ISSN - L:2026-5611

Nature & Faune

Volume 25, Issue 2

Economic and Social Significance of Forests For Africa's Sustainable Development

FAO Regional Office for Africa

Nature & *Faune* is a peer-reviewed open access international bilingual (English and French) publication dedicated to the exchange of information and practical experience in the field of wildlife and protected areas management and conservation of natural resources on the African continent. *Nature* & *Faune* has been in wide circulation since 1985.

Nature & *Faune* is dependent upon your free and voluntary contribution in the form of articles and announcements in the field of wildlife, forestry and nature conservation in the Region.

Front Cover Photos:
Top to bottom: handicraft shop, anonymous; grazing cattle, Dana Hoag; Lorry carrying timber in Cameroon, anonymous; *Eucalyptus grandis* plantation in South Africa, Nigel Cattlin; Bright red bird in South Africa, Corey.

Back Cover Photo:
The Rugati muddy feet in Kenya, Adamharmer

FAO REGIONAL OFFICE FOR AFRICA

Nature & Faune

Enhancing natural resources management for food security in Africa

Volume 25, Issue 2

Economic and social significance of forests for Africa's sustainable development

Editor: Foday Bojang
Deputy Editor: Ada Ndeso-Atanga
FAO Regional Office for Africa

nature-faune@fao.org
http://www.fao.org/africa/publications/nature-and-faune-magazine/

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Accra, Ghana
2011

FAO REGIONAL OFFICE FOR AFRICA

FAO REGIONAL OFFICE FOR AFRICA

Contents

Message to Readers

Maria Helena Semedo[1]

The year 2011 has been proclaimed the International Year of Forests (in brief "*Forests 2011*") and it is being celebrated under the theme "Forests for People". This is truly a remarkable theme. One cannot come close to covering all of it in a single edition of *Nature & Faune* as it addresses good management, conservation and sustainable development of all types of forests[2]. Consequently, *Nature & Faune* magazine will contribute to this celebration by dedicating all of the publications in 2011 to reflections and activities related to "*Forests 2011*". This first issue examines the ***"Economic and social significance of forests for Africa's sustainable development"***.

You can read in these pages about efforts of African nations to sustainably manage their forests. This issue explores management approaches that balance social, economic and environmental objectives, allowing users to reap the benefits of forest resources while conserving them to meet the needs of future generations. Authors share cases and experiences highlighting efforts of forest and natural resource managers to develop innovative partnerships with new stakeholders outside the traditional forest sector. In this context, the editorial by Professor Peter Rosa focuses on the entrepreneurship perspective of socioeconomic significance of forests. Its message is that the basic honest entrepreneurial pressures still do not favour the forest at the moment. How do world leaders deal realistically with the perceptions that non-forest lands are seen as having greater economic and social significance to the most directly affected stakeholders than forest lands? The editorial argues that many conservation policies in Africa discourage destructive entrepreneurial practices but do little to establish the requisite incentives for entrepreneurs to use forest resources in a productive, sustainable and ethical manner. It concludes by asking how African governments can develop effective partnerships with neighboring countries and international actors to invest in infrastructure and to establish systems to make legitimate ethical bio-prospecting rewarding, and bio-piracy costly and not worth pursuing.

As you delve into the magazine, you will find out where to obtain information on the contribution of wildlife to national economies and get a full comparison of the prices of hunting tourism in southern and eastern Africa. It includes two technical reports published in a joint initiative of the Food and Agriculture Organization of the United Nations (FAO) and the International Council for Game and Wildlife Conservation (CIC)[3].

The regular feature *Country Focus* shines the spotlight on Lesotho where less than 1% of the total land area of the nation is under forest cover. Maile Nchemo describes Lesotho's efforts to celebrate the International Year of the Forests 2011. The photos of activities at various levels of the society take the message home - that despite its scantiness, the patches of remaining indigenous trees and shrubs fulfill important socio-economic and ecological functions. In Lesotho, the social worth of forests is rated very high.

The special article features Eunice Joroge's and Gregory Muli's views on the

[1] *Maria Helena Semedo, Assistant Director-General/Regional Representative for Africa, Regional Office for Africa, United Nations Food and Agriculture Organization, P. O. Box 1628 Accra. Ghana. Tel: 233-302-675000 ext. 2704/ 233 302 7010 930 ext. 2704; fax: 233-302-668 427*

[2] http://www.un.org/en/events/iyof2011/

[3] http://www.cic-wildlife.org/?id=412 publications n.7 and 8

socioeconomic value of forests in Rwanda where wood for fuel and other uses are harvested from man-made forests, while natural forests are protected. The *Opinion Piece* presents the mangrove ecosystems in the south eastern Nigeria. On the menu are eleven other articles presenting diverse and rich views from Zambia, Gabon, South Africa, Nigeria, Cameroon, Ghana, and subregional perspectives from West and Central Africa.

Enjoy these articles and features, which are set within the context of International Year of the Forests 2011. Thank you for your interest and commitment to making the activities marking the celebration a veritable instrument to raise awareness on good management, conservation and sustainable development of all types of forests in the continent.

Editorial

Economic and Social Significance of Forests for Africa's Sustainable Development: An Entrepreneurship Perspective

Peter Rosa[1]

Entrepreneurship, as the economist William Baumol (1990) wrote, can be a productive or a destructive force. It can be beneficial when pportunity exploitation by entrepreneurs leads to ethical innovation, wealth creation and jobs. It can be unproductive, even destructive when entrepreneurs engage in rent seeking and other opportunities linked to unethical and illegal practices such as corruption and organized crime. Given the existence of an attractive opportunity, there will always be an entrepreneur who will find it and try and exploit it. Once success is demonstrated, others will copy him or her and through competition maximize its exploitation. Baumol argued that the degree to which a society obtains benefits from entrepreneurs depends on how it offers incentives and "payoffs" to entrepreneurs. Through mechanisms such as government policy, a society can heavily influence the allocation of entrepreneurs, influencing whether entrepreneurs choose to pursue productive or destructive opportunities.

This argument is particularly relevant to forest conservation, particularly to the conservation of tropical forests. The balance of incentives is, sadly, heavily weighted towards the clearance and consumptive exploitation of forests:

- Forests are sources of easy profit. Many tropical forests contain valuable timber which has taken years, sometime hundreds of years for nature to produce. The growth of valuable trees is not paid for by people. It is a free good, provided by nature. The main cost is that of harvesting. Valuable timber can be extracted at a small selective scale by local entrepreneurs, or harvested on an industrial scale by large scale entrepreneurs who command considerable resources and lobbying power. Once the value is consumed, a new area of forest can be targeted for exploitation. If forest resources are extensive, this can take some years to complete, but in many countries with only limited forest cover they can disappear alarmingly quickly. The market for valuable timber acts as an important incentive for large scale entrepreneurs and companies to exploit logging concessions.
- Forest often covers an even greater resource, productive well watered land. There is an opportunity cost leaving forest un-cleared, when the land could be more profitably utilized for other purposes. Once cleared, forestry land becomes available for a large variety of uses, arguably offering more commercial opportunities for entrepreneurs than the forest that was replaced. The initial clearing of the forest even provides revenues that can be used to reinvest in these new better opportunities. The economies of many African countries depend on crops grown on cleared forests, such as cocoa, coffee, tea, sugar and oil palms. The increasing numbers and affluence of the world population is leading to higher demands for such commodities, which can be most easily satisfied by clearing more forest land. In the case of oil palms, for example, the demands for alternatives to fossil fuels have greatly accelerated forest clearance in some countries. Behind new plantations there is almost inevitably an entrepreneur or entrepreneurial family, often in partnership with enterprising politicians who facilitate permission to clear, or just turn a blind eye.

[1] *Peter Rosa, George David Chair of Entrepreneurship and Family Business and Head of Entrepreneurship and Innovation Group. The University of Edinburgh Business School, William Robertson Building, 50 George Square Edinburgh EH8 9JY Edinburgh UK. Email: Peter.rosa@ed.ac.uk Phone: +44(0)131 6503798*

Clearing the forest opens up land for flexible exploitation in many different ways. Governments in developing countries face difficult dilemmas on whether to conserve forests or convert them from what many regard as unproductive wildernesses to land for profitable agriculture and pastoralism. Conversion has potential attractions for governments too (revenues from logging concessions; higher and regular taxes from new agricultural commodities grown on cleared land); for balance of payments (forest products form an important source of exports for many African countries); it leads to job creation (forestry employs few people compared to large scale agriculture); it leads to more satisfied local people who can ease the pressure on land by opening up new land in the forest zones. Once land is cleared, a large number of options become available for agri-entrepreneurs. Entrepreneurs are especially responsive to opportunities arising from subsidies and are quick to exploit subsidies to enhance crop production that Governments deem desirable. Providing subsidies for producing bio-diesel, for example, can lead to rapid changes in land use. As the pressure grows from outside and within African countries to conserve virgin tropical forests and exploit them sustainably, African Governments face great political challenges from powerful entrepreneurs and their supporters who see alternative uses for and quick profits from clearing forest lands. It has been estimated that the conversion of forests to agricultural land is the major factor for the decrease in global forest area by 0.18% per year in 1990-2000) and 18% per year in 2000-2005, and the loss of an annual area of primary forest covering an area the size of Ireland (Green Facts, 2007).

The traditional answer to forest conservation has been legal protection, endorsed by treaties and conventions designed to preserve forests and the bio-diversity of forest habitats, and underpinned by influential conservation lobbies extolling the reasons why tropical forests are essential to human welfare. Many conservationists passionately believe, as Kaosta-Ard (1995) notes, that "there is an obvious and immense need for developing countries to conserve their forests" (p.1) and that "the benefits that come from forests are both obvious and numerous" (p.5). To summarise some of the more important benefits:

- Forests contain essential timber products which are needed in the long term as well as the short term. Forest conservation ensures a managed and steady supply of these products over a much longer period of time, especially where valuable tree species take many years to mature, and could be quickly consumed without long term management. There is a compelling commercial reason for preserving native forests where most valuable timber of this type is found.
- Forests can be an important life support for people (forests are important for protecting water catchments and for enhancing conservation; for regulating rainfall; for preventing land slides and so on).
- Conserving forests helps to sequester carbon (which otherwise would be released into the atmosphere in the form of CO2) contributing to mitigation of global warming.
- Forests provide utilitarian support for people and communities. Some communities depend on forests for their main livelihood, and many people in developing countries still rely on forests for medicinal remedies derived from indigenous plants.
- Forests are an important pool of biodiversity which has only partially been scientifically explored, and which could be irretrievably degraded by widespread clearance. The importance of biodiversity and of preserving the stock of genetic diversity for future food and medicinal needs and purposes are regarded as of global importance, and are enshrined in international treaties and conventions.
- Forests provide areas of outstanding natural beauty which provide recreational and spiritual renewal for stressed urban dwellers. As the human race expands and

becomes more urbanized, the need for wilderness areas will increase.

The power of these arguments has added considerable authority to the growing body of protective conventions and legislation at international and national levels. Such policies should act as effective disincentives for the open consumptive exploitation of tropical forests, and discourage or even eliminate destructive entrepreneurialism, but these policies only have localized effects in Africa. It is almost impossible to police large areas of forests even if the will is there to do so. In many African countries forestry officials are paid low wages, encouraging corruption and collusion by unscrupulous entrepreneurs. Tacit tolerance of these practices can permeate to the highest levels of Government. Even if enforcement is effective for a period, it can be reversed in times of political instability, or made less effective as pressures of consumer demand for forest products increases. Where a tropical forest represents an irreplaceable ecological system, it only takes one lapse in enforcement to either see its disappearance or to result in irreparable damage or degradation.

A problem with many conservation policies in Africa is that while they seek to regulate the environment to discourage destructive entrepreneurial practices, they do nothing to provide incentives for entrepreneurs to exploit forests ethically and productively. Since the 1990s there have been efforts to alter this balance, through encouraging awareness of non timber forest products, through bio-prospecting, through giving local communities greater ownership, control and management of local forests and to try and diversify the range of opportunities for local entrepreneurs. There have been many ideas put forward in the last three decades to encourage forest entrepreneurship, such as harvesting sustainable products such as honey; medicinal plants for local use; selective but sustainable timber and charcoal production and ecotourism. To facilitate this, NGOs and charities have sprung up, often linked with overseas experts and consultants, to provide opportunity assessments and entrepreneurship training and support for local entrepreneurs to make a sustainable living from their neighbouring forests. The concept of the "forest dependent poor" (Macqueeen, 2001), has entered the vocabulary on international poverty alleviation, To provide further understanding on how entrepreneurship can operate sustainably, a whole new academic branch of entrepreneurship has arisen in the last decade, called "sustainable" entrepreneurship (Dean and Mullen, 2007; Schaper, 2010; Shepherd and Patzelt, 20011). This is a rapidly growing field and many of its insights have yet to be tested rigorously through applied research. There is a great opportunity for researchers and practitioners engaged in forest conservation in Africa to draw inspiration from this new field.

In the last analysis, however, all of these positive efforts to persuade entrepreneurs to work productively in the interests of forest conservation, are still at a small scale compared to the rampant incentives for entrepreneurs to clear forests. Additionally the benefits of potentially very lucrative bio-prospecting has been undermined by bio-piracy, which in the last two decades has created reservations and controversy within African governments and ethical NGOs about promoting and developing this source of income.

There is a need to think of new policies to attract such entrepreneurs to make money from forest conservation rather than forest destruction. This is the ultimate challenge, how to appeal to their opportunism constructively, not just to rely on arguments on the need for conservation. How can large scale entrepreneurs and companies be incentivised to protect large forests? We are only at the beginning in thinking through this challenge. One important factor, often overlooked, is that forests, though physically remote, are not isolated from the overall local and global economy. For new sustainable markets to develop, there needs

to be much greater integration between the local, national and international economic spheres. How can African governments, in partnerships with each other and international governments, set up infrastructures and systems to make legitimate ethical bio-prospecting rewarding, and bio-piracy costly and not worth pursuing? Should the prohibitions and restrictions for trading valuable forest products and exotic wildlife be eased by developed countries? At present legitimate traders in such products are not encouraged, whilst the rewards are reaped by illegal poachers, smugglers and criminals, who are not exploiting these resources sustainably. Why are not forests, rich in biodiversity, being offered as concessions for leasing to pharmaceutical companies, for example, in the same way as they are destructively being offered for logging? Africa as a continent has the poorest take up of carbon trading opportunities, yet they could potentially offer large incentives for protecting forests as well as reforestation. Why are not forest concessions being leased to holiday companies and global tourist entrepreneurs? All these kinds of initiatives require solutions which ultimately should link in sustainable forestry products into the mainstream economy in the same way that agriculture does. Unless such opportunities are developed and made attractive to local, national and international entrepreneurs, destructive consumption of forests will continue.

