soil and water protections), and preservative values (recreational and cultural value for the purpose of hunting and performance of traditional rituals). Appendix 2, provides an illustration of the total value of forest as already explained.

Appendix 2: The total components of extractive and non-extractive value, is also akin to 'market and non-market values', conveying the same meaning as explained by Bishop [3], and presented mathematically thus:

$$TFV = MV + NMV$$

Where: TFV is the Total Forest Value; MV is the Market Value; NMV is the Non-Market Value

Calculation of the above total forest value components is achieved

*Corresponding author: Jackson EA, Doctoral Scholar, University of Birmingham, Edgbaston, Birmingham, UK, Tel: 447862703701; E-mail: emersonjackson69@gmail.com

Received March 31, 2015; Accepted April 21, 2015; Published April 27, 2015

Citation: Jackson EA (2015) Assessment of Forest Valuation to GDP Contribution in Sierra Leone. Forest Res 4: 143. doi:[10.4172/2168-9776.1000143](https://doi.org/10.4172/2168-9776.1000143)

Copyright: © 2015 Jackson EA. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

through the application of different valuation methods as explained by Bishop [3] and, more explicitly illustrated by Brahic and Terreaux [4] as shown in Table 1. The merit of the above TFV methodology is based on the fact that it allows both the market and non-market value of forest to be computed simultaneously when determining the total value of forest to a national economy. As previously explained the market/extractive value component determines tangible extraction of resources from forest, which includes timber products like industrial timber and fuel wood; with fruits and livestock as the non-timber components (reference to Appendix 2). In addition, the non-extractive/non-market value also provides a means of attaching financial valuation to usage of the natural ecosystem, for example, its use in sustaining biodiversity through absorption of carbon sequestration, soil and water protection. It can also be viewed as a way of integrating methodological triangulation, with the aim of improving overall outcome of data validity. In this situation, the fact that market and non-market components are factored simultaneously means that any of the suggested methods of valuing forest resources can be used, but more so depends on the justification for which one is considered in preference over the other.

From a critical point of view, each and every one of the methods listed in Table 1 have their weighted merits and limitations depending on the purpose for which they are considered relevant during the process of valuing forest resources. The stated preferences approach (incorporating contingent valuation and choice experiment), determines individual preferences to pay for environmental services/goods (for example, public goods like park) in relation to cost levied for their usage. The advantage of these methods is their ease of administration through the use of questionnaire survey. On the other hand, a limitation addresses the wide variation of individuals' income to pay for environmental services over specified period. Another limitation to this method is the fact that users of services, particularly in the context of developing nations, is the unrealistic judgements made by people about the true market value of environmental goods/services, which in most cases, can be an undervaluation or over-valuation depending on the financial circumstances of the individual or groups interviewed.

The revealed preferences approach which incorporate Travel cost, Hedonic pricing, Production function, Protection expenditure

and Replacement cost (summarised in Table 1) involve real choices made by people on the basis of the true picture/calculated costs of how much they intend to pay for environmental services/forest goods [5]. This for example, takes into consideration costs of travelling to and from accessing public goods/services like parks or wildlife resort and in addition, the added costs of payments to enter facilities and other associated costs. One of the main limitations of the revealed preference approach is the inefficiency of collecting vital data, which in most cases deals with only a cross-section of the population. The positive side of using both techniques is to do with the scope for methodological triangulation, thereby enhancing richness and valuation of data in the computation process of forest valuation. In that vein, it is possible to use any of the methods during the process, but with sound justification, and supported by explanation of merits and limitations for clarification purpose(s).

Data Collection Method and Analysis based on GDP Contribution

Data used in the analysis originated from the 2013-14 Sierra Leone statistical office annual review; one of the most reliable sources for information of this nature from the country. Table 1 (Sierra Leone Statistics, 2014) provide analysed interpretation of GDP contribution from all divisions of the agricultural sector. The emphasis here is on the forestry division with a view of assessing valuation components used to determine GDP contribution (Figure 1).

