

Environmental Sustainability and Conservation of Nigeria Forest Reserves

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Climate observations are essential for understanding the complexities of the global climate system; indeed virtually all breakthroughs that have been made in understanding climate have come from observations. Observations provide critical benchmarks for testing and further developing our predictive capability through models.

Nigeria needs to translate the landscape of national policy commitments into an assessment of risk and opportunity across the value chain. At the same time, Nigeria has to pay attention to conserving her natural resources and improving the status of our environment.

Keywords: Climate change; tropical rainforest; conservation; biodiversity; sustainability.

1. INTRODUCTION

The forestry sector is one of the main pivots on which Nigeria's welfare was built, thereby making it a very important part of the country's economy.

It ranks among one of the highest revenue and employment generating sectors and serves as a resource base for many forest industries. However, the unsustainable exploitation of the different types of forests, either natural or

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planted, particularly the woody species component and their indiscriminate removal for other non-forest purposes coupled with the lack of current forest management plan(s), led to significant loss of these renewable natural resources where they can grow throughout the country. Therefore, series of sustainable forest management (SFM) intervention efforts have been suggested, adopted, and/or adapted in different instances for managing the remaining and proposed forests.

Sustainable management of the available natural and planted forests, reforestation and afforestation are some of the intervention efforts geared toward increasing both the size and perhaps quality of the country's forest cover. These efforts are particularly increasingly important because of the recognition of the centrality of forests to issues concerning the climate and environment. For instance, in order to capture and store carbon dioxide and other greenhouse gases (GHGs) identified as the main cause of the recently experienced global climate change, in substantial quantity, there will be the need for large size and high quality living vegetative biomass, such as forests, for this purpose.

Irrespective of the several importance of forests and efforts aimed at their sustainable utilisation, available information shows that forest size in most parts of the tropics, Nigeria inclusive. Forests still appear to be declining significantly even with the availability of myriad of studies/researches and their published outcomes aimed at surmounting this challenge, although, opinions still differ concerning the "real/actual" size of the remaining forests (both natural and planted), rates of deforestation, reforestation and afforestation. In addition, the cause(s) of the observed decline in forest size also differ(s) from one part of the tropics to the other with Nigeria's case not being an exception.

Therefore, with the variation in the estimations of forest size and quality, rates of deforestation/degradation, reforestation and afforestation, there will be the need for proper, acceptable and continually updated database that will unambiguously reflect forest size and quality changes in the different climes where this is still a challenge. This article, among others, briefly assessed the trend in forest cover changes in Nigeria in the years between 2000 and 2010, based on published data with a highlight of some perceived and real causes of

deforestation and degradation and an identification of some steps at achieving positive net forest cover changes.

The importance of forests and forestry sector to Nigerians and the economy cannot be over emphasised, as they have contributed to sustenance of people's livelihoods and generation of income for governments both in the past and currently. In spite of this, reliable database that gives accurate extent of forest in the country is not presently available, thus, various estimates for forest size exist in literature. There is an almost unanimous agreement that the country's forest estate is progressively declining in size, perhaps worsened by the lack of any current management plan for managing forests in the country. These have not only hampered many of the country's forest management strategies, they have also limited the potentials toward many incentives and benefits accruable to countries and communities with increasing forestland cover.

In line with this, it is pertinent that the various stakeholders in this sector be increasingly sensitised of the need to overcome this challenge. Meanwhile, data published by the United Nations' Food and Agriculture Organization, for instance, showed that the size of Nigeria's forests have been progressively declining before and from the year 2000 when it was approximately 13,517,000ha to 9,041,000ha in the year 2010. The documented causes of this decline and suggestions of strategies that can be aimed at reversing this trend are multifaceted; however, few of these were briefly highlighted in the article. In addition, the centrality of forests to issues concerning climate change, environmental sustainability and some benefits that can be obtained from incentive programmes like Reducing Emissions from Deforestation and Degradation were also briefly highlighted in the article [1-10].

1.1 Estimated Total Forest Cover Changes in Nigeria from Year 2000 to 2010

Almost all estimates in the literature tend to agree that the Nigeria's forest estate is declining in size and perhaps quality. However, what seem to be inconsistent are the rates of decline and present size and quality of the country's forest. For instance, an account claimed that

Nigeria, once in the heart of the tropical rainforest belt, has lost about 95% of her total forest cover and now has to import 75% of the timber she needs for her own purposes. In the same vein, another account revealed that documents from the Federal Ministry of Environment showed that Nigeria's total forest coverage, which was 10% at the end of the British colonial rule in 1960 had reduced drastically to about 6% by 2010. This implies that the country lost 40% of her forest cover within this period [11,10].

Similarly, another account claimed that recent studies showed that forest now occupy about 923,767 km² or about 10 million ha, i.e., about 10% of Nigeria's forest land area and that the country lost 21% of its forest between 1990 and 2005 alone [12,8] In addition, FAO, (2007) also claimed 12.2% of the country's total land area to be under forest. These kinds of variable size estimates for the country's forest might have informed some earlier studies such as FORMECU, (1998) that was aimed at assessing the vegetation and land use changes in Nigeria between 1976/78 and 1993/95 and perhaps create a baseline for developing a database in this regard. Nevertheless, the inconsistencies in these numerical figures in the literature still currently subsist with their applications in different assessments and in some instances they may give misleading information [8].

In the light of these inconsistent and sometimes outright contradicting data, need exists for a somewhat consistent and reliable data repository wherever and whenever issues concerning forest cover and its changes are to be discussed. This is a challenge facing articles such as this one. and this is the reason why the author decided to analyse periodic data on this subject for Nigeria published by Food and Agriculture Organization (FAO) of the United Nations (UN) between year 2000 and 2010. The FAO is known to conduct periodic assessments of the area under forest cover, including deforestation and degradation, although, there is still the need for improvements in these FAO's estimates relating to forest quality and density at all levels, particularly at the sub-national levels.

These improvements have been suggested owing perhaps to series of contradictions that most times exist between data from various other sources at national/sub-national levels and those

from FAO, which usually make data from FAO and those from these other sources most times unnecessarily contentious. Irrespective of this challenge, more national and sub-national studies can still be carried out continuously, results of which can be utilised to supplement these FAO data for setting intermediate and long-term targets, and corresponding monitoring indices. It is thus noteworthy that countries such as Nigeria should increase efforts toward harmonising these studies not only to have a reliable database but also to avoid duplication of efforts or cases of "reinventing the wheel" [13,14,5].

For the purpose of this article, as earlier stated, documented data information by FAO were evaluated in order to evaluate the current estimated forest cover changes in Nigeria, based on five-year intervals, between 2000 and 2010 as depicted in Fig. 1. The graph in Fig. 1 was used to illustrate the trend where forest size in Nigeria declined from 13,517,000ha in year 2000 to 11,089,000ha in 2005 and declined further to 9,041,000ha by 2010 based on published data by FAO. These forest size reductions are particularly more worrisome as the mean annual percentage rate of decline.

Recent Estimations of Net Forest Cover Changes in Nigeria and their likely Implications on Efforts toward Carbon Emission Reduction period 1990-2000 increased to 3.3% in the period 2000-2005 and also increased to 3.7% between 2005 and 2010 (Fig. 2).

Report by FAO (2011) also have it that Nigeria, which was among countries with large extent of forests, contributed to a significant share of net forest loss in West Africa and Africa's total within the period under review. However, there have been investments in planted forests in countries such as Nigeria that are noted to now have relatively low forest cover. This is yet to significantly impact positively on the country's net forest cover changes within the period referred to, even as the observed overall forest cover changes that was negative for Africa up to 2005, have been positive up to year 2010. The current trend implies that it appears as if the country's forest will continue to decline if the present factors that contribute to deforestation and forest degradation remain the same, most especially with the increasing negative mean annual rate of change as depicted in Fig. 2. [7,8,9,10].