REFERENCES

Baumol, W. (1990) Entrepreneurship, productive, unproductive, and destructive, *The Journal of Political Economy,* **Vol. 98(5),** pp. 893-921.

Dean, T.J. & McMullen, J.S. (2007), Toward a theory of sustainable entrepreneurship: Reducing environmental degradation through entrepreneurial action, *Journal of Business Venturing*, **Vol. 22, (1)**, pp. 50-76

Green Facts, (2007) http://www.greenfacts.org/en/forests/index.htm#2

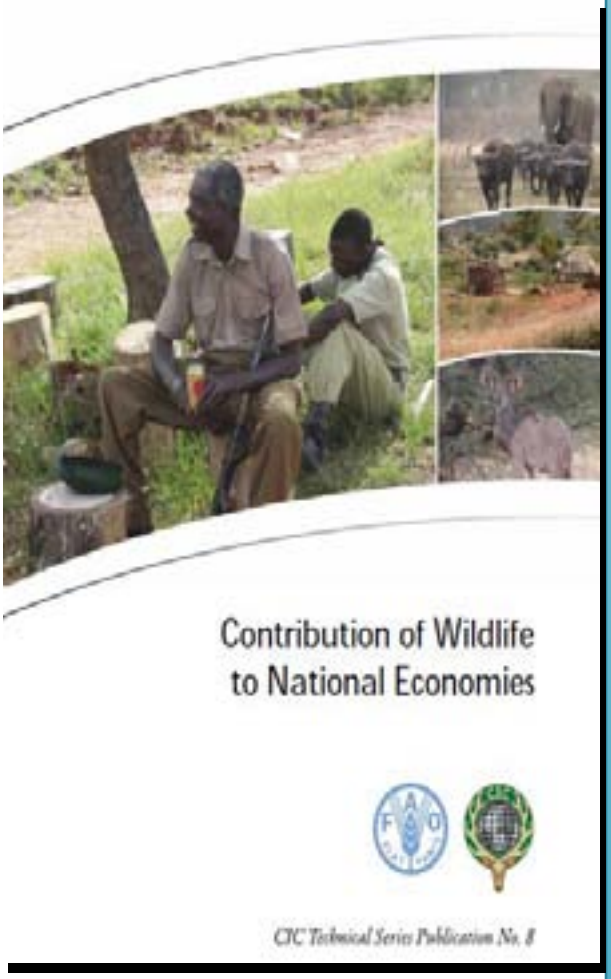
Kaosta-Ard, M. (1995), *Sharing the benefits and costs of forest conservation, TDRI Quarterly Review* **Vol. 10(4),** pp. 11-19

MacQueen, D.J. (2001) *Common Problems for the Forest Dependent Poor. Results from 22 Countries.* FRP Natural Resources International Ltd.

Schaper, M. (2010) *Making Ecopreneurs: Developing Sustainable Entrepreneurship*, Gower (2nd edition).

Shepherd, D. & Patzelt,H., 2010, The new field of sustainable entrepreneurship, *Entrepreneurship Theory & Practice,* **Vol. 26(1),** *pp.137-163.*

ANNOUNCEMENTS



Sources of information on contribution of wildlife to national economies

Two new reports have been published in a joint initiative of the Food and Agriculture Organization of the United Nations (FAO) and the International Council for Game and Wildlife Conservation (CIC). They are published under the FAO/CIC Technical Series, to share more widely best practices in wildlife management and conservation among practitioners and decision makers, and to support sustainable economic development of the wildlife sector. To facilitate access and/or place orders, the photos of the cover-pages are shown on the left. The titles and citations are shown hereunder:

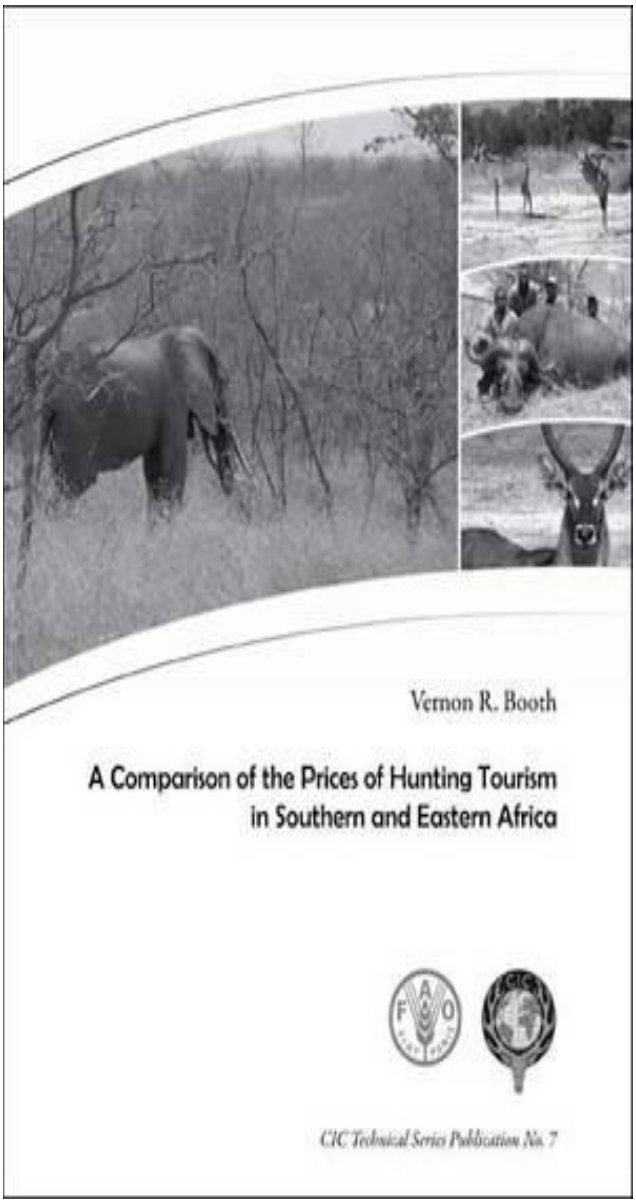
Title: Contribution of Wild Life to National Economies

Citation:
Vernon R. Booth (2010): The Contribution of Hunting Tourism:
How Significant is This to National Economies?
in Contribution of Wildlife to
National Economies. Joint publication of FAO and CIC. Budapest. 72 pp.
Edited by: Kai-Uwe Wollscheid, CIC; René Czudek, FAO

Published by:
CIC – International Council for Game and Wildlife Conservation and
FAO – Food and Agriculture Organization of the United Nations

Addresses:
FAO HEADQUARTERS
Viale delle Terme di Caracalla, 00153 Rome, Italy
Phone: +39-06-57051, Fax: +39-06-57053152
E-mail: FAO-HQ@fao.org, Website: www.fao.org

INTERNATIONAL COUNCIL FOR GAME AND WILDLIFE CONSERVATION
Administrative Office, P.O. Box 82, H-2092 Budakeszi, Hungary
Phone: +36 23 453 830, Fax: +36 23 453 832
E-mail: office@cic-wildlife.org, Website: www.cic-wildlife.org



Title: A Comparison of the Prices of Hunting Tourism in Southern and Eastern Africa (http://www.cic-wildlife.org/?id=519)

ISBN: 978-963-88778-0-2

Citation:
Vernon R. Booth (2009): A Comparison of the Prices of Hunting Tourism in Southern and Eastern Africa. Joint publication of FAO and CIC. Budapest. 40 pp.

Published by:
CIC – International Council for Game and Wildlife Conservation and
FAO – Food and Agriculture Organization of the United Nations

Addresses:
FAO HEADQUARTERS
Viale delle Terme di Caracalla, 00153 Rome, Italy
Phone: +39-06-57051,
Fax: +39-06-57053152
E-mail: FAO-HQ@fao.org, Website: www.fao.org

INTERNATIONAL COUNCIL FOR GAME AND WILDLIFE CONSERVATION
Administrative Office, P.O. Box 82, H-2092 Budakeszi, Hungary
Phone: +36 23 453 830,
Fax: +36 23 453 832
E-mail: office@cic-wildlife.org, Website: www.cic-wildlife.org

News

Launch of Millennium Development Goals (MDGs) Report 2011 in Geneva

The "Millennium Development Goals Report 2011" was launched in Geneva by the United Nations Secretary-General on 7 July 2011 during the High-level Segment of the Economic and Social Council of the United Nations (ECOSOC). The report which is prepared annually provides an assessment of global progress towards the MDGs. It shows that although significant strides have been made, reaching all the MDGs by 2015 remains challenging because progress has failed to reach the most vulnerable. In his remarks, at the launch, the Secretary-General indicated that the MDGs have made a tremendous difference. They have raised awareness and have shaped the broad vision that remains the overarching framework for development work across the world, and they have fuelled action and meaningful progress in people's lives. At the same time however, progress has been uneven and the poorest of the poor are being left behind. Referring to the fast approaching deadline of 2015, the UN Secretary-General emphasized the need for a rejuvenated global partnership for development, for breakthroughs in trade negotiations and in climate action and to build resilience to shocks, be they conflicts, natural disasters or volatility in food and energy prices. It was also mentioned that ecosystems must be protected to support continued growth and natural environments and the Rio+20 Conference in June 2012 offers a major opportunity for new progress.

Further information on the launch is available at *http://www.un.org/millenniumgoals/news.shtml*. The language versions of the report are accessible also at the FAO MDG Site *at http://www.fao.org/mdg/en/*.

Forest ownership rights can improve peoples' livelihoods

FAO declared in a newly published guide, ***Reforming Forest Tenure,*** that reforming forest tenure systems and securing forest ownership rights can significantly improve peoples' livelihoods and enable them to gain income from forest products.

The continuing demand for land, weak governance in many countries, and emerging global challenges such as climate change increase the urgency of addressing forest tenure reform. The guide was launched at the Forest Tenure, Governance and Enterprise Conference that took place in Lombok, Indonesia, from 11 to 15 July 2011. Attended by around 200 representatives from international and regional organizations, private sector, non-governmental organizations, civil society and researchers, the conference was co-organized by the Indonesian Ministry of Forestry (MOF), the International Tropical Timber Organization (ITTO) and the Rights and Resources Initiative (RRI).

In recent years, FAO has carried out extensive assessments of forest tenure systems in Africa, Southeast Asia, Latin America and Central Asia and its impact on sustainable forest management and poverty reduction. Based on this analysis, the guide offers practical guidance for policy makers involved in forest tenure reforms.
For the whole news brief, visit: *http://www.fao.org/news/story/en/item/81859/icode/*

Ecosystem Marketplace's Forest Carbon News Brief

To get an update on ecosystem markets and related issues, visit: *http://www.forestcarbonportal.com/content/latest_forest_carbon_newsletter*

Special Feature

Economic and Social Significance of forests for Rwanda's sustainable development

Eunice Njoroge[1] and Gregory Muli[2]

Summary
Rwanda forests render important economic, environmental and socio-cultural values through the provision of both wood and non-wood utility products. Wood fuel and wood for other uses are harvested from man-made forests, whereas all natural forests are protected. Natural forests host a rich biodiversity, serve as the backbone of tourism industry and support invaluable ecological functions such as water and soil protection. Forests thus contribute to rural livelihoods and socio-economic stability of the country. Various legislative instruments exist to ensure that both natural forests and plantations are sustainably managed to contribute to national development.

Introduction

Rwanda is a small mountainous, landlocked country covering 26,338 Km^2 with 11,117,033 million people, with an average population density of about 408 inhabitants per Km^2. The country is covered by a great diversity of ecosystems, including forest ecosystems and natural forests like Nyungwe, Mukura and Gishwati. These natural forests are rich in flora and fauna, including numerous species of birds and primates. Indeed, a high percentage of these species are endemic. In addition to natural forests, there are man-made forest plantations, which are established by the Government and by farmers. Currently, the total area of the national forest estate is 553, 098 ha, representing 21% of total country area.

Forests are a key component of our landscape and life-support system, in view of both the products and the services which they provide. Rwanda's indigenous and planted forests are important for economic, environmental and socio-cultural well-being, through provision of both wood and non-wood products and services. Indeed, it has been recognized that the economic, social and environmental well-being of the Rwandan population is closely associated with the health of forests and their sustained ability to provide multiple benefits. Unfortunately, Rwanda's forestry sector has suffered from degradation and regression of existing forest resources; the main causes being the overexploitation of forests, poor management of existing resources and forest conversion.
Fortunately, Rwanda has made the protection of its remaining natural forests a priority, and has set a target of increasing the forest cover to 30 percent by 2020, as outlined in Vision 2020 and the Economic Development and Poverty Reduction Strategy (EDPRS). This goal, it seems, is set to be achieved well ahead of schedule. In addition, there is an intensive campaign against unsustainable use of forests, while tree-planting and management is being promoted across the country.

Social and economic benefits of Rwanda's forests

Source of energy

Wood is the principal source of energy in Rwanda, where forests accounts for approximately 84% of current primary energy use. 96.2% of all households use wood as a source of energy. For instance, charcoal is a basic necessity in urban areas, where more than 60% of the urban population uses charcoal as a source of energy. According to estimates in Rwanda's Biomass Energy Strategy (BEST) study, the

[1] *Eunice Njoroge, Ministry of Forestry and Mines, P.O.BOX 447, Kigali Rwanda.*
Email: eunicennjoroge@yahoo.com
[2] *Gregory Muli, Ministry of Forestry and Mines, P.O.BOX 447, Kigali Rwanda.*
Email: grmuli@yahoo.com

2008 consumption of commercial fuel wood was about 700,000 tonnes, while that of charcoal was 150,000 tonnes. In 2007, forests contributed up to 80% of total energy needed in the country, as illustrated in Figure 1 below.