In real term, GDP contribution from the forestry division fell continuously from 2010 to 2014, but still shows a reasonable average in comparison to other division like livestock, groundnut and even fruits and vegetables which are also on the lower end. The forestry division accounts for up to 2.4% of its activities to employment, a considerable progress given the fact that Sierra Leone is only recouping from the experience of the brutal civil war in the period 1991-2001 (World Bank, 2010) (Appendix 1) (Figure 2).

It is not quite clear as what method(s) were used in the computation of GDP returns for the forest division. Equally, the validity of forest employment statistics figure in Appendix 1 is also questionable given the wide range of activities taking place within the forestry division in Sierra Leone (timber logging and charcoal trading, to name a few). An overt approach to the above computed GDP data would have proved

	Method	Procedure	Applicable values	Exclusions
Stated Preferences	Contingent valuation	Determine individual preferences by directly questioning people about their willingness to pay.	All	Special situations where individuals have no prior knowledge
	Choice experiment	Determine individual preferences by directly asking people to select their preferred option among a set of options each having particular characteristics.	All	Special situations where individuals have no knowledge
Revealed Preferences	Travel cost	Estimate travel costs of people by a survey on the time expenses incurred to visit the studied site	Effective-use value: use of a recreational site	Non-use values
	Hedonic pricing	Determine the influence of an environmental characteristic on market prices (e.g., real-estate).	Quality of air, water, cultural benefits, beauty of landscapes (city parks), etc.	Non-use values, those not related to a marketable good
	Production function	Study the impact of change in ecosystem services on the goods produced	All impacts affecting the goods produced	Non-use values
	Protection expenditure	Determine the real or potential costs to individuals in protecting against negative externalities.	Negative externalities (protection against fire, etc.)	Non-use values, anything that is not a negative externality
	Replacement cost	Determine the cost to replace a lost good or service.	All lost goods and services	Non-use values

Source: <http://www.set-revue.fr/problems-and-methods-forest-biodiversity-economic-valuation/texte> [Brahic and Terreaux, 2011]

Table 1: Calculation of the total forest value components is achieved through the application of different valuation methods.

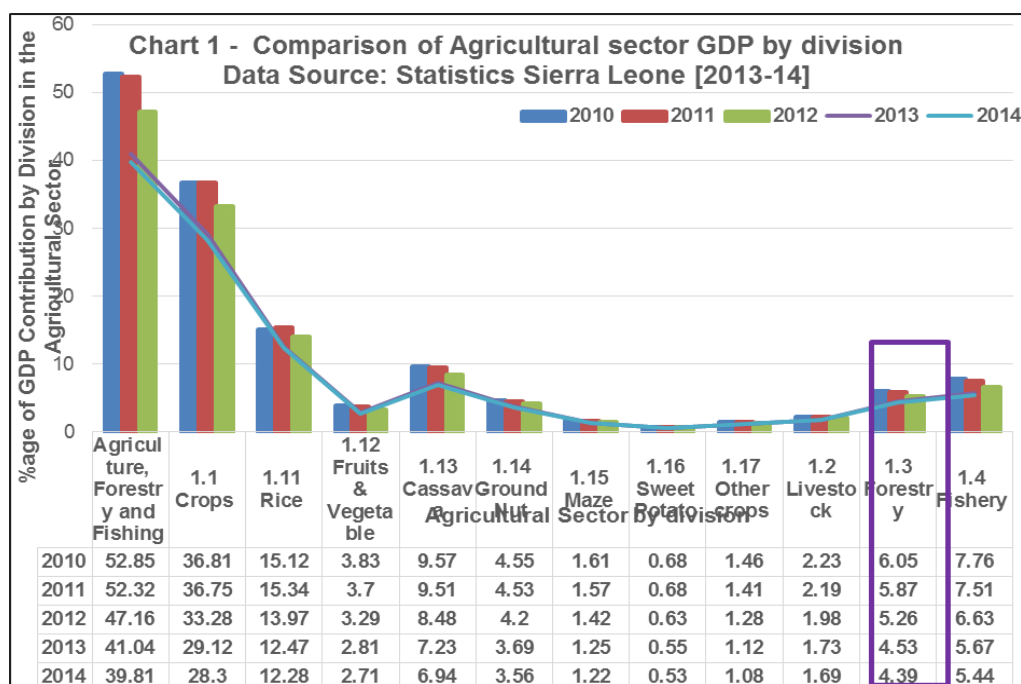


Figure 1: Comparison of Agricultural sector GDP by division.

Employment in natural resources sectors [Source: World Bank, Statistics Sierra Leone]	
Sector ⁴⁰	Share of national employment
Forestry	0.4–2.3 percent
Livestock	0.4 percent
Hunting/fishing	1.7 percent
Crop farming	61.3 percent
Mining and processing	2.6–4.5 percent
Total	66.4–70.6 percent

Figure 2: Employment in natural resources sectors.

reliable with a breakdown of components used to compute or record data. Given the situation of widespread illegal timber logging activities taking place in the country, it would have been good to explore how effectively revenue generated from such activities were filtered into the computation of GDP contribution made by the forestry division in the country. On a similar note, vital livelihood activities within the forest division like fuel wood and charcoal trading account for over 90% of the country's bio-fuel consumption [6]. There is no indication as to whether revenue generated from these areas was filtered into the forest GDP computation.

Divisions like 'Crop, Rice and Cassava' shows higher percentage to the total GDP contribution from the entire agricultural sector, and this is indicative of the attention centred around the Sierra

Leone Agricultural Research Institute (SLARI) in applying modern technology to improve food production for self-sustainability. Based on Stads and Momoh [7] study conducted on behalf of SLARI, it clearly shows that the forestry division is insignificant when it comes to valuing its contribution to the economy. Effort to improve productivity in key divisions like Crop, Rice and Cassava has focused attention on intensive technology approach (es), and backed by an improvement in the human resource potential of staff employed to work at the institute. Forestry division in Sierra Leone has the potential and capacity to contribute substantially to the national revenue; this can be achieved with concerted efforts to improve management and staff skills so as to properly address appropriate method(s) to adequately value forest resources in the country.

Critical Issues in Relation to the Revealed GDP Computation

This section is intended to provide critical assessment of computational method(s) used to present the above statistical results for GDP contribution from the forestry division. The analysis is based on secondary macroeconomic data (Figure 1) for GDP computation produced by the Sierra Leone Statistics Department. Contribution of GDP made by forestry division in the period 2010 - 14 provide a good base for further research to probe into the validity and reliability of method(s) used to collect and compute results which is critical in portraying realistic performance of economic activities, particularly within the forest division.

As outlined in the a report (The Reddesk, 2015), the division is struggling in its capacity to produce detailed inventory of forestry valuation; some of the underlying problems for this include the lack of specialist equipment and poorly trained personnel to address suitable methods of capturing vital data. In addition, there is an issue of uncoordinated working partnership between MAFFS and other government agencies responsible for regulating the management of illegal use of forest resources, particularly commercial logging of timber (ibid). The aforesaid discussion raises serious concerns about the accuracy of GDP computation presented for the forestry division (2013/14). A critical question that may likely be raised about the validity of data includes the following:

1. Did the calculation of GDP index for the forestry division actually factor forest valuation techniques in the computation of the total valuation function/formula ($TFV = MV + NMV$)?
2. If so, which methods were considered to be appropriate in the light of prevailing circumstances in Sierra Leone?

Choices made with regard to method (s) used in collecting forest valuation data is very helpful in portraying reality about outcomes and policy making [8]. Therefore, in computing GDP contribution, it is absolutely important for both components (extractive and non-extractive values) to be carefully recorded. This requires detailed investigation about the suitability of which method is considered appropriate in the context of the population dynamics and in addition, other situation like the availability of trained personnel, and cost implication to cover the country's geographic border. Once detailed attention is paid to all the constrained situations, it is evident that GDP computation will be made easy as a means to projecting future calculations using straightforward models like Time Series.

In general, any of the methods listed on Table 1 can be used as a way of monitoring the computation of both market and non-market valuation of forest to an economy. As in the case with Sierra Leone, weaknesses in human resource capacity across the country and backed by the endemic corruption of personnel in the civil service, is an issue when dealing with the computation of GDP (UNEP, 2010). The forest division at MAFFS is currently under-staffed, and with only limited amount of skilled graduate available to manage and monitor forest resource usage in the entire country. This is a real problem which inevitably will render the situation difficult for staff to be able to address the appropriate approach (revealed or staged preference) that will be best suited to adequately address forest valuation in the country.

Given the technicalities involved in the design of questionnaires to capture vital data when it comes to the use of the 'Stated Preference technique (which incorporate Contingent valuation and Choice Experiment)', it is questionable as to whether any of these have been

taken into consideration by personnel responsible for computing the above GDP statistics for the forest division. The current under-staffed capacity of forest personnel at MAFFS is rendering the validity of GDP data questionable as the picture do not show transparency in computation, as seen in the high level of activities like charcoal trading, timber logging that takes place throughout the year in the country. Similarly, it is not quite clear as to whether the survey conducted on Charcoal Business on urban centres (Statistics Sierra Leone in 2013) was incorporated as part of the revealed computation of the 2013/14 GDP statistics for the forestry division. Despite the application of high level skills in collecting data through structured survey analysis, it is not clear as to whether taxes were deducted from revenue generated, and if so whether these were computed into GDP statistics for the forest division.

Effective Governance of Forest Division in Monitoring Revenue Generation

Lately, enactment of forest and other related legislations (Environmental Agency Protection, Wildlife Conservation and the National Protection Area Authority & Trust Acts) (FAO, n.d.) (Appendix 3: The World Law Guide, 2010) is also considered useful in monitoring forest resources and tracking individuals or groups engaged in abusive use of forest resources across the country. Given the underlying issues associated with the computation of forest valuation components, it is very important that effective planning is carried out by management in the forest division at MAFFS to tightening up legislative procedures so as to make it possible for chosen forest methods to be easily implemented (Figure 3).

Sierra Leone is an under-developed economy with high percentage of poverty and illiteracy rate in the African sub-region. In this vein, careful consideration should be given to method (s) selected, and with reference to the Stated Preferred technique (which incorporate Contingent Valuation and Choice Experiment), the use of questionnaire to solicit people's opinion about their willingness to pay for the utilisation of environmental/public good services like park or wildlife resorts. Officials in the forest division at MAFFS should be equipped with the right level of skills to enable them to devise survey aimed at capturing response (s) from respondents.

Given the high rate of illiteracy rate in the country (mostly residents around forest communities), it is very important for officials administering interviews to engage with forest residents earlier so as to explain the purpose of the survey. Willingness to pay must take into consideration earnings rather than imposing stipulated amount given the fact that large part of forest territories are public goods. This will eventually help officials to achieve desired objective(s) of the chosen method(s), and through which government can also generate income for computation into the GDP annual statistics.

The 'European Union Forest Law Enforcement and Governance Trade (EU-FLEGT)' (Appendix 4)

Appendix 4: The EU FLEGT as it is called, sets out the programme as a way of curtailing the mass illegal trading of forest timbers and most importantly a way of improving global environmental conservation and climatic conditions. It is estimated that over \$10 billion is lost in revenue each year around the world as a result of the illegal trading of timber products, particularly in regions around the world where forest protection and monitoring is very weak, for example developing countries in Africa, Asia and Latin America [9] (Figure 4).

The EU-FLEGT policy is an important document relevant for the

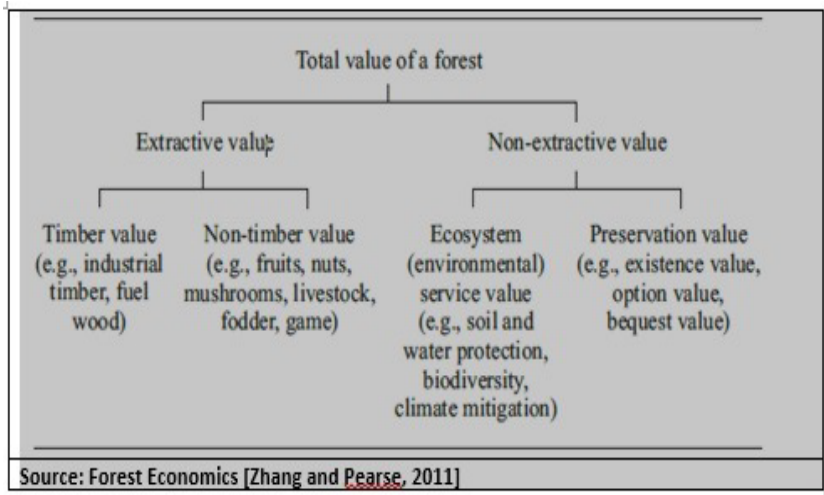
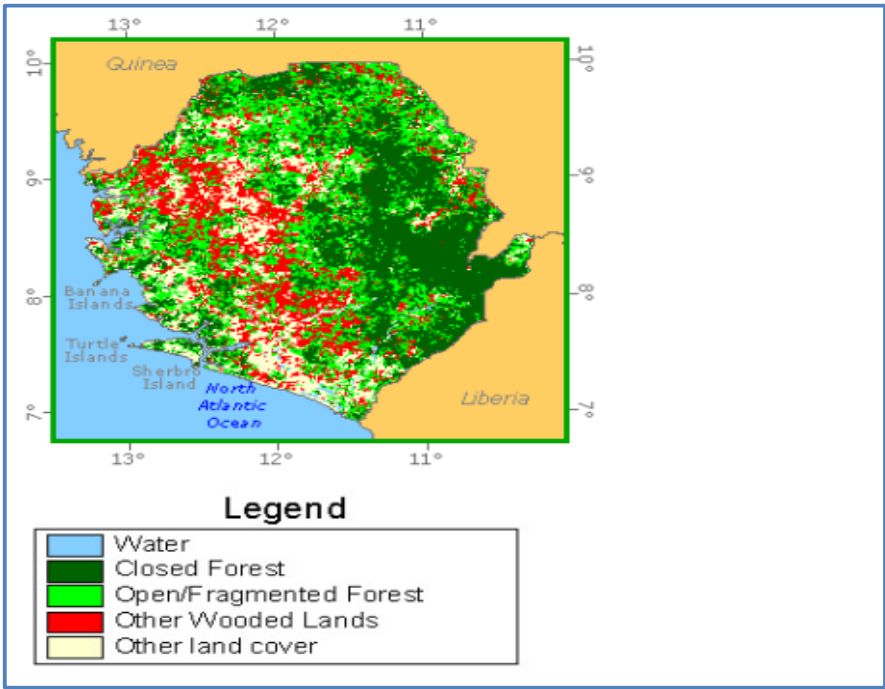


Figure 3: Total value of a forest.



enforcement of forest governance relating to illegal timber trading in and around forest communities in Sierra Leone. The effective enforcement of the policy will make it possible for income generation activities to be monitored, and most importantly, serve as a means through which forest techniques such as the ‘Stated Preference (which incorporate Contingency Valuation and Choice Experiment) can be administered, for the benefit of forest communities and the preservation of forests in the country. Licenced arrangements to forest investors (both national and international) can be made effective by making sure monitoring is carried out on a regular basis by staff in the forest division at MAFFS and also engaging forest community residents throughout the process [10-13]. With this, communities directly affected by environmental

impacts from forest investment will be able to express their views on how much they will be prepared to pay for consuming forest resources.

Conclusion and Recommendations

In conclusion, this report has provided an overview of GDP contribution from the forest division to the national economy. Discussions were centred on the validity of approaches/methods used to compute GDP data as depicted in the overall GDP statistics for the agricultural sector in the country [2013-14]. Both Stated and Preferred approaches are considered appropriate in helping with the collection of data relevant in valuing forest resources, and most importantly, the computation of GDP statistics [14].

In the context of Sierra Leone where poverty and illiteracy records are high, it can prove challenging to portray valid evidence from which data are used to compute GDP contribution, particularly in the situation with forest valuation. On the basis of this, the preferred choice of technique to consider in valuing forests in Sierra Leone's situation is 'Stated Preferences' which incorporate Contingent Valuation and Choice Experiment methods [15]. Most importantly, the construction and pre-testing of questions in questionnaire will provide opportunity for assessing the validity of questions aimed at capturing data considered relevant in helping with the accurate computation of GDP statistics for the forest sector.

Depending on the experience and quality of staff used, the use of all or any of the methods associated with the 'Revealed Preferences' technique can equally prove worthy in eliciting high quality forest valuation data when considering the fact that environmental characteristics like climate change factored into the valuation component, e.g., methods like Hedonic pricing and Protection expenditure.

In summary, the best way forward should take into consideration the following recommended action points:

High level investment in human resource development to equip staff with the necessary skills required to use and apply relevant valuation techniques and methods in valuing forest ecosystems in the country.

A thorough understanding of the geography of the country will be needed so as to make it quite easy for forest staff to give account for activities taking place around forest communities [16].

The use of modern technology like GPS will allow forest professionals within the forest division at MAFFS to monitor illegal activities taking place in forest communities. Such investment will make it quite easy for substantive data to be captured regardless of which method(s) is used in the valuation of forest resources in the country. In this vein, it is possible that financial forecasting of returns from forest investments, particularly GDP computation will be made easier with the continued use of advanced technology resources [17]. Limitations to this technique, and particularly in the situation with

cash-strapped Sierra Leone, is the costs and continued management of the system which requires highly skilled personnel to regularly monitor activities taking place in and around forest communities.

References

- Emerton L (2003) Tropical forest valuation: Has it all been a futile exercise.
- Zhang D, Pearse PH (2011) *Forest Economics*. Toronto: UBC Press.
- Bishop JT (1998) Environmental Economics Programme, International Institute for Environment and Development: London
- Brahic, Terreaux (2011) Problems and methods of forest-biodiversity economic valuation..
- Whitehead JC, Pattanayak SK, Van Houtven GL, Gelso BR (2007) Combining Revealed and Stated Preference Data to Estimate the Non-Market Value of Ecological Services: An Assessment of the State of the Science.
- Sannoh J (2011) Agricultural and Rural Development Statistics in Sierra Leone - Key Aspects of Institutional Arrangements & Performance.
- Stads G, Momoh J (2010) Sierra Leone Recent Developments in Agricultural Research [SLARI – Online].
- Davies H, Nutley S, Walter I (2005) Assessing the impact of social science research: conceptual, methodological and practical issues.
- Blinker L (2006) Country Environmental Profile [CEP]: Sierra Leone. United Kingdom: Consortium Parsons Brinckerhoff.
- EU FLEGT (2007) FLEGT Briefing Notes Number 01.
- International Monetary Fund (2013) IMF Executive Board Approves Three-Year US\$95.9 Million ECF Arrangement for Sierra Leone.
- Statistics Sierra Leone (2013) 2012 Survey of Charcoal Businesses in Urban Centres of Sierra Leone.
- Statistics Sierra Leone (2014) Report on the 2013 Real Gross Domestic Product [RGDP] Figure at 2006 Price.
- The Sierra Leone Government (2013) The Agenda for Prosperity - Road to Middle Income: Sierra Leone's Third Generation Poverty Reduction Strategy Paper (2013 - 2018).
- The World Law Guide (2010) Legislation Sierra Leone.
- UNEP (2010) Sierra Leone Environment, Conflict and Peacebuilding Assessment: Technical Report
- UNEP [n.d]. Forest Definition and Extent.