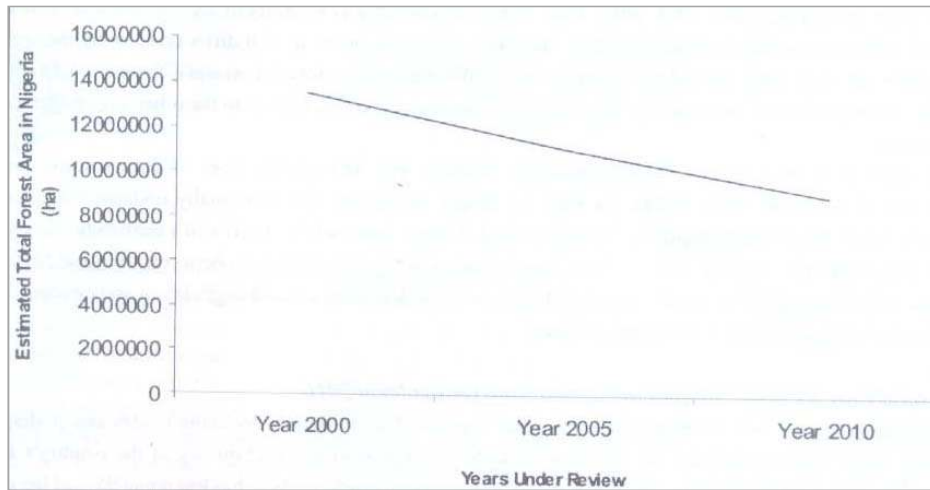


Fig. 1. Trend in the estimated total forest cover changes in Nigeria (Year 2000-2010)

Sources: FAO, (2003; 2007; 2009; 2011)

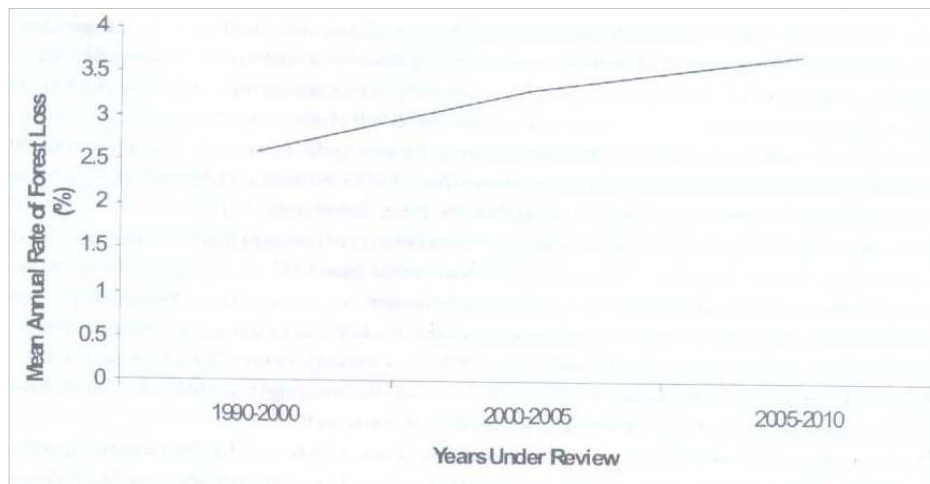


Fig. 2. Trend in the estimated mean annual rate of forest loss in Nigeria (Year 2000-2010)

Sources: FAO, (2003; 2007; 2009; 2011)

1.2 Some Perceived and Real Causes of Deforestation and Forest Degradation

Estimates showed that more than one-half of tropical forests have already been destroyed with more still undergoing destruction. However, more than 1.6 billion people still presently depend on forests, to varying degrees, for their livelihoods and the number of these people is growing steadily, including approximately more than 400 million people, and about 60 million indigenous people living in, or at the fringes of forests and who depend on forests resources for

their subsistence and sustenance. Therefore, the importance of forests to these people cannot be overemphasised, thus, factors responsible for forest loss globally should be continuously identified in such ways as to assist in surmounting the challenge of deforestation and forest degradation [15].

Deforestation and forest degradation are location specific and are mainly as a result of anthropogenic activities resulting from the multiplicity of forest uses by different stakeholders. In Nigeria, studies and

experiences have shown that the major factors contributing to deforestation and forest degradation are logging, removal of forest for developmental purposes such as infrastructures like road, among others, and conversion of forestland to small-scale permanent agriculture, with investment in large-scale agriculture also predicted to become a major contributor in the future. In addition, the use of woody and other lignocellulosic materials, as the main source of energy in this part of the world has also been noted to contribute to deforestation and forest degradation.

It is pertinent to note that *some recent observations* have shown that even though fuel wood might be obtained from wood residues after logging, most firewood does not come from the forests but from trees/shrubs in lots and woodlands outside of forests such as agroforestry plots. On the other hand, charcoal production has been noted to be a major contributor to deforestation and forest degradation in some areas in Nigeria. Therefore, this is a factor that need to be carefully addressed as the trend for the use of this energy source in this part of the world have been increasing and has been predicted to continue in this manner in the foreseeable future as it is being presently worsened by illegal charcoal trade within the country and for export.

In addition, the future prospect of exporting wood fuel to developed countries that have increased this type of energy in their energy-mix might put more pressure on the declining forests in some tropical countries such as Nigeria. Furthermore, it is important to note that the forest types in the coastal zone of this country are not exempted from indiscriminate destruction and degradation. They are also under pressure from human activities such as the search for firewood, charcoal and timber, deliberate land reclamation for urban and industrial development, shrimp and fish farming and dumping of pollutants, petroleum exploration and exploitation and associated activities, pollution from seaports, among others. The situation for the Savannah and other forest types in the northern fringe of the country do not appear to be different from that for the lowland forests [1,13,16,14,5].

1.3 Achieving Positive Net Forest Cover Changes and Some Associated Benefits

Forests are sources of climate amelioration and different types of raw materials and products,

and have been perceived and seen as resources to be exploited by man from time immemorial. Thus, it is difficult if not practically impossible for forests and their products to be completely prevented from being utilised by the different stakeholders particularly in this part of the world where substantial proportion of the inhabitants' population are dependent on them for survival and sustenance. This is one of the reasons why attentions are being focused on methods/ways by which management of the existing and regeneration of new forest resources can outpace their utilisation in perpetuity. These different efforts may be simply summarised under the concept of SFM, a concept that has been variously defined in different contexts.

In the context of this article, the concept of SFM will be defined as the process of managing permanent forestland to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services. This is to be achieved without undue reduction in its inherent values and future productivity and without undue undesirable effects on the physical and social environment. Managing forest resources in line with this and other similar concepts that have taken cognisance of the local realities are currently seen as one of the ways by which positive balance can be maintained between production and utilisation of forests and their resources so that there will be continuous production of forest resources in perpetuity.

Sustaining a continuous positive net forest cover changes in perpetuity is a key towards achieving climate adaptation and environmental sustainability as it is increasingly known worldwide that forests are central to achieving this objective. For instance, as it concerns the increasing quantity of wood fuel used globally, studies have shown that this act possess potentials for carbon neutrality when issues concerning mitigation of the currently experienced global climate change are considered [2,3]. Biomass, such as wood and other lignocellulosics, when grown and converted in a closed-loop feedstock production scheme, generates no net carbon dioxide emission, thereby claiming a neutral position in the build-up of atmospheric GHGs [2,3].

Furthermore, forests store large amounts of carbon in trees during growth, under-storey vegetation, litter, roots, and organic matter in the soil released when forests are even modestly

disturbed. This makes forests very important in reducing atmospheric carbon. Tropical forests are efficient in this regard, although, all the factors contributing to the balance between carbon emission and storage are not yet fully understood. However, it is estimated that tropical forests possess about 65% of the total climate change mitigation potential in the forest sector [13]. Their large scale destruction and degradation have also been estimated to account for about 20% of human-generated carbon dioxide emissions, although, the overall numerical figures, still require much further clarifications [13,17,18].

Nevertheless, SFM is a necessary tool in this part of the world because of the critical role of tropical forests as globally significant standing stocks of above- and below-ground carbon. In addition, atmospheric carbon sequestration through tree planting is the only currently eligible land use change activity for developing countries within the Clean Development Mechanism of the UN Framework Convention on Climate Change (UNFCCC) for which there is an international carbon market and where Certified Emission Reductions are traded. In line with this, there exist within the UNFCCC framework, a mechanism known as Reducing Emissions from Deforestation and Degradation (e.g., REDD, REDD plus, REDD readiness, etc.).

The original objective of REDD is to reduce GHGs as a result of deforestation and forest degradation but it can also deliver "co-benefits" such as biodiversity conservation and poverty alleviation. In simple terms, the concept is a set of steps designed to use market/financial incentives in order to reduce the emissions of GHGs from deforestation and forest degradation through the protection of forests leading to enhancement of the stock of carbon stored away from the atmosphere. While still with certain controversial debates in the areas of definitions and implementations, REDD has been widely seen by scientists and environmentalists as a way to address environmental degradation by assigning value to intact forest ecosystems such as those found in the tropical regions of the world, e.g., rainforests and peat swamp forests.

This move is expected to lead to the transfer of billions of dollars - in the form of carbon credits – from industrialised countries to tropical nations for slowing GHGs emissions by reducing the rates of deforestation. This could be of great significance both for climate change mitigation

and as a new source of forest funding for developing tropical countries. However, if REDD is to be successfully implemented under the revised Kyoto Protocol then degradation will have to be monitored. Nevertheless, the definition of degradation is proving difficult since different users have different objectives and perceptions which also complicate its measurement. Therefore, reducing emissions from *deforestation and forest degradation* implies a distinction between the two activities at this stage.

The process of identifying the two is what raises questions about how to measure each within the REDD mechanism; consequently, their distinction is vital. Deforestation is the permanent removal of forests and withdrawal of land from forest use. Forest degradation refers to negative changes in the forest area that limit its production capacity. Therefore, in order for SFM to achieve and maintain positive net forest cover changes in the country, its strategies should aim at balancing diverging priorities of sustainable economic and social development on one hand, and ecological sustainability on the other. This implies that forestry is still expected to play its traditional roles of ecological stabilisation and at the same time, engender economic development [19,12,15,18].

1.4 Environmental Sustainability and Forest Resource Management

Sustainability is a term that has gained much popularity in recent time. It means that a resource is used in such a way that it continues to be available. It is a consensus that we must learn how to sustain our environmental resources including forest so that they continue to provide benefits for the people and other living things on our planet. One fundamental premise for sustainable development is the recognition that environment and development are not exclusive of each other but are complementary and inter-dependent.

For some people in the world, environmental sustainability is about meeting a basic need, such as clean water or sanitation. But for others in consumer-based societies, environmental sustainability in development practices can reduce climate change impact, energy consumption, pollution, and material use. Environmental sustainability is never an option but imperative. For a better world to live in; we need good air, pure water, nutritious food,

healthy environment and greenery around us. Without sustainability, environmental deterioration and economic decline will be feeding on each other leading to poverty, pollution, poor health, political upheaval and unrest. The rapid increase in greenhouse gases in the atmosphere, land degradation, increasing floods and droughts, advancing deserts and deteriorating conditions of fragile ecosystems, deforestation, loss of biodiversity and environmental pollution have become subjects of serious global concern. The overall impact of these phenomena is likely to result in depletion of ozone layer, change of climate, rise in sea-level, loss of natural resources, reduction in their productivity ultimately leading to an ecological crisis affecting livelihood options for development and overall deterioration in quality of life. Development based on utilization of natural resources, pressure of population and their growing demands and poverty of the people took a heavy toll of our environmental assets. While natural assets have shrunk, demands have grown resulting in overdrawals being unsustainable. We have to improve our economic growth rate, provide basic minimum life support services to a large section of our population and deal with the problems of poverty and unemployment. At the same time, we have to pay attention to conserving our natural resources and improving the status of our environment [11,20,17].

1.5 Environmental Sustainability and Nigeria Forest Resources Management: The Scorecard

Apart from the available statistical data, it is obvious Nigeria is not on the track to achieve the MDG No 7. The Millenium Development Goal (MDG) seven, focuses on ensuring environmental sustainability with a major specific target of increasing the proportion of land covered by forest. According to some assesments, the world's total forest area is just over 4 billion hectares, which corresponds to an average of 0.6 ha per capita. The five most forest-rich countries (the Russian Federation, Brazil, Canada, the United States of America and China) account for more than half of the total forest area. Ten countries or areas have no forest at all and an additional 54 have forest on less than 10 percent of their total land area of which Nigeria is one. From the above assessment report, it has been shown that Nigeria is not working hard enough to achieve the objective of growing the nation's forest cover

from 10 per cent in 2000 to the intended target of 35 percent in 2015. The present forest cover is less than 10 percent.

Nigeria is blessed with a large expanse of land and variable vegetation, but this important resource is not sustainably used or managed. Many rural dwellers in the past have treated our forest resources as inexhaustible. Today the story is different. The average rural dweller now realizes that the forest is "finished," but poverty continues to force people to exploit even the relics of remaining forests. In Nigeria, deforestation or loss of vegetation or the selective exploitation of forests for economic or social reasons is very common. In most areas, major losses have been recorded in vegetation, forest complexity (diversity), or in germplasm (quality). Between 2000 and 2010, Nigeria lost nearly a third (31 percent) of its forest cover, while its primary forests suffered even worse: in just five years (2000 to 2005) over half of the nation's primary forests were destroyed, the highest rate in the world during that time. Yet, Nigeria's dwindling forests have never received the same attention as many other countries, such as Indonesia, Brazil, Malaysia, or Peru, even though in many ways Nigeria struggles with even deeper problems than other developing nations. Despite vast oil business, the nation is plagued by poverty and destitution, a prime example of what economists call the 'resource curse'. Environmentally, it has been named one of the worst in the world. Yet, not all forest news out of Nigeria is bleak: The success of the Nigerian Montane Forest Project in one of the country's remaining forests is one such beacon of hope, and one example of how the country could move forward. There is nothing in our politico-economic sphere to suggest that the country is really determined to achieve MGD 7 (environmental sustainability) in the context of the present status of forest resource management [2,4,14,12].

2. RECCOMENDATION

The state of Nigeria's forest estate may be a subject for critical discussions particularly as it concerns its "real/actual" size and percentage land cover changes within a particular period but what appears to be less contentious in the literature is that the country's forests are continuously declining in size and perhaps quality which is very dangerous for climate change. This is corroborated by the data on forest cover changes for the country published by

various institutions as highlighted in this paper. This supposed unacceptable reality has necessitated series of initiatives aimed at reversing this trend. Thus, the present situation concerning forest cover changes in this country can be turned around, if initiatives encapsulated by sustainable forest management are vigorously pursued.

It is no more news that there is the need for drastic reductions in the removal (deforestation) of the remaining forests while reforestation/afforestation efforts should be continuously intensified and sustained. In addition, the current situation whereby no State Government in the country including that of Federal (to the best of author's knowledge) is in the process of developing any recent management plans) for the various forests cannot be said to be a good development in the short and long run. Therefore, sustainable strategies incorporated into proper and recent management plans) should be developed for the purpose of managing the country's remaining and proposed forests for better environment to combat climate change [1,2,9].

3. CONCLUSION

Sustainability concepts are emerging from theory to practice as the solution to the problems of climate change. They demonstrate that national policy and legislation are evolving and informed by a science-based understanding of sustainability. They clearly show that industry and the market place have incorporated concepts of sustainability into regular business practice. It is important to recognize that all parties engaged in development of the conceptual framework for suitable forest/environmental management to combat climate change implicitly accepts that, with proper environmental management, it is possible to achieve sustainable environmental management in practice. All parties should enter into negotiations leading related international agreements. With that in mind, those involved in the business of financial supporting certification systems must have market-driven incentives to achieve sustainable environmental management. In effect, all parties are committed to the principle that it is possible to maintain and enhance the site productivity, water quality, and biodiversity of environment managed with varying intensities over the long-term at stand and eco-region levels of resolution by applying management systems that consider climate change, environmental,

economical, and social criteria. It is hoped that with adoption of the adaptive measures, adequate sensitization and full participation of local people-the vanguards of the relic environment-community base environmental management; culture of conservation would be imbibed rather degrading it thereby sustaining and managing the environment sustainably.

Effective environmental sustainability to combat climate change in Nigeria faces many challenges as the threats to environmental integrity are strong and growing stronger in the face of population growth and unsustainable practices. It is actually imperative that food and other essentials of life for the increasing population should be provided. But this should not be at the expense of degrading the source of supply of these essentials. It is not too late to protect and conserve some of the remaining strongholds for biodiversity and some of the last large patches of tropical forest if stronger financial support is made available and all those with a stake in the outcome take actions that are more decisive. A climate change friendly, environmentally safer, biologically richer Nigeria for now and the future is still very possible [1,13,19,5,7,18].

COMPETING INTERESTS

Author has declared that no competing interests exist.

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