

Sustainable Forestry in Ghana: Tracing Illegally Logged Timber Species through DNA Barcoding

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ABSTRACT

Forests are considered to be a strategic resource for national development and have great importance on a nation's environment. Despite increasing concern over the loss of tropical forests and the significant local and international efforts to find solutions to the problems, the rate of deforestation in the tropics continues to increase. Though Ghana's timber export is the fourth largest industry after gold, tourism and cocoa, her primary rain forest has reduced drastically over the years. It is imperative to make conscious efforts to save our forest and timber resources. However, the correct identification of all timber species is the first step towards their proper management. This study sought to use DNA barcoding as a tool in the identification of timber tree species that are used in commercial trade to enhance sustainable forestry in Ghana. DNA barcoding is an innovative technology appropriate to identify organisms by comparing a sequence of a standard gene region from an unknown specimen with a comprehensive database of sequences from species of established identity. Silica-dried leaf samples of timber trees species in commercial trade in southern Ghana were collected from three biodiversity hotspots in the country namely Bia National Park; Ankasa Resource Reserve and Kakum National Park and sequenced at rbcLa gene region. A success rate of 96.77% was obtained from the sequence. These sequences form the database of DNA barcodes for the identification of timber tree species in commercial trade in southern Ghana. Six timber species were sequenced to verify the utility of the database; they were successfully sequenced and matched with their counterparts in the main database. A hundred percent matching success was achieved which implies that DNA barcoding can correctly identify all timber species. A purposive sampling method was employed to determine the knowledge of plant identification, timber resource situation, timber species used on the industry and the level and the importance of forest conservation using structured questionnaires and interview guides. Identification of plants using morphological features was the only method used by the respondents in the

identification of timber species. Sawn timber was identified by the use of colour and scent produced by the wood which at times is misleading and virtually impossible for woods with the same colour and produces mild or no scent. DNA barcoding is therefore, the efficient identification tool which must be accepted and use by the timber industry to solve these identification challenges. 80% of the respondents were aware of the importance of forest conservation, however, 43% think it is irrelevant to the protection of timber trees species. To ensure the sustainability of our forest both the direct and indirect causes must be tackled simultaneously.

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