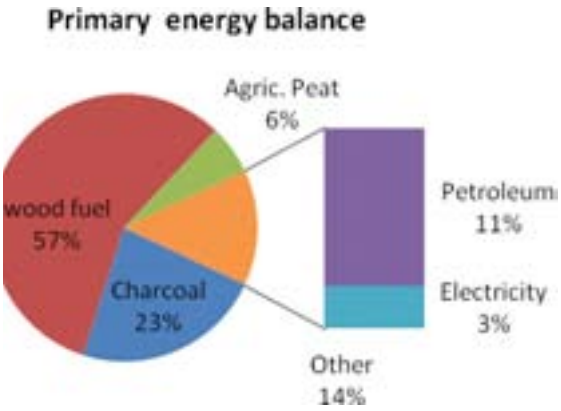


Figure 1: Primary energy balance
Source: MININFRA, 2008

Rwandan forests are a renewable source of energy and if they are properly managed, they will provide an eternal energy supply which can be counted upon at least until viable alternatives become available. Most importantly, as the largest source of national energy, the use of wood based energy does not depend on external influences or foreign exchange. Its worth to note that as far as environment protection is concerned; the Rwandan Government is aiming at decreasing and replacing the use of wood and charcoal as energy sources, with modern energy sources like liquid petrol gas, peat and biogas.

Source of income

The sale of wood products other than fuel wood also generates significant incomes to those involved. Forest products accounted for 1.1% of GDP in Rwanda in 1998. Moreover, such products play an important role in reducing poverty since they contribute to the economy of both local people and the country at large. Rwanda's forests are thus an important capital, which generate direct monetary income and revenue. For instance, charcoal production is a big business in Rwanda. A partial study on charcoal trade between six towns and five wood producer districts, carried out in 2008, showed that the commercialization of charcoal alone contributed US$ 2.6 billion representing 5% of the Gross Domestic Product (GDP). BEST (2009), indicates that the charcoal and firewood market has a value of US $120-150 million per year in the country, and that 50% of the revenue remains in rural areas, where it is distributed among farmers/wood growers and charcoal makers. This is a really large source of income for rural farmers. According to EDPRS (2007), more than 94% of the energy for both domestic and industrial uses comes from firewood.

Tourism is a fast-growing sector and is now the country's leading foreign exchange earner, the most popular activity being the tracking of mountain gorillas. With an exceptional number of plant and wildlife species – including 12 different types of primates – the protected Nyungwe forest has tremendous potential for attracting tourists. Tourist arrivals are projected to increase from about 980,000 in 2008 to over 2 million in 2020, thereby increasing foreign exchange earnings from about US$ 200 million to over US$ 600 million. The gorilla naming ceremony ("Kwita Izina"), which is held each year, attracts a number of international celebrities, providing a good platform to promote tourism, gorilla protection, as well as the conservation of gorilla habitats.

Moreover, forests within parks and protected areas act as a source of employment and promote income generation to local communities, e.g. as guides, trackers and anti poachers. Forest supports outdoor recreation, education and ecotourism for both foreign and local tourists, contributing to socio-economic development. In total, the forest sector contributes around 100,000 full time jobs in the country. In addition, Rwanda government hires local cooperatives to run

nurseries for afforestation and reforestation in contract basis, thus increasing revenues to local population.

The overall economic value of forestry products, including charcoal, fuel wood, sawn timber and rough timber is estimated at US$ 472 million, equivalent to 10.6% GDP.

Ecological significance

Forests ecosystems contribute to the protection of watersheds of hydro-electric power generation schemes, as in the case of the Ntaruka station within the Rugezi wetland, and provide water for irrigation and protect soil against erosion, making agriculture more viable.

Forests are a key element in the regulation of hydrological cycles, climate and the reduction of the atmospheric pollution, and they play an essential role in the global carbon cycle. As indicated by Rwanda Environmental Management Authority (REMA) in 2009, local communities and local governments can be helped to appreciate and be made aware of the opportunities of using forests to earn carbon funds.

Most of the plant species found in forests in Rwanda are used in traditional medicine and some plants species can provide important biochemical extracts. Other benefits of forests to the population include non-wood products such as honey, fruits, other wild foods, and raw materials for handicraft production which can act as a source of income, and supplement resources to meet other household needs. However, no proper accounting has been made in Rwanda on non wood forest products (NWFP) and their economic contribution to the national economy.

Conclusions

To ensure forest sustainability and continued provision of social, economic and environmental benefits to Rwanda's population, a range of legislative instruments exist in the field of forestry which aims at ensuring sound forest management. These include the Decree of 18/12/1930 concerning the harvesting and marketing of wood; the Rwandan Forest Policy of 2010; and Ministerial orders which supplement these instruments. For instance, the Rwanda National Forest Policy aims at developing forestry into one of the pillars of the national economy and ecological viability. Thus, it is planned to carry out strategic actions to reduce degradation of biodiversity as well as soil erosion in upstream zones of wetlands, by undertaking reforestation programmes and agro-forestry. The forest policy also aims at managing existing forest plantation sustainably in order to increase wood production.

In addition to legislative instruments, Rwanda pledges nationwide forest landscape restoration. To this end, the Government has made a bold, definitive and long-term commitment to country-wide ecosystem restoration. To this effect, Rwanda Forest Landscape Restoration Initiative (RFLRI) has been developed by Ministry of Environment and Lands (MINELA) and Ministry of Forestry and Mines (MINIFOM), in partnership with the United Nations Forum for Forests (UNFF), the Global Partnership on Forests Landscape Restoration (GPFLR), and the International Union for the Conservation of Nature (IUCN). The RFLRI has both mid (2015) and long-term (to 2035) strategies which clearly align and support existing national priorities and targets. The outcomes are based on social, economic and environmental developments and will be delivered through cross-sectoral engagement and commitment. The plan is designed to achieve sustainable agricultural production, low carbon economic development, adequate water and energy supplies, improves the quality and opportunities for rural livelihoods and safeguards the nation's biological diversity.

For instance, Gishwati forest landscape has experienced tremendous loss of biodiversity, widespread soil erosion, degradation and landslides. Likewise, Rugezi

Highland Wetland landscape, located in the north of Rwanda, is a unique and important ecosystem that is part of the headwaters of both the White Nile and Congo rivers. Large-scale loss of functionality has had significant local and national consequences as the marshes feed Lake Bulera which in turns acts as the reservoir for the nationally important 20Mw Ntaruka power plant. Due to their economic and environmental importance's, both Gishwati Forest and Rugezi Highland has been identified as areas that requires urgent attention and are thus among the initial consideration in the RFLRI.

Currently, some restoration activities such as reforestation are already ongoing. Further to this, vulnerable communities on fragile slopes have been relocated to better farming areas.

In conclusion, the Rwandan government aspires to manage natural and planted forest resources sustainably, to benefit its population socially, environmentally and economically. To achieve this, the government is raising awareness and mobilising engagement with Rwandan stakeholders including Government agencies, civil society and the private sector, and particularly local government and local communities, to manage and utilize the forests sustainably, to contribute to national development.

References

BEST -Biomass Energy Strategy Rwanda, 2008

BEST -Biomass Energy Strategy Rwanda, 2009

EDPRS - Economic Development and Poverty Reduction Strategy, 2007. Economic Development and Poverty Reduction Strategy, 2008-2012

MININFRA - Ministry of Infrastructure, Kigali, 2008. Biomass Strategic Workshop, 30th April 2008.

Nielsen, H. & Spenceley, A., 2010. The success of tourism in Rwanda – Gorillas and more

NIRS - National Institute of Statistics of Rwanda. Statistical Year book 2010 edition

Republic of Rwanda, 2010. Government Programme 2010-2017

REMA - Rwanda Environment Management Authority, 2009. Rwanda State of Environment and Outlook Report

Republic of Rwanda, 2009. National Energy Policy and National Energy Strategy 2008-2012

Republic of Rwanda, 2011. Rwanda Forest Landscape Restoration Initiative.

Republic of Rwanda, 2010. National Forestry Policy

Republic of Rwanda, 2003. National Strategy and Action Plan for the conservation of biodiversity in Rwanda

Republic of Rwanda, 2009. Sustainable Tourism Development Master Plan for Rwanda – Final Report," Project of the Republic of Rwanda and the United Nations World Tourism Organization, May 2009.

USAID, 2009. Rwanda economic growth <http:www.usaid.gov/rw/our work/programs/docs/factsheets/twopager economicgrowth.pdf>

Opinion Piece

The last stand of mangrove forest ecosystems in south eastern Nigeria

Mfon Udo[1], Blessing Oribhabor[2], Francis Nwosu[3], Utibe Daniel[4] and Anthony Akpan[5]

Summary

Standing on the abandoned jetty at Iwuochang / Upenekang fishing beach in 1999 [Ibeno LGA, Akwa Ibom State] and looking across the Qua Iboe River [en-route the Atlantic Ocean] were strips of luxuriant mangrove forests [Rhizophora species] all around the estuary. Surprisingly, 12 years later still standing on the same jetty and looking across the same River also, all the forests round about the estuary are now replaced by the exotic mangrove nipa palms [Nypa fruticans] forests with only pockets of native mangrove vegetation. The fear of the authors is that, there may be crash in fish supply from the coastal waters of Nigeria in the near future. In mangrove – fisheries relationship, many species of commercially important marine organisms seem to depend on mangroves for at least part of their life cycle while serving as a feeding and nursery grounds for coastal fish species. As one of Nigeria's richest natural forest reserves, they also represent a rich source of wood supply for various domestic and industrial purposes. The time to act is now and Fisheries Society of Nigeria (FISON) must be pro-active in this coastal re-construction and re-habilitation. Nigeria's coastal water is a 'food-basket'; much should be done to protect and jealously cherish it – else, it may be the last stand of mangrove forest ecosystems in the south eastern Nigeria.

[1] *Mfon T. Udo PhD, Department of Fisheries and Aquaculture, Faculty of Agriculture, University of Uyo, PMB 1017,Akwa Ibom State, Nigeria. Email: udomfon@yahoo.com Phone: +2348028901377*

[2] *Blessing Oribhabor PhD, Department of Fisheries and Aquaculture, Faculty of Agriculture, University of Uyo, PMB 1017,Akwa Ibom State, Nigeria.*
Email: oribhaborblessjuls@yahoo.com
Phone: +2348033558270

[3] *Francis Nwosu PhD, Institute of Oceanography, University of Calabar, PMB 1115, Calabar, Cross River State, Nigeria.*
Email: fmnwosu@yahoo.com
Phone: +234 8038355564

[4] *Utibe Daniel, Department of Animal and Environmental Biology, Faculty of Science, University of Port Harcourt, PMB 5323, Rivers State, Nigeria. Email: utibedaniel@yahoo.com*
Phone: +234 8067303566

[5] *Prof. Anthony William Akpan, Deputy Vice Chancellor, University of Uyo, Nigeria and Lecturer Dept of Zoology, Faculty of Natural Science, University of Uyo, PMB 1017, Akwa Ibom State, Nigeria.*
Email: tonykpan@yahoo.com
Phone: +2348023928256

Introduction

International discussions on forest conservation have dedicated insufficient attention to African mangrove forests. Some of the reasons for concentrating on other types of forest ecosystems – particularly tall inland tropical rainforests – could be that these appear to have more economic value and to host higher levels of biodiversity than mangroves. Both assumptions could be challenged (cf. Carrere, 2009). The thought by Carrere is shared also by the authors based again on the level of insufficient attention given to mangrove [*Rhizophora* species] forest succession in the coastal waters of Nigeria.

Mangroves and people's livelihoods

Mangrove forests have a huge value for coastal communities that derive their livelihoods from them. Although commonly defined as 'poor' in official statistics, communities living in healthy mangrove areas have what many urban people lack: diverse and abundant food. Additionally, mangroves provide many of their needs, usually complemented with other productive activities such as farming, etc.

Mangrove wood is a multi-purpose resource for fish stakes, fish traps, boat building, paddles, yam stakes, fencing, carvings, building timber, fuel and many other uses (World Rainforest Movement, 2002). The importance of mangrove to local communities becomes even clearer when they are degraded or disappear. Much more, they are of importance to fish and invertebrate nurseries, erosion control, and water quality control.

Factors driving the loss of mangrove forests in south eastern Nigeria

- Oil and Gas exploration and exploitation [gas flaring in the mangrove ecosystem]
- Rapid Urbanization [reclamation of mangrove forests for residential building & for urban development]
- Dredging Activities [dredging activities to create pipeline route through the vegetation dredged materials dumped on mangrove vegetation]
- Mangrove wood extraction by rural communities [mangrove logs for fuel economy], and
- Introduction of exotic plant species (Nypa Palm: *Nypa fruticans*).

The continuing decline in fish catch poses a grave threat to food security and results in greater poverty and conflicts between commercial and municipal fishers. A result of declining fish catch and increasing population is also a decline in per capita consumption of food fish. The decline is much more pronounced in fishing communities that make consumption of fish possible for urban Consumers. This is because fishers tend to sell most valuable fish for cash income as prices rise in the cities, thus leaving only small and poorer quality fish for their own consumption.

The present paper suggests with affirmation that, if population growth continues at its current rapid pace and nothing is done to arrest the overfishing and habitat destruction patterns prevalent in the country's coastal waters, there may occur a breakdown in supply of fish. While the country has embarked on various foods security programs, not enough importance has been given to the aggressive potent succession of the mangrove forest ecosystems in the coastal waters. As a stake-holder, Fisheries Society of Nigeria (FISON) has a part to play in this replacement scenario in Nigeria's coastal food basket.

Historical background

Nigeria is a developing country with diverse water bodies (marine, brackish, fresh waters). Its coastal ecosystems are besieged by crude oil explorations characterized by frequent oil spills, potent fishing activities/navigation, and the aggressive succession of the native mangrove forest (*Rhizophora*) by alien palms (*Nypa*).

The estuaries of Qua Iboe River, Cross River, Imo and Niger Delta along with their creeks and tributaries comprise a rich collection of biotopes dominated by vast areas of mangrove swamp forests. Mangrove swamp forests provide nurseries and feeding grounds for commercially important species of fin and shell fishes. As one of Nigeria's richest natural forest reserves, they also represent a rich source of wood supply for various domestic and industrial purposes (Ekundayo, 1985). The damaging effects of oil pollution on mangrove ecology have been documented in Nigeria and elsewhere (Ekwekwe, 1981). Therefore, a potential source of pollution to the mangrove swamp forest of the Qua Iboe River, Cross River, Imo and Niger Delta, is the expanding off-shore oil activities in the region. It is necessary to be able to detect changes in ecological features of the environment with particular reference to the existing biota.

Apart from marsh land reclamation and pollution, an important man-induced environmental threat to the Nigerian coastal swamp ecosystem is the potent vegetational succession involving the replacement of the dominant native mangrove macrophytes (*Rhizophora mangle, R. harizonii, R, racemosa, Laguncularia racemosa* and *Avicennia africana*) (Wilcox, 1985; Udo *et al* ., 2008; Udo, 2009; Udo *et al* ., 2009).

Consequently, most of the Niger Delta as well as those of Qua Iboe River, Cross River and Imo, now have nipa palms in large expanse of the adjoining intertidal swamps and only isolated residual patches of the mangrove forests (King and Udo, 1997; Udo, 2002, 2004; Udo *et al*., 2009). Other than its use in its native Pacific Islands, nipa's presence in coastal waters of Nigeria is becoming a nuisance and a digression from the original aesthetic/ornamental objective. *Nypa* is also considered a menace to navigators and an agent of erosion as small islands of it get dislodged from the coast and float into rivers (Wilcox, 1985).

Management of mangrove forest

Authors' recent observations point to the facts that the last remnants and / or stands of the mangrove forest ecosystems [southeast of the Niger Delta] are indeed in pockets, dotted round about the region. This is not a good omen for the development of Nigerian fisheries sector, considering the importance of these estuarine mangrove forest niches to life histories of several fin and shellfishes.

Resource management is a critical area of research today, particularly in developing countries where many people are reliant on natural resources for their livelihood. Nipa palm (*Nypa fruticans*) is an economically and ecologically important mangrove species to people in the Pacific Islands. Nipa commonly inhabits the swamplands in the upper reaches of estuaries throughout the Philippines and is often harvested and locally manufactured into shingles for roofing. Despite its economic importance, however, it has been under threat for sometime (Rivera and Newkirk, 1997). In some areas communities are under pressure to replace nipa with other land-use activities.

This present paper calls for a more result-oriented approach by the Federal Government to tackle this simple but degrading menace in the coastal waters east of the Niger. It is thought-provoking that the Government has paid little attention to situation and it is costing her now many millions of Naira to combat this nuisance, and to see to what useful materials the weed itself can be converted Wilder(1981 in Adesulu and Syndenham, 2007). Nipa palm is widespread. The population is dynamic and competitive in growth pattern. For instance, there has been an estimated 24% decline in mangrove areas within the species' range since 1980 [http://www.iucnredlist.org/apps/redlist/details/178816/0]. In some parts of Africa including Nigeria where it has been introduced, it has become invasive and is considered as a pest. Adaptively, this invasive species has shallow root system that destabilizes the banks along the water ways, further impacting sediment distribution lower in the south east of the Niger Delta system.

Apart from impeding navigation, nipa palm decreases overall biodiversity including shell and fin-fishes; it has no fertilizing attributes; lacks micro-habitats as provided by the prop-stem of the mangroves; it is also a poor substrate for attachment of biota *vis-à-vis* the mangrove species [Udo, 2009]. The palm spread has replaced native mangrove species, the *Rhizophora* in Nigeria [Kathiresan, 2004]; hence the Federal Ministry of Environment of Nigeria has developed the 'Nipa Palm Control Programmes' to control the invasive species. But the question is how pragmatic and successful is this programme as more of the so called protected areas have been potently and aggressively replaced by the invading nipa palms.

As matter of urgency, the Nigerian Government should adopt and encourage traditional resource management practices along with her 'programmes', as a way of conserving the ecological resources of the region. Why, because the people may look at formal protection as a threat to their right of access to their resources. It should not be imposed on them; they should be seen as stake-holders to the resources in question. Therefore, the people should be enlightened and encouraged to strengthen these

practices for success and sustainable development of the area.

Standing on the abandoned jetty at Iwuochang/Upenekang fishing beach in 1999 [Ibeno LGA, Akwa Ibom State, Nigeria] and looking across the Qua Iboe River [en-route the Atlantic Ocean] were strips of luxuriant mangrove vegetation all around the estuary. Surprisingly, 12 years later still standing on the same jetty and looking across the River, all the vegetation round about are now replaced by nipa palms with pockets of mangrove stands. As research scientists in EIA/PIA studies (2004, 2008-2010) along the near-shore and offshore zones of Cross, Imo and Qua Iboe estuaries, we sadly noted that most of the forest creeks and channels are now colonized by nipa palms with few stands of mangrove macrophytes. The fear of the authors is that, there may be crash in fish supply from the coastal waters of Nigeria in the near future. The time to act is now and FISON must be pro-active in this coastal re-construction and rehabilitation. If action is not taken very soon the last stand of mangrove forests southeast of the Niger delta and /or the coastal food basket may disappear. Other than its use in its native Pacific Islands, nipa's presence in coastal water ecosystems of Nigeria is becoming a nuisance and a digression from the original aesthetic/ornamental objective.

Ecologically, in comparing the rich-resource of the native mangrove forests vis-à-vis those of the nipa:

- *Nipa palm limits human accessibility to the tidal mudflats, due to its prostrate underground stem, luxuriant foliage and aggregate / clumped distribution.*
- *The presence of nipa palm exacerbates coastal erosion as small islands of it are often dislodged from the coast and float into the open rivers, creeks and estuaries causing navigational hazards to all forms of water crafts and destroying set gill nets.*
- *Nipa palm also contributes very little to the energy inputs, nutrient cycle and productivity of the intertidal ecosystem.*
- *Again, since its leaves are hardly shed, they hardly decay. Thus, nipa palm contributes very little to the detritus food-web.*

REFERENCES

Adesulu, E. A. & D. H. J. Sydenham. 2007. The freshwater fishes and fisheries of Nigeria. Macmillan, Nigeria. 397p.

Ekundayo, J. A. 1985. The challenges of the mangrove ecosystem. *In:* Mangrove ecosystem of Niger Delta. Proceedings of a workshop (ed. By B. H. R. Wilcox and C. B. Powell). University of Port Harcourt, Port Harcocurt, Nigeria. 357p.

Ekwekwe, E.1981. The Funiwa – 5 Well blowout.Petroleum industry and the Nigerian Environment. Proceeding Int. Seminar. Pp 64 – 68.

Kathiresan, K., 2004. How to alleviate degradation of Mangroves? *J. Environ. Biol.*, 25(4): 399 - 401.

King, R. P. & M. T. Udo 1997. Vegetational succession – mediated spatial heterogeneity in the environmental biology of *Periophthalmus barbarus* (Gobiidae) in the estuary swamp of Imo River estuary, Nigeria *Intern. J. Surf. Min Reclam. Envir.,* 11: 151 – 154

King, R. P. & M. T. Udo 1997. Some aspects of the reproductive biology of the endangered mudskipper, *Periophthalmus barbarus* (Gobiidae) in Imo River estuary, Nigeria *Trans. Nig. Soc. Conserv.,* 5: 50-53.

Red List of Threatened Species http://www.iucnredlist.org/apps/redlist/details/178816/0]

Rivera, R. & G. F. Newkirk (1997). Power to the people: a documentation of nongovernmental organizations' experience in community-based coastal resource management in the Philippines. *Ocean and Coastal Management* 36(1-3): 73-95.

Udo, M. T. 2002. Trophic attributes of the mudskipper, *Periophthalmus barbarus* (Gobiidae:

Oxudercinae) in Imo River estuary, Nigeria *J. Env. Sciences, (China).* Vol. 14, No. 4: 508 – 517.

Udo, M. T.**, A.W . Akpan & A. O. Ekwu. 2008.** Observations of the indices of fecundity of the mudskipper, *Periophthalmus barbarus* (Gobiidae) in the Qua Iboe River estuary Southeastern Nigeria. *Ecol. Env.* 7 Cons. 14 (2-3): 255-262

Udo, M. T., A. W. Akpan, I. E. Ekpo, M. Essien-Ibok & P. E. Lebo. 2008. Changes in the trophic attributes of the altantic mudskipper, *Periophthalmus barbarus* (Gobiidae) between a mangrove and nipa swamp creek of Qua Iboe River estuary, Nigeria. *Nigerian Journal of Fisheries* 5 (92) 89- 96.

Udo, M. T., A. W. Akpan, B. J. Oribhabor & U. I. Daniel. 2009. Fecundity capacity of the mudskipper in two estuarine (*mangrove swamp versus nipa swamp*) creeks of southeastern Nigeria. *Ecol. Env. & Cons.* 15 (3): 455 – 460.

Udo, M. T. 2009. Biological characteristics of the Schlegel's goby, Porogobius schlegelii, in the Mangrove – Nipa ecosystem, southeast of the Niger Delta. *FAO – Nature & Faunae*, 24 (1): 110 – 115.

Wilcox, B, H. R. 1985. Angiosperm flora of the Niger Delta. p 34 – 55. *In*: The mangrove ecosystem of the Niger Delta (Wilcox B. H. R. and Powell, C.B. eds). Publication. Committem University of Port Harcourt. 357p.

World Rainforest Movement – Mangroves. Local livelihoods vs. corporate profits, 2002. http://www.wrm.org.uy/deforestation/mangroves/book.pdf

Articles

Socio-economic and environmental significance of plantation forests in South Africa

Rudzani Makhado[1] and Amani Saidi[2]

Summary
In celebration of the year 2011 as the International Year of Forests, we have reviewed various reports and scientific articles that demonstrate the significance of plantation forests to the livelihoods of society. We found that plantation forests play a significant role through creation of employment, contribution to food security and provide diverse free environmental services. The main objective of this review is to raise awareness about the value of forests, challenges in plantation forests and to share knowledge that could promote sustainable forest management for the benefit of current and future generations.

Introduction

Plantation forests cover as little as 1 266 196 hectares (1%) of the total 122.1 million hectare land area of South Africa (DWAF 2008), but play a central role to the livelihoods of a significant proportion of society. The sector employs thousands of people countrywide. Communities adjacent to plantation forests benefit through harvesting wood and non-wood products. They also enjoy indirect benefits such as leisure, sequestration of carbon dioxide and spiritual healing. The plantation forests therefore make significant contribution to the livelihoods of rural people and to the country's economy. It is for this reason that sustainable management of plantation forests becomes imperative so that the communities could continuously enjoy the benefits that are directly or indirectly derived from forests.

Contribution of plantation forests to the society livelihood

The majority of plantation forests in South Africa are located adjacent to rural communities, where more than 75% of people are poor. This provides a major reason for this review, so that we can assess the contribution of plantations forests to the wellbeing of society, particularly in rural areas. FAO (2001) report shows that forest and tree resources help reduce poverty and contribute to rural food security. Forest resources are therefore essential in the sense that they supply basic needs and act as safety-net (DWAF 2005). The society at large benefits directly through employment opportunities, access to grazing, supply of firewood, harvesting of non-wood products; and indirectly through sequestration of CO_2 (a greenhouse gas linked to climate change), and leisure activities. Forestry employment, collection and sale of forest products and small forest-based enterprises provide income which is important for meeting household needs and for rural investment (FAO 1997; Shackleton 2004; FAO 2009).

Direct contribution of plantation forests

Direct benefits from forestry include employment creation, contribution to the GDP and various products harvested for subsistence and commercial purposes. Those benefits are discussed as follows:

Economic benefits

Direct economic benefits are through creation and sustaining of jobs and contribution to the Gross Domestic

[1] *Rudzani A Makhado, Research and Evaluation Section, Limpopo Legislature, P/Bag X9309, Polokwane, 0700 South Africa.*
Email: makhador@limpopoleg.gov.za / makhado2002@yahoo.com

[2] *Amani T Saidi, South African Environmental Observation Network, National Research Foundation, P.O Box 2600, Pretoria, 0001 South Africa*

Product (GDP). Various studies show that the creation of employment and business opportunities within the forestry sector is probably the most significant contribution that forestry could make towards provision of household food security and upliftment of rural people's livelihoods (FAO 1997; DWAF 2005; Ofoegbu 2010). The level of employment in the forestry sector is thus an indicator of both the social and economic value of the sector to the society (DWAF 1997; FAO 2010).

It was estimated in 2006 that the forestry sector contributed to about 116 000 employment, which is 0.5% of the total labour force in South Africa (FAO 2009). However, recent estimates shows that the total number of people employed in the forestry sector amounted to 170,025 in 2008, which decreased to 169,700 in 2009 (See Table 1 below culled from Godsmark 2009; Godsmark 2010). Various factors might have contributed to the decrease in employment, but the global economic recession which affected the industry market is considered as the primariy cause of decline in employment rate in the forestry sector.

The employment rate in the forestry sector varies significantly at provincial level. For instance, Kwazulu-Natal, Mpumalanga, Cape and Limpopo Provinces contributed 34,700 (45%), 29,300 (38%), 10,300 (13.4%) and 2,700 (3.6%) respectively to the total 77,000 direct jobs contributed by forestry sector in 2008. The total estimated indirect jobs created by the forestry industry amounted to 462,000 in 2008 and 371,000 in 2009. Most of the indirect jobs in 2008 were created in the Kwazulu-Natal (208,200), followed by Mpumalanga (175,800), Cape (61,800) and lastly Limpopo (16,200). The total number of direct and indirect dependents to those working in the forestry industry was estimated to be 1.7 million in 2008, which decreased to 1.4 million in 2009. Similarly, the total number of people who depend on forestry for their livelihood was estimated to be 2.3 million in 2008 (Godsmark 2009; Godsmark 2010).

The total GDP in South Africa amounted to R2,3 trillion in 2009. The forestry sector contributed immensely to the GDP, expressed through increase contribution to the total GDP. The contribution of forestry sector to the total GDP has shown to increase from 4.5% in 1980 to 9.7% in the year 2009 (Godsmark 2010).

Wood and non-wood products

Rural communities adjacent to forest plantations harvest wood and non-wood

Table 1: Employment contribution from forestry sector (Godsmark 2008; Godsmark 2009; Godsmark 2010)

	Number of Employees				Total Employment	
	Direct		Sub-sector			
	2008	2009	2008	2009	2008	2009
Forestry	76,844	66,500	30,000	30,000	106,844	96,500
Pulp and Paper	13,200	13,200	10,781	10,800	23,981	24,000
Sawmilling	20,000	20,000	n/a	10,000	20,000	30,000
Timber Board	6,000	6,000	n/a	n/a	6,000	6,000
Mining Timber	2,000	2,200	n/a	n/a	2,000	2,200
Other	11,000	11,000	n/a	n/a	11,000	11,000
TOTAL	**129,244**	**118,900**	**40,781**	**50,800**	**170,025**	**169,700**

products for subsistence and commercial purposes. Wood products harvested include fuelwood and poles used for construction (DWAF 2005). Fuelwood for instance accounts to about 80% of household energy requirements in rural areas (DWAF 2009-2030), and thus accounts for close to 10% of net national energy consumption (DWAF 1997). It is estimated that each year, the average rural household uses 5.3 tonnes of fuelwood for cooking and heating (DWAF 2007). However, at a national scale, Gandar (1994) estimated that 11 million tonnes of fuelwood are consumed in South Africa per annum.

Non-wood products harvested from forests include thatch grasses, medicines, bushmeat, honey, edible mushrooms, fruits, vegetables and insects (DWAF 2005; Ofoegbu 2010; FAO 2009). It is estimated that 27 million people in South Africa rely on medicinal plants for health care (DWAF 2007). This dependency on medicinal plants applies to more than half of the population in South Africa. In addition, communities adjacent to plantations also harvest non-wood products for both subsistence and commercial purposes.

Indirect contribution of plantation forests

The contribution of forests to the wellbeing of the society cannot only be measured in monetary terms; there are significant indirect benefits such as environmental benefits, social benefits, and free access rights to farm and graze in the plantations, which are equally important (DWAF 2007). The indirect benefits are discussed as follows:

Environmental benefits

The environmental services provided by forests are seldom fully valued or adequately reflected in forest planning and management decisions (FAO 1997). Environmental services as provided by forests are currently receiving increasing attention on climate change mitigation debates. Such services include biodiversity conservation, watershed protection (FAO 2001), and sequestration of carbon dioxide (CO_2) (Christie & Scholes 1995).

Plantation forests provide habitat for diverse number of insects, birds and animals. The forests also play a significant role in climate change mitigation due to their ability to sequestrate CO_2. It is estimated that plantation forests in South Africa has the potential to stock about 4.41 million Mg C yr^{-1} (Shackleton *et al*., 2002), which compares well with estimate of 3.69 million Mg C yr^{-1} by Christie and Scholes (1995). Chamberlain *et al*. (2005) estimated that carbon sequestration by plantation forests can reduce environmental costs of the industry by R89 million. It is further predicted that in the future, plantation forest will be managed as much as carbon they store as for their timber yield (Scholes & Scholes 2000).

Social benefits

Forests provide beautiful sites for tourism, recreation, spiritual healing, leisure and religious practices (FAO 1997; Shackleton 2004). The beauty of the forest, species in the forest and waterfalls provide invaluable social benefit to many people. The sector is also crucial for educational purpose, as it attracts local and international students to do their forestry research.

Free access right to farm and grazing land

Many plantations in South Africa provide free grazing for livestock from the surrounding communities. Communities around Mondi forests for instance have free access to farmland and grazing land. The abundance of open grassland in Mondi forest was found to be of value to the villagers for rearing their cattle (Ofoegbu 2010).

Challenges in plantation forests

Despite all the benefits, the productivity of the sector is mainly destroyed by fires and other factors such as climatic factors, insects and diseases. Of the total 77 150 hectares of plantations destroyed by fires,

weather, diseases, insects and animals in the 2007/2008 surveys; 70 812 hectares (92%) were destroyed by fire alone (Table 2). Softwood species (e.g. Pine) are mostly destroyed by fires as opposed to the hardwood species (e.g. Wattle). Out of the total 70 812 hectares destroyed by fire, 58 564 hectares (83%) were softwood species, while 12 248 hectares (17%) were hardwood species (Table 2).

Plantation forests are also seen as threat to biodiversity and water resources (Cossalter & Pye-Smith 2003). Evidence suggests that replacing natural species by non-native species in plantation forests results in monoculture, reduce stream flow and increase loss of biodiversity. Various studies further suggests that plantation forests consume more water than indigenous species they replace (e.g. Gush & Dye 2008). Research findings show that indigenous tree annual cumulative sap flows are less than 8.5 t $tree^{-1}$ yr^{-1}, whereas sap flows in plantation forests exceeded 20 t $tree^{-1}$ yr^{-1} (Gush & Dye 2008). A study which was based on decision support system adjustment for all rainfall areas estimated that plantation forests use about 400 million m^3 of water per year (Schulze *et al*. 2004). Although there is general consensus that plantation forests use more water than indigenous trees, more research studies are still needed to reduce uncertainties with regard to the amount of water being used.

Conclusion

Despite the challenges facing forest plantations, the industry contributes immensely to the social, economic and environmental needs of the society, particularly the rural poor. The sector contributes significantly to the country's GDP and employment opportunities. It also contributes to the surrounding communities' livelihood through the supply of various wood and non-wood products. Plantation forests are therefore ideally located to contribute to rural development and poverty eradication in rural areas. The opportunity of the sector to increase its potential is still great, but as also proposed by FAO (2001); the challenge currently is to support specific changes that will lead to a greater role for the sector to adequately support the livelihoods for the poor. This therefore means that communities adjacent to plantations, foresters and decision makers should work together to promote sustainable forest management practices so as to ensure that the full potentials that plantation forests can contribute are realised.

References

Chamberlain, D., Essop, H, Hougaard, C, Malherbe, S. & Walker, R. 2005. *Part I: The contribution, costs and development opportunities of the Forestry, Timber, Pulp and Paper industries in South Africa*. Johannesburg: Genesis Analytics (Pty) Ltd.

Table 2: Damage to plantations in South Africa. Data source: DWAF (2009)

	Fires (ha)	Weather (ha)	Diseases (ha)	Insects (ha)	Animals & Rodents (ha)	Total Area Damaged (ha)
Softwood	58 564	448	54	71	931	60 068
Hardwood	12 248	3 569	88	1 015	162	17 082
TOTAL	**70 812**	**4 016**	**142**	**1 086**	**1 094**	**77 150**

Christie, S.I. & Scholes, R.J. 1995. Carbon storage in Eucalyptus and pine plantations in South Africa. *Environmental Monitoring and Assessment* 38: 231-241.

Cossalter, C. & Pye-Smith, C. 2003. *Fast-wood forestry: Myth and realities*. Joint venture project between CIFOR, WWf International IUCN and Forest Trends, Bogor, Indonesia.

DWAF. 1997. *South Africa's Forestry Action Programme*. National Forestry Action Programme (NFAP), Department of Water Affairs and Forestry (DWAF), Pretoria.

DWAF. 2005. *Pilot State of Forest Report: A Pilot Report to Test the National Criteria and Indicators*. Department of Water Affairs and Forestry (DWAF), Pretoria.

DWAF. 2007. *Report to Parliament on South Africa's Forests 2004 - 2006*. Department of Water Affairs and Forestry (DWAF), Republic of South Africa.

DWAF. 2008. *Report on commercial timber resources and primary roundwood processing in South Africa*. Department of Water Affairs and Forestry (DWAF), Pretoria, Republic of South Africa.

DWAF. 2009. *Report on commercial timber resources and primary roundwood processing in South Africa*. Department of Water Affairs and Forestry (DWAF), Pretoria, Republic of South Africa.

DWAF. 2009-2030. *Forestry 2030 Road Map.* Department of Water Affairs and Forestry (DWAF), Pretoria.

FAO. 1997. *State of World's Forests*. Food and Agriculture Organization of the United Nations, Rome, Italy.

FAO. 2001. *How forests can reduce poverty.* Food and Agriculture Organization of the United Nations (FAO) and the Department for International Development, Rome, Italy.

FAO. 2009. *State of the World's Forests*. Food and Agriculture Organization of the United Nations, Rome, Italy.

FAO. 2010. *Global Forest Resources Assessment 2010*. FAO Forestry Paper 163, Food and Agriculture Organization of the United Nations, Rome, Italy.

Gandar, M. 1994. *Afforestation and woodland management in South Africa*. South African Energy Policy Research and Training Project: Widening Access to basic Energy Services for the Urban and Rural Poor, Paper Number 9. Energy for Development Research Centre: University of Cape Town.

Godsmark, R. 2008. *The South African forestry and forest products industry 2007*. Forestry South Africa, South Africa. [Online]. Retrieved from: http://www.forestry.co.za [2009, September 22].

Godsmark, R. 2009. *The South African forestry and forest products industry 2008*. Forestry South Africa, South Africa. http://www.forestry.co.za [2010, February 16].

Godsmark, R. 2010. *The South African forestry and forest products industry 2009*. Forestry South Africa, South Africa. http://www.forestry.co.za [2011, January 17].

Gush, M.B & Dye, P.J. 2008. Water-use efficiency within a selection of indigenous and exotic tree species in South Africa as determined using sap flow and biomass measurements. CSIR Report, Pretoria.Ofoegbu, C. 2010. *An evaluation of the socio-economic impact of timber production with and without the inclusion of biomass energy production*. (Published MSc dissertation). Stellenbosch University, Stellenbosch.

Scholes, R.J. & Scholes, M.C. 2000. Climate change and carbon storage. In *South African Forestry Handbook*, edited by J.S.B. Scotcher. Pretoria: South African Institute of Forestry. pp. 577-578.

Schulze, R.E., Summerton, M.J, Meier, K.B, Pike, A. & Lynch, S.D. 2004. *The ACRUforest Decision Support System to assess hydrological impacts of afforestation practices in South Africa*. Report commissioned by the Water Research Commission. 749/1/04: 138-149.

Shackleton, C., Hassan, R.M, de Wit, M, Shackleton, S. & Beukman, R. 2002. Natural woodland and forests: Contribution to the national income and economic welfare. In *Accounting for stock and flows values of woody land resources: Methods and Results from South Africa*, edited by R.M. Hassan. University of Pretoria: Centre for Environmental Economics and Policy in Africa (CEEPA).

Shackleton, C.M. 2004. *Assessment of livelihoods importance of forestry, forests and forest products in South Africa*. Grahamstown: Rhodes University.

A review of the significance of non-timber forest products to rural livelihoods in Nigeria

Folaranmi Dapo Babalola[1]

Introduction

Increasing global concern about environmental issues, especially deforestation, with increased attention to rural poverty, and with the emergence of the concept of "sustainable development" brought non-timber forest products (NTFPs) into limelight (Belcher *et al.*, 2005). This attention coincided with new commitments to address rural poverty and the recognition that forests can provide multiple products and services. Forest products, especially NTFPs were given a high profile by researchers at this time because of the perception that forest exploitation for products other than timber is more harmless.

The term "Forest product" almost immediately brings to mind wood and wood-based products, but there are equally important non-timber products (NTFPs) that are procured from the forest (FAO, 1993). NTFPs can be referred to as all non-wood products extracted from forest ecosystem and utilised within the household or marketed, and which have social, cultural or religious significance (FAO, 1990; Chandrasekharan, 1992). NTFPs are generally components of the forest system which exist in nature and they are generally not cultivated, although most of them are now undergoing management and domestication (Adepoju and Salau, 2007). NFTPs may be harvested for both subsistence and commercial use either regularly or as a fall back during times of need (Barrett *et al.*, 2002; Charlie and Sheona, 2004).

[1] *Folaranmi Dapo Babalola, PhD (Forest Economics and Management), University of Ibadan, Nigeria*
Email: folababs2000@yahoo.com
Telephone: +234-8025487802

Significance of Non-Timber Forest Products in Rural Livelihoods

Several opportunities for improved rural development are linked to NTFPs (FAO, 1995). Their use provides many opportunities for pro-poor forest activities, which can complement and strengthen key components of livelihoods and poverty reduction strategies (Arnold, 1996). Activities related to the use of NTFPs are often attractive to resource-poor people. Despite the fact that these activities are characteristically labour intensive, they generally have low technical entry requirements, they can provide instant cash in times of need and the resource is often freely accessible (Neumann and Hirsch, 2000).

Charlie and Sheona (2004) discovered that more than 85% of the rural households in South Africa used forest products such as fuel wood, wooden utensils, edible fruits, and edible leaves or roots including wild spinach. Furthermore, more than half of the households investigated made use of wood for construction, edible insects, bushmeat and wild honey for food, and reeds for weaving. In whatever form consumed, food from the forest often play a significant role in supplementing regular household food, particularly during the period of scarcity, when the previous year's crops are exhausted and the new crops are yet to mature.

Many products of both plant and animal origin are consumed either directly as food or as supplements to other food products (Jimoh, 2006). Some are eaten raw, without prior cooking, boiling or processing, while others can only be consumed after processing. Through their consumption, NTFPs have many curative roles for nutrition problems (Table 1).

Table 1: Some common nutritional problems and the potential curative roles of Non-Timber Forest Products

Nutrient-related problems	NTFPs with potential for combatting deficiencies
Protein-Energy malnutrition: due to inadequate food consumption causing reduced growth, susceptibility to infection, changes in skin hair and mental facility.	Energy-rich NTFP which is available during seasonal or emergency food shortages, especially, nuts, seeds, oil-rich fruit and tubers; e.g. the seeds of *Geoffroea decorticans, Ricinodendron rautanenil,* and *Parkia* sp.; oil of *Elaes guineensis,* babassu and coconut palms; protein-rich leaves such as baobab (*Adansonia digitata*); as well as wild animals (e.g. snails) including insects and larvae.
Vitamin A deficiency: in extreme cases causes blindness and death; responsible for blindness of 250,000 children/year.	Forest leaves and fruit are often good sources of Vitamin A; e.g. leaves of *Pterocarpus* sp., *Moringa oleifera, Adansonia digitata,* the gum of *Sterculia* sp., palm oil of *Elaes guineensis*, bee larvae and other animal food; in addition fats and oils are needed for the synthesis of Vitamin A.
Iron deficiency: in severe cases causes anaemia, weakness and susceptibility to disease; especially women and children.	Wild animals including insects such as tree ants, mushrooms (often consumed as meat substitutes), as well as forest leaves such as *Leptadenia hastata, Adansonia digitata.*
Niacin deficiency: common in areas with a maize staple diet; can cause dementia, diarrhoea, and dermatitis.	Forest fruits and leaves rich in niacin such as *Adansonia digitata,* fruit of *Boscia senegalensis* and *Momordica balsamina*, seeds of *Parkia* sp., *Irvingia gabonensis* and *Acacia albida*.
Riboflavin deficiency: common throughout southeast Asia; among those with rice diets causes skin problems.	Forest leaves are especially high in riboflavin, notably *Anacardium* sp., *Sesbania grandiflora*, and *Cassia obtusifolia*, as well as wild animals, especially insects.
Vitamin C deficiency: common to those consuming monotonous diets; increases susceptibility to disease, weakness.	Forest fruit and leaves often supply the bulk of Vitamin C consumed, especially good sources include fruit of *Ziziphus mauritiana, Adansonia digitata* and *Sclerocarya caffra,* leaves such as *Cassia obtusifolia*, and the gum of *Sterculia* sp., are also good sources of this vitamin.

Source: Falconer and Arnold, 1988

Dominic (2002) found that in Ghana more than 80% of the population uses medicinal plants from the wild, while over 90% of the rural and over 40% of the urban populations in Nigeria depended on traditional medicine based on the use of NTFPs. The importance of traditional medicine is also highlighted by the number of traditional healers as opposed to that of western-trained medical doctors in many countries in Africa. In Ghana (Kwahu District) and Nigeria (Benin City), traditional healers are officially recognized, and the ratio of medical doctors to traditional healers is estimated to be 1:92 and 1:149, respectively.

Rural householders may rely on household income from the collection and marketing of NTFPs during given seasons when other income is low (Babalola and Agbeja, 2008). Where employment opportunities from traditional industries are declining, workers

looking for alternative income sources often turn to collection of these products from nearby forests (Adepoju and Salau, 2007). A study in the tropical rainforests of Southern Cameroon revealed that local communities rely heavily on the collection and marketing of forest products for their subsistence. More than 500 plant species and 280 animal species were found to be used in one way or another, with about 20 NTFPs sold in the local markets and contributing significantly to the income of rural people (van Dijk, 1999). The individual contribution of each NTFP may be little but collectively they contribute significantly to the rural economy and can add to national export revenues. In a study on socio-economic importance of some selected NTFPs in South-West Nigeria, marketing of non-timber forest products served as a major source of income and employment to the stakeholders along the marketing chain (Babalola, 2011). Falconer (1990), in a survey of some selected villages in the high forest zone of Southern Ghana, found that individuals from 68% of the households surveyed were employed in small-scale forest-based industries.

Even where quantity of forest products-based employment is low, they often account for a high proportion of overall non-farm employment. Forest-based activities often depend on season of farming, labour wage as well as fluctuations in the availability of labour. Outside employment often declines at the peak of farming activities or are sometime deliberately scheduled so that it is available during periods when there is a slack in agricultural work. At times, it is governed by seasonally induced cash needs such as the need for families to pay school fees, to have cash for traditional or religious festivals or to procure food during "the hungry season" (Jimoh, 2006).

The availability and use of NTFPs are especially important to women in many developing countries (Gbadebo and Gloria, 1999). In addition to their importance in safeguarding family welfare (food, medicine etc), NTFPs can help generate income to women through marketing and commercialization. Organization into groups may give women the opportunity to share experiences related to NTFPs in the areas of nutrition and health and, in some cases, may help provide access to credit for related activities (Marshall, *et. al.*, 2006).

Conclusion

The contributions of NTFPs to sustenance of rural livelihoods cannot be underestimated. There is need for sustainable production and exploitation of these products; this should be coupled with appropriate diversification of their processing and use to meet new and increasing demands. Present high levels of deforestation and forest degradation has direct negative impacts on the production of many NTFPs and should be curbed. The sustainable production from the wild of NTFPs for both household use and for marketing and commercialization should be promoted, and the cultivation and domestication of important products should be intensified.

References

Arnold, J. E. M. & Ruiz Perez, M. 2001: *Can Non-Timber forest products match tropical forest conservation and development objectives?* Ecological Economics 39: 437-447.

Arnold, J.E.M 1996: *Economic factors in farmer adoption of forest product activities*. In Leaky, R.R.B., Temu, A.B., Melynyk, M. and Vantomme, P. (eds) Domestication and commercialisation of Non-Timber forest products in agroforestry systems. Proceedings of an international conference held in Nairobi, Kenya 19-23 january 1996. Non-wood forest products. FAO, Rome. 131 p.

Babalola, F.D. and Agbeja, B.O. (2008): Potentials of multipurpose trees producing non-timber forest products (NTFPs) on farmland in Southwestern States of Nigeria. *Nigeria Journal of Forestry* Vol. 38 (1):49-56

Babalola, F.D., 2011. Socio-economic contributions of Selected Non-Timber Forest

Products (NTFPs) to rural economy in South-West Nigeria. A PhD thesis. University of Ibadan, Nigeria. 183 pp

Barrett, C.B., Reardon, T. and Webb, P 2002: *Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics, and Policy Implications*. Cornell University, Ithaca, NY 14853–7801 USA

Belcher, B., Rui´Z-Pe´Rez, M., Achdiawan, A. 2005. Global Patterns and Trends in the Use and Management of Commercial NTFP: Implications for Livelihoods and Conservation World Development Vol. 33, No. 9, pp. 1435–1452, 2005 doi:10.1016/j.worlddev.2004.10.007

Chandrasekharan, C. 1992. *Terminology, Definition and Classification of Forest Products Other Than Wood*. Available at www.fao.org/docrep/V7540e/V7540e28.htm

Charlie, S. and Sheona S., 2004. *The Importance of Non-Timber Forest Products in Rural Livelihood Security and as Safety Nets: A Review of Evidence From South Africa*. In: South Africa Journal of Science 100 Nov/Dec 2004. Pg 58-664.

Dominic, B. 2002. *Tropical secondary forest management in humid Africa: Reality and perspectives.* An introductory paper for the FAO/ECLNV/GTZ Workshop on tropical secondary forest management in Africa: Reality and perspectives. In collaboration with ICRAF and CIFOR Nairobi, Kenya, 9-13 December 2002

Falconer, J. and Arnold, J.E.M., 1988. Forests, trees and household food security. Social Forestry Network Paper 7a. London, Overseas Development Institute.

Falconer, J., 1990. Hungry season food from the forests. Unasylva, 41: 14-19.

FAO, 1990. *The Major Significance of "Minor Forest Product.* The Local Use and Value of Forest in the West. African Humid Forest Zone. Community Forestry Note 6. Food and Agriculture Organization of the United Nations, FAO, Rome.

FAO, 1993. *Non-Wood Forest Products* - A Regional Expert Consultation for English-Speaking African Countries. Organized by Commonwealth Science Council and Food and Agriculture Organization of the United Nations (FAO) In co-operation with Ministry of Tourism, Natural Resources and Environment, Tanzania Series Number CSC(94)AGR-21. Technical Paper 306. FAO Rome. 39pp

FAO, 1995. *Non-wood Forest Products for Rural Income and Sustainable Forestry*. Non-wood Forest Products 7. Food and Agriculture Organization of the United Nations, FAO, Rome. 138 pp. ISBN 103756. Available online at http://www.fao.org/docrep/V9480E/V9480E00.htm. Accessed on 11/07/2010

Gbadebo J.O and Gloria, U., 1999. *The Non-Wood Forest Products of Nigeria.* A report produced as output of the EC-FAO partnership programme (1998-2000) - project gcp/int/679/ec

Jimoh, S.O., 2006. Sustaining the Roles of Non-Timber Forest Products in Rural Poverty-Reduction and Household Food Security in Nigeria. Journal of Fisheries International 1: (2-4): 63-69. Available online at http://www.scialert.net/pdfs/jfi/2006/63-69.pdf.

Leakey, R.R.B., and Newton, A.C., eds. 1994. *Domestication of tropical trees for timber and non-timber products.* MAB Digest 17. UNESCO, Paris.

Marshall, E., Schreckenberg, K. and Newton, A.C. (eds) 2006. *Commercialization of Non-Timber Forest Products: Factors Influencing Success.*

Lessons Learned from Mexico and Bolivia and Policy Implications for Decision-makers. UNEP World Conservation Monitoring Centre, Cambridge, UK. 140 pp. Pdf version available at www.unep-wcmc.org/forest/ntfp. Accessed 08/10/2007

Neumann, R. P. and Hirsch, E. 2000. *Commercialisation of Non-Timber Forest Products: Review and Analysis of Research*. Center for International Forestry Research (CIFOR). Bogor, Indonesia. 1796 pp. Accessible online at: http://www.cifor.cgiar.org/nc/online-library/browse/view-publication/publication/723.html

Sheil, D., and S. Wunder. 2002. *The value of tropical forest to local communities: complications, caveats and cautions.* Conservation Ecology 6 (2): 9. [online] http://www.consecol.org/vol6/iss2/art9. Accessed 08/09/2006

van Dijk, J., 1999. Non-Timber forest products in the bipindi akom region Cameroon. A socio-economic and ecological assessment. Press Release Tropenbos, Wageningen, p. 7.

FAO REGIONAL OFFICE FOR AFRICA

The role of social capital in strengthening community based natural resource management in Zambia

Vincent Nyirenda[1] and Wilbroad Chansa[2]

Summary

This paper provides framework for progression of local community participation in natural resources management in Zambia. It discusses major challenges and opportunities manifested in the past three decades of community based natural resource management and further highlights need for rethinking implementation of effective natural resource management. Semi-structured questionnaires were administered to randomly selected members of local communities in Luangwa Valley, eastern Zambia. The study concludes that social stocks have fluctuated and currently reached growth stage, which requires maintaining through improved systems development, connectedness and individual benefits at base levels for effective natural resource management.

Introduction

The reality of natural resource (including forests) management in Zambia is expressed by disturbances, crises or challenges and opportunities that confront it. As complimenting approach to fortress conservation, community based natural resource management (CBNRM) stresses conservation of nature, wealth creation and devolution of power to local communities (Anderson, 2002). Against the backdrop of the daunting tasks of setting conditions for implementation of CBNRM, three decades of implementation has resulted in serious uncertainties to stakeholders on its impacts (Berkes, 2004; Fabricius, 2004; Blaikie, 2006). For instance, high rates of deforestation, wildlife resources depletion and over-exploitation of fish resources remain a significant challenge (GRZ, 2011). Under such geographically attributed circumstances, the role of community conservation has been questioned.

In order to explore the issues, a study was undertaken to understand the influence of selected social capital elements of local communities on natural resource management. Social capital includes features such as trust, norms, commitment, reciprocity, sanctions, infractions, connectedness and networks that facilitate collective action (Pretty, 2003). The study focuses on institutional perspectives, which included social networks and institutions, participation, levels of trust, institutional learning, equity and information sharing.

Materials and methods

Qualitative field research was adopted to establish relationships between concepts and themes using population sample of 311 respondents based on Strauss & Corbin (1998). Field data in Lupande Game Management Area (4, 840 km^2) in Luangwa Valley, eastern Zambia (Fig. 1) was collected between August 2008 and December, 2010 with the help of six field assistants. Generic semi-structured questionnaires were administered to respondents, and focus group interviews were also conducted to seven (7) interest groups in accordance with protocols suggested by Düvel (1987) and

[1] *Vincent R. Nyirenda, Executive & Technical Assistant, Office of the Director General, Zambia Wildlife Authority, Private Bag 1, Chilanga, Zambia; Tel: +260 211 278 683, Cell: +260 977 352 035, Fax: +260 211 278 524*
Email: nyirendavr@hotmail.com
Email: nyirendav@zawa.org.zm

[2] *Wilbroad C. Chansa, Director of Research, Planning, Information and Veterinary Services, Zambia Wildlife Authority, Private Bag 1, Chilanga, Zambia; Telfax: +260 211 278 355, Cell: +260 975 062 301*
Email: chansa.chomba@zawa.org.zm

Bradburn *et al.* (2004). Respondents were requested to rank (0 – 10; 0 being lowest and 10 highest) the social capital stocks over years. The same key questions were administered to each of the respondents, with historical perspective of issues under discussion in English or vernacular.

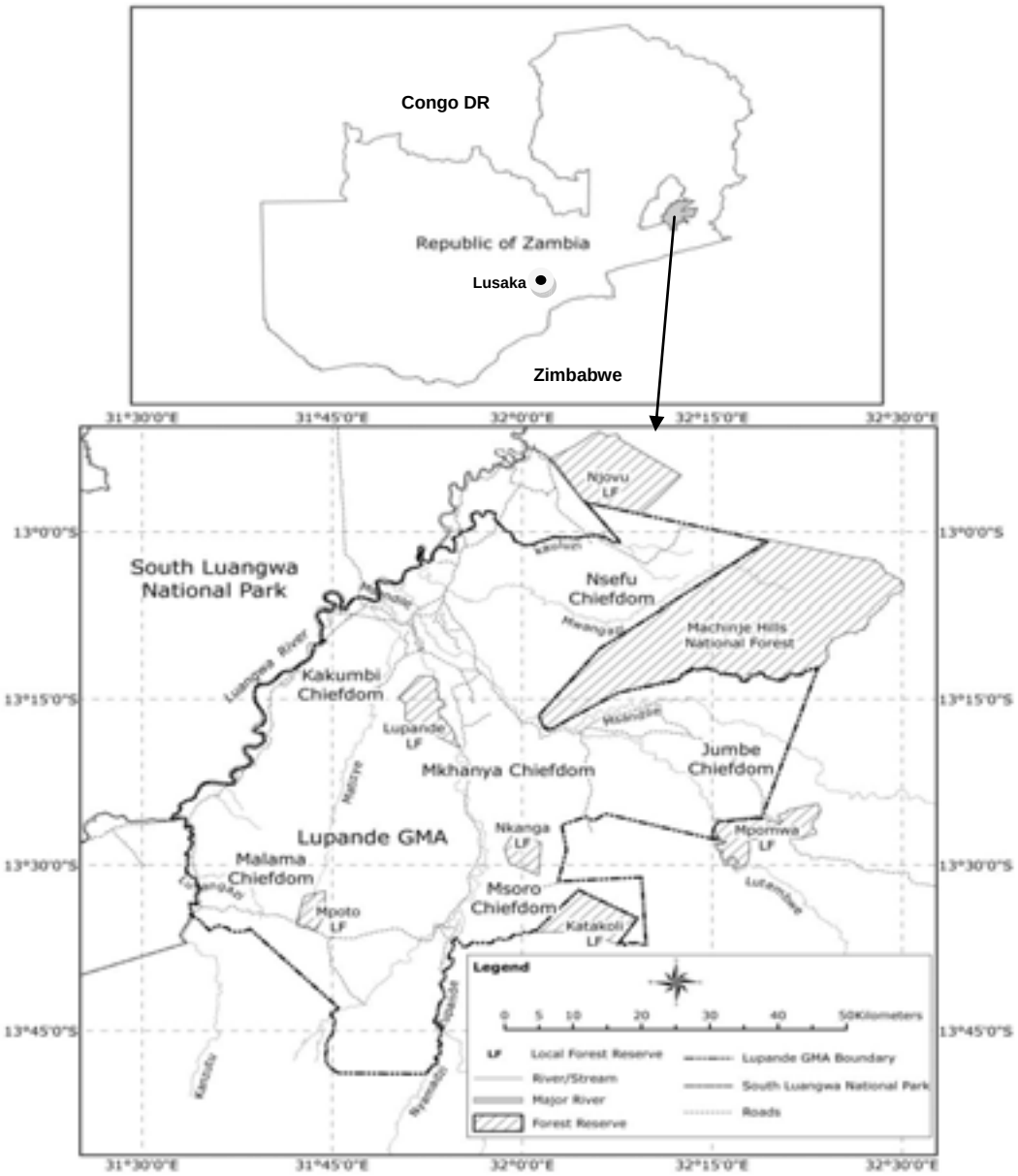


Fig. 1: Lupande Game Management Area in Luangwa Valley of eastern Zambia.

The study area has 7 designated forests and adjoins a rich biodiversity National Park (Fig. 1). It is also a birthplace of CBNRM programme in Zambia (Lewis *et al.* 1990), aimed at protecting natural resources and maximising benefits to local communities. In the first CBNRM generation (1984-1999), social capital is legitimized by partial devolution of authority and power to the local communities. The second CBNRM generation (2000-2010) aims at furtherance of empowering local communities. There are six Chiefdoms: Jumbe, Kakumbi, Malama, Mnkhanya, Msoro and Nsefu, which are inhabited by the Kunda tribe with an estimated total population of 45,000 inhabitants. Agriculture is the mainstay of the people in the Luangwa Valley, as a source of revenue and food (Dalal-Clayton & Child, 2003; Lewis, 2007). Other key landuses are safari hunting and timber harvesting.

Results and discussion

Local community perception is reflected in respondents (n=311) revealing various perceived stock levels of social capital from pre-colonial era to contemporary times in the Luangwa Valley, Zambia. Illustratively, with the aid of selected indicators, Table 1 evinces that social capital has significantly been increasing between generations of programmatic CBNRM (Mann-Whitney $U_{(311,311)}$ test =31,314.7; P<0.003, two-tailed). The significant improvement in social capital is attributed by preponderance of respondents (89.71%, n=279). Traditional social networks (Indicator 1) are reinforced by kinships and clans, cultural groups, village action groups, timber and fish associations. Participation (Indicator 2) by local communities has increased in all six Chiefdoms, except for Nsefu Chiefdom due to adoption of transparency and accountability principles reflected in, for instance, regularity of meetings and communication. However, leadership capacity, palliative engagement, empowering and facilitation by Wildlife Agency pursuit to formations of local institutions need strengthening. Levels of trust (Indicator 3) by local communities, action groups and external organizations have dwindled over the two generations of the CBNRM due to weak leadership. Institutional learning (Indicator 4) has escalated and spanned over generations of CBNRM largely because of intensive extension works, proliferation of community based projects, increased social networks and communities' adoption to own controls over natural resources utilization of benefits from fisheries, water, grass, forest resources and crafted culture based enterprises coupled with local conflict resolution mechanisms. Equity sharing (Indicator 5) has improved particularly due to implementation of benefit sharing rules, locally developed and adopted. Sharing of information and understanding of social – ecological system progressed as various actors such as Wildlife Agency (Zambia Wildlife Authority), Wildlife Conservation Society (WCS), World Wide Fund for Nature Conservation (WWF) and South Luangwa Conservation Society facilitated various conservation initiatives in Luangwa Valley.

Table 1: ***Perception of local communities on social capital in Luangwa Valley, Zambia, 1999 – 2009.***

Indicator	Kakumbi Chiefdom		Jumbe Chiefdom		Malama Chiefdom		Mnkhanya Chiefdom		Msoro Chiefdom		Nsefu Chiefdom		All Six Chiefdoms	All Six Chiefdoms	Mann-Whitney *U* test (two tailed)
	1999	2009	1999	2009	1999	2009	1999	2009	1999	2009	1999	2009	1999	2009	
1	M=6 R=(2,7) n=58	M=6 R=(4,7) n=58	M=7 R=(1,8) n=45	M=6 R=(2,6) n=45	M=7 R=(4,9) n=46	M=7 R=(3,8) n=46	M=7 R=(5,7) n=55	M=5 R=(4,6) n=55	M=7 R=(4,7) n=53	M=6 R=(5,9) n=53	M=7 R=(4,8) n=54	M=5 R=(5,8) n=54	M=7 R=(1,9) n=311	M=6 R=(2,9) n=311	$U_{(311,311)}$ = 109,951.5 P<0.001***
2	M=6 R=(3,7) n=58	M=7 R=(5,9) n=58	M=5 R=(4,7) n=45	M=7 R=(5,8) n=45	M=5 R=(3,6) n=46	M=6 R=(4,9) n=46	M=6 R=(5,8) n=55	M=6 R=(2,6) n=55	M=5 R=(4,6) n=53	M=7 R=(4,8) n=53	M=6 R=(5,7) n=54	M=7 R=(4,8) n=54	M=5 R=(3,8) n=311	M=7 R=(2,9) n=311	$U_{(311,311)}$ = 82,505.5 P<0.001***
3	M=5 R=(1,7) n=58	M=6 R=(3,7) n=58	M=6 R=(1,8) n=45	M=5 R=(4,7) n=45	M=5 R=(4,7) n=46	M=7 R=(6,9) n=46	M=4 R=(4,7) n=55	M=5 R=(1,5) n=55	M=5 R=(2,6) n=53	M=5 R=(4,6) n=53	M=6 R=(3,8) n=54	M=4 R=(2,5) n=54	M=5 R=(1,8) n=311	M=5 R=(1,9) n=311	$U_{(311,311)}$ = 111,147.0 P<0.096 (NS)
4	M=5 R=(3,6) n=58	M=6 R=(5,9) n=58	M=6 R=(3,6) n=45	M=4 R=(2,5) n=45	M=5 R=(3,8) n=46	M=7 R=(4,8) n=46	M=6 R=(4,6) n=55	M=6 R=(3,6) n=55	M=6 R=(1,7) n=53	M=7 R=(4,9) n=53	M=5 R=(4,7) n=54	M=7 R=(3,8) n=54	M=5 R=(1,8) n=311	M=7 R=(2,9) n=311	$U_{(311,311)}$ = 88,730.5 P<0.0003***
5	M=5 R=(2,5) n=58	M=7 R=(3,8) n=58	M=5 R=(4,7) n=45	M=5 R=(4,9) n=45	M=5 R=(3,6) n=46	M=8 R=(4,9) n=46	M=5 R=(3,9) n=55	M=7 R=(5,9) n=55	M=5 R=(4,8) n=53	M=7 R=(5,8) n=53	M=5 R=(4,5) n=54	M=6 R=(4,9) n=54	M=5 R=(2,9) n=311	M=7 R=(3,9) n=311	$U_{(311,311)}$ = 68,800.0 P<0.001***
6	M=4 R=(3,7) n=58	M=7 R=(5,8) n=58	M=4 R=(3,4) n=45	M=6 R=(3,8) n=45	M=5 R=(4,8) n=46	M=8 R=(5,10) n=46	M=4 R=(3,5) n=55	M=6 R=(2,7) n=55	M=5 R=(4,6) n=53	M=6 R=(5,9) n=53	M=4 R=(3,8) n=54	M=6 R=(3,6) n=54	M=4 R=(3,8) n=311	M=6 R=(2,10) n=311	$U_{(311,311)}$ = 64,577.0 P<0.001***
Total	M=5 R=(1,7) n=58	M=7 R=(3,9) n=58	M=5 R=(1,8) n=45	M=6 R=(2,9) n=45	M=5 R=(3,9) n=46	M=7 R=(3,10) n=46	M=6 R=(3,9) n=55	M=6 R=(1,7) n=55	M=5 R=(1,8) n=53	M=7 R=(4,9) n=53	M=5 R=(3,8) n=54	M=6 R=(2,9) n=54	M=5 R=(1,9) n=311	M=7 R=(1,10) n=311	$U_{(311,311)}$ = 31,314.7 P<0.003***

Indicator 1: Social networks and institutions; Indicator 2: Community participation;
Indicator 3: Level of trust; Indicator 4: Institutional learning;
Indicator 5: Equity sharing; Indicator 6: information sharing.
M – median; R – range; n – sample number; *** –statistically significant;
NS – not statistically significant

As detailed in Fig. 2 (below), social capital stocks are perceived to have significantly declined from pre-colonial times to colonial era (Mann-Whitney $U_{(311,311)}$ test =59,547.4; P<0.001, two-tailed) and subsequently significantly escalated from colonial times to post – colonial era (Mann-Whitney $U_{(311,311)}$ test =63,911.8; P<0.001, two-tailed).

There is significant improvement in the social capital perceived by the local communities from the beginning of the post-colonial era to commencement of programmatic CBNRM (Mann-Whitney $U_{(311,311)}$ test =45,654.2; P<0.001, two-tailed).

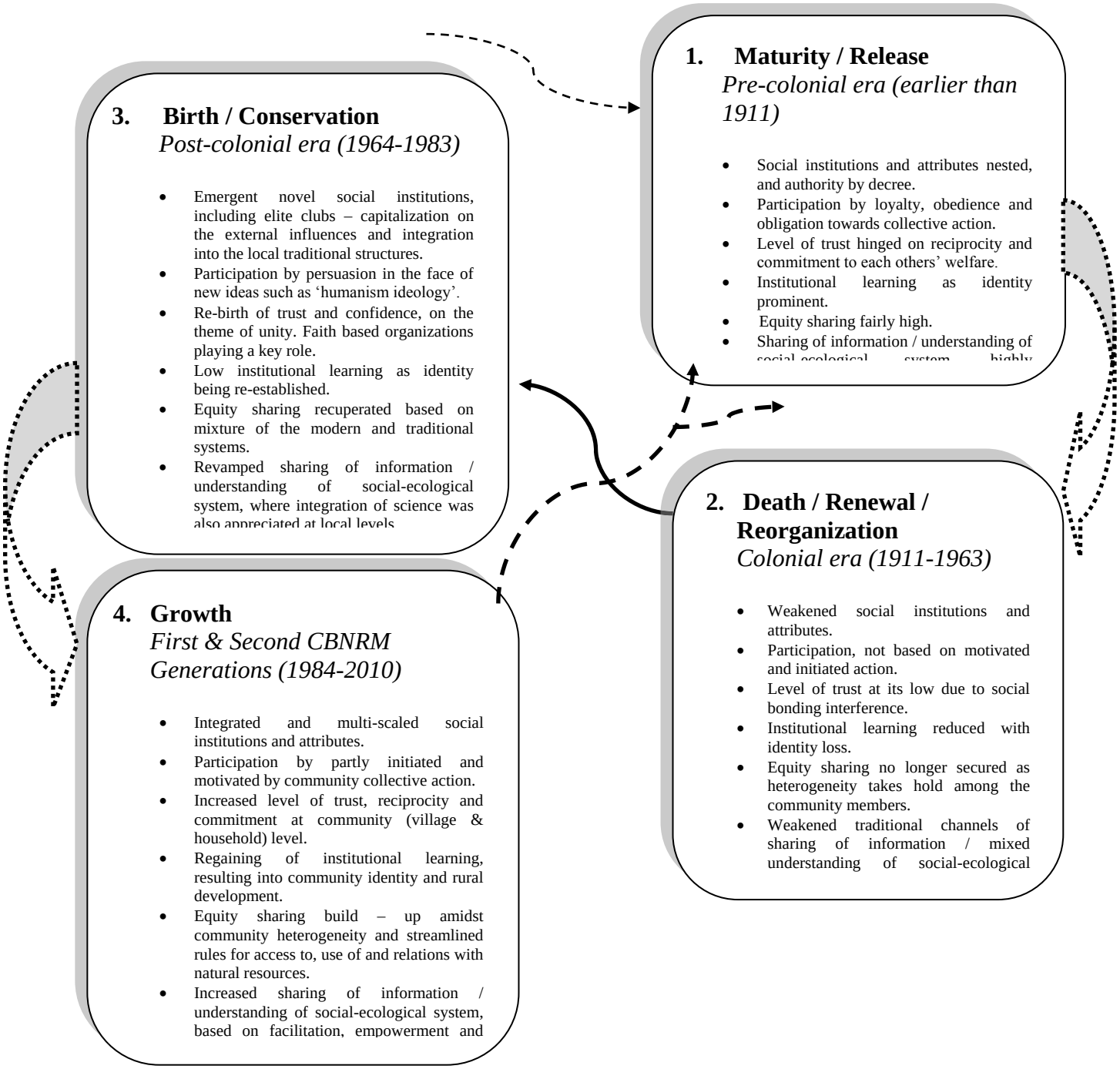


Fig. 2: Reconstructed phases of social capital of CBNRM in the Luangwa Valley, eastern Zambia from pre-colonial era to 2010.

Social capital in the Luangwa Valley has transcended through multi-dimensional dynamics from pre-colonial era to contemporary times. The dynamics in the social capital have caused transformations and re-organization in institutional arrangements as influenced by internal and external factors (Fig. 2). Luangwa Valley started with high stocks of social capital in the pre-colonial era. Although the social

institutions were well established at base levels, in a horizontal sectional pattern, there were limited vertical networks outside local communities. Traditional authority was largely by decree. Collective action by local communities during that phase was ensured through expressions of loyalty, obedience and undertakings of obligations by local communities. These expressions were the sources of trust in posterity among the members, breeding reciprocity in times of adversaries and triumph. Local communities created institutional learning with identity, demonstrated in the sanctions given to non compliant members or rewards due in reciprocity fashion. Institutional learning prevented infractions in local communities. Problems of open access to common pool resources existed, but individuals in local communities were given fair opportunities to equity sharing of resources. Information was adequately shared through various nested social networks, for different mixtures of groupings, conveyed via oral and action expressions. The advent of colonial rule tested the resilience to unprecedented disturbances, changes and surprises to the full-fledged social capital by reversing social capital stocks. However, the social curators perspired to revive the social capital. The advent of Christianity and Islamic belief systems soothed the loss of social capital, but occasionally clashed with traditional norms. During the post colonial era, the social capital recuperated. On introduction of CBNRM programme in 1984, social capital grew further largely due to strengthening of conservation legislation, rights for utilisation of resources, increased sanctioned power and responsibilities to local communities and increased social connectedness and networks for improved collective action and decision-making. Mwima (2007) evaluated management effectiveness in wildlife protected areas using multiple criteria and rated Lupande area as having high management effectiveness among other Game Management Areas. Most other protected areas of the same category were poorly managed. Though the study did not directly make inference to social capital, for example, most of threats and pressures (91.67%, n=11) considered were anthropogenic factors, which further suggests that social capital played part in management of Luangwa Valley ecosystem.

In the contemplary achievements there have been, however, some drawbacks in Zambia's natural resource management which include:

- Proprietary rights given to the local communities by the state are only partial. Jones & Murphree (2004) observe that responsibility had to be linked with the authority and entitlements of full proprietorship if it was to provide the right incentive package for committed and effective management.
- Natural resources are largely under-valued.
- Institutional structures to implement CBNRM at the base are not well aligned.
- There is absence of holistic CBNRM policy and strategy.
- Conditions for corruption at the base levels, brain – drain of trained skilled personnel for natural resources management and inadequate leadership capacity among the local communities prevail.

Some of the opportunities for effective community based conservation include:

- There is growing private sector interest in natural resource management to foster commercialization agenda among the interest groups. Capacity in local communities to effectively negotiate (Agrawal & Gibson, 1999; Jones & Murphree, 2004) can enhance broad stakeholder participation.
- With democratization and decentralization processes currently being implemented, there is possibility that mainstreaming of direct conservation payments in all sectors of natural resource management can be conducted to adequately compensate local communities for their participation.

- Most of natural resources sector based policies and legislation are soon going to be reviewed.

An array of similarities and differences with comparable aspects of social capital at base levels in Southern Africa exists. We discuss a selection of them. According to Roe *et al.* (2009) CBNRM is often about major institutional reforms and fundamental changes in power.

They further observe that, for instance, local community participation in land conservancies have resulted in increased land under effective community based conservation in Namibia. In selected cases, governing principles on benefit sharing and distribution are integrated in CBNRM system, though community projects are placed in proximity with the well-skilled, wealthy and politically connected.

Jones & Weaver (2009) reiterate increased community conservation participation, fiscal beneficiation and stewardship over natural resources in Namibian Conservancies, outside state protected areas. However, fuzzy entitlements of the local communities and lack of institutional governance membership has also contributed to their impeded participation in natural resource management (Devereau, 1996; Jones & Weaver, 2009), while legitimacy powers to traditional authority hierarchy often overshadowed by statutes ensue (Hinz, 1995; Corbett & Daniels, 1996). Jones (1996) elucidates how weak leadership and capacity in local communities of eastern Tsumkwe District, Namibia negatively affected the sustainability of CBNRM initiatives and provided case study of contributory role of institutional relationships.

Suich & Murphy (2002) give aspects of collective management by local women and traditional authority leadership in Masokotwane, Namibia involved in craft works based on forest products utilization. The collaborative actions are characterized by coherence factors such as women organizations, market facilitation by external organizations like Rössing Foundation, cooperative collection of forest products, mechanisms for equity, and collaboration between interest groups. Information sharing and adaptive management were facilitated through collaboration platforms. Though competition over rights, revenues and natural resources in some cases result in conflicts (Suich & Murphy, 2002; Jones & Weaver, 2009), collaborative features of institutional arrangements provide for growth of social capital. Jones & Weaver (2009) outline that among the key threats to growth of CBNRM in Namibia are weak communal proprietorship, lack of secure and exclusive group land tenure, and inadequate support capacity by external stakeholders for profelific conservancies.

In Zimbabwe, stakeholders adapt to prevailing economic and political crises by establishing novel types of relationships to maintain wildlife production systems on communal lands (Roe *et al*., 2009). Among key challenges, however, is persistent centralized control over natural resources despite unclear change in rhetoric over land and resource management (Child, 1996). Therefore, tension in some places occurs between the development of locally accountable governance and traditional authorities. Community Areas Management Programme for Indigenous Resources (CAMPFIRE), a process that aimed at revamping economic institutions to correct the market and pricing distortions which result in wasteful and inefficient situation, provide robust incentives to local communities to invest in the wildlife management and avoid over-exploitation due to its high value and proprietorship (Child, 1996). Child further illustrates that given appropriate information and rights, Masoka community in Guruve District, Zimbabwe, were able to develop and implement sound land use management as inspirational example of successes of CAMPFIRE. Furthermore, he stresses that institutional networking among “grass-root” political base and other intra-community

stakeholders were positive drivers for pervasive CAMPFIRE.

Taylor (2009) evaluates performance of CAMPFIRE in Zimbabwe for period between 1989 to 2006 and highlights, giving examples from Masoka and Gairezi communities, Zimbabwe, that direct payments as means of guaranteeing equity coupled with effective leadership accountability positively influenced CBNRM. Clear devolutionary legislation, conferring full use rights for wildlife makes it possible for CAMPFIRE to standout different from various hybrids of CBNRM in Africa, though required developed capacity and systems (Child, 1996). However, like in Zambia with Community Resource Boards, in Zimbabwe the legal legitimacy ended with District Councils, without further devolution to the village level at least from legal perspective yet in practice villages are involved at operational level.

Roe *et al.* (2009) envisage that progressive rural communities will have sustenance in land and natural resource management when CBNRM facilitation prioritizes local interests, agency and capacity in decentralized models. This emphasizes the importance of relational capital in dynamic social systems (Nkhata *et al.* 2008).

Conclusion

Drawing on the insights of systems progression by Anderies *et al*. (2004) and Gunderson & Holling (2002), we reflect that robustness of the social-ecological system may persist but may at a given point in time collapse due to certain disturbances or crisis in the system. We thus suggest strengthening of environmental subsidiarity, implying exercising of preponderance of freedom for decision making by local institutions (Handy, 1994), the lowest units of management. As human and social dimensions of natural resource and protected area management have remained relevant as postulated by Western & Wright (1994) since inception of CBNRM programmes, there would be need to pay more attention to social capital aspects and develop them appropriately in a holistic manner for effective natural resources management, if stakeholders were to address the problems and not employ symptomatic approaches.

Acknowledgement

The study benefited from support given by Zambia Wildlife Authority. The authors are grateful to the area ecologist, P. Sichone for study facilitation role and field assistants for participating in data collection. The map in this publication was gratefully produced by Chaka Kaumba, GIS specialist. Part of the study grant came from Safari Club International (SCI).

References

Agrawal, A. & Gibson, C.C., 1999. Enchantment and Disenchantment: The role of community in natural resource conservation. *World Development* 27 (4): 629 – 649.

Anderson, J., 2002. *Nature, wealth and power: emerging best practice for revitalising rural Africa*. USAID / Africa Bureau (AFR/SD).

Anderies, J. M., Janssen, M. A. & Ostrom, E., 2004. A framework to analyze the robustness of social – ecological systems from an institutional perspective. *Ecological Society* 9(1): 18 Retrieved from: URL: http://www.ecologyandsociety.org/vol9/iss1/art18/ on 12 April 2011.

Berkes, F., 2004. Rethinking community based conservation. *Conservation Biology* 18: 621-630.

Blaikie, P., 2006. Is small really beautiful? Community based natural resource management in Malawi and Botswana. *World Development* 34(11): 1942-1957.

Bradburn, N., Sudman, S. & Wansink, B., 2004. *Asking questions: The definitive guide to questionnaire design – for market research, political polls, and social and health questionnaires.* California: Jossey-Bass.

Child, B., 1996. The practice and principles of community based wildlife management in Zimbabwe: the CAMPIRE programme. *Biodiversity and Conservation* 5: 369 – 398.

Dalal-Clayton, B. & Child, B., 2003. *Lessons from Luangwa: The story of the Luangwa Integrated Resource Development Project, Zambia.* London: International Institute for Environment and Development.

Devereau, S., 1996. Fuzzy entitlements and common property resources: struggles over rights to communal land in Namibia. *Working paper No. 44*. Brighton: Institute of Development Studies. University of Sussex.

Düvel, G. H., 1987. Situation determination: from theory to a practical model. *South African Journal of Extension.* 1: 1-10.

Fabricius, C., 2004. The fundamentals of community based natural resource management. In: C. Fabricius, E. Koch, H. Magome, & S. Turner (Eds.), *Rights, resources and rural development: Community based natural resource management in Southern Africa*. London: Earthscan.

Gunderson, L. H. & Holling, C. S., (eds) 2002. *Panarchy: Understanding transformations in human and natural systems.* Washington D C: Island Press.

GRZ (Government of Republic of Zambia), 2011. *Sixth National Development Plan (2011 – 2015). Sustained economic growth and poverty reduction*. Lusaka: Ministry of Finance and Natural Planning.

Handy, C., 1994. *The empty raincoat. Making sense of the future*. London: Arrow Books.

Hinz, M., 1995. Customary land law and implications for forests, trees and plants. Windhoek: Food and Agricultural Organization.

Jones, B. T. & Murphree, M. W., 2004. Community based natural resource management as a conservation mechanism: lessons and directions. In: B. Child (ed). *Biodiversity, rural development and the bottom line*. London: Earthscan.

Jones, B. T., 1996. Institutional relationships, capacity and sustainability: lesson learned from a community based conservation project, eastern Tsumkwe District, Namibia, 1991 – 1996. *DEA Research Discussion Paper No. 11.* Windhoek: Directorate of Environmental Affairs, Ministry of Environment and Tourism.

Jones, B. T. & Weaver, C., 2009. CBNRM in Namibia: Growth, trends, lessons and constraints. In: H. Suich, B. Child & A. Spenceley (eds). *Evolution and innovation in wildlife conservation. Parks and Game Ranches to Transfrontier Conservation Areas.* London: Earthscan.

Lewis, D. M., 2007. Opportunities and constraints for protected area management through increased connectivity to local livelihood needs in surrounding border areas: lessons from Luangwa Valley, Zambia. In: K. H. Redford & E. Fearn (eds). *Protected areas and human livelihoods.* Working Paper No. 32, pp. 38 – 49. New York: WCS Institute.

Lewis, D. M., Kaweche, G. B. & Mwenya, A., 1990. Wildlife conservation outside protected areas – Lessons from an experiment in Zambia. *Conservation Biology* 4 (2): 171 – 180.

Mwima, H. K., 2007. Synthesis of completed management effectiveness tracking tool for protected areas managed by the Zambia Wildlife Authority for the year 2007. Lusaka: Ministry of Tourism, Environment and Natural Resources.

Nkhata, A. B., Breen, C. M. & Freimund, W. A., 2008. Resilient social relationships and collaboration in the management of social – ecological systems. *Ecology and Society* 13(1): 2. Retrieved from: URL: http://www.ecologyandsociety.org/vol13/iss1/art2/ on 12 March 2011.

Pretty, J., 2003. Social capital and connectedness: Issues and implications for agriculture, rural development and natural resource management in ACP countries. *CTA Working Document No. 8032.* pp. 46

Roe, D., Nelson, F., Sandbrook, C. (eds.) 2009. Community management of natural resources in Africa: Impacts, experiences and future directions. *Natural Resource Issue No. 18*, London: International Institute for Environment and Development.

Strauss, A., & Corbin, J. (eds.) 1998. *Basics of qualitative research: techniques and procedures for developing grounded theory*. Thousand Oaks, California: Sage Publications.

Suich, H. & Murphy, C., 2002. Craft women: the livelihood impact of craft income in Caprivi. *DEA Research Discussion Paper* No. 48. Windhoek: Directorate of Environmental Affairs, Ministry of Environment and Tourism.

Taylor, R., 2009. The performance of CAMPFIRE in Zimbabwe: 1989 – 2006. In: H. Suich, B. Child & A. Spenceley (eds). *Evolution and innovation in wildlife conservation. Parks and Game Ranches to Transfrontier Conservation Areas.* London: Earthscan.

Western, D. & Wright, R. M., 1994. The background to community based conservation. In: D. Western & R. M. Wright (eds). *Natural Connections. Perspectives in community based conservation.* Washington D.C: Island Press.

The first community forests of Gabon: towards sustainable local forest management?

Meunier Quentin[1], Federspiel Michèle[2], Moumbogou Carl[3], Grégoire Bruno[4], Doucet Jean-Louis[5] and Vermeulen Cédric[6]

Summary

Forest resources abound in Gabon. Species diversity and quality of trees in the Gabonese forests make it a very lucrative production niche. Even though international forest operators are well established there and are making profit, the Gabonese rural communities have not yet developed their own operations. In view of their remoteness from decision-making centers, villagers often unlawfully lose, without being aware of it, a great deal of the riches in their villages. Today, the rural socio-economic component is not sufficiently integrated in the management factors of the resource, even though populations that depend on them daily are supposedly the best placed individuals to make wise use of them. In this sense, community forestry helps to promote sustainable use of forest resources at a scale that is at par with the needs of the community, and seeks to guarantee that profits are shared at village level. In Gabon, the process of legalization of community forests is ongoing since 2001. Pilot projects such as DACEFI (Development of Community Alternatives to Illegal Logging) strive to assist communities in securing their community forest. However their legalization is slow in coming, while logging activities in the rural forest estate are increasing, and the quality of the species is deteriorating continually.

Introduction

Gabon is part of the Congo Basin, home to the largest dense humid forest range in Africa. The dense forest covers almost 85% of its territory, a surface area of more than 22 million hectares. If the low population density and the underdeveloped road infrastructures have partly preserved that vast area, logging companies have gradually established themselves and today their concessions cover almost 12 million hectares – more than half of the forest surface area. Even though traditionally, rural populations have had little interest in commercial logging, they have, for generations, maintained close socio-cultural ties with the forest. The communities directly rely on this ecosystem as a source of food, medication, fuelwood and construction wood, and more recently farmland. However, their formal involvement in the management of this resource is only minimal. Relegated to a role of passive actors, they are barely taken into account in the process of allocation of large permits and perceive only a small part of the profits of this activity which is nevertheless performed, in most cases, in areas where

[1] *Meunier Quentin, Technical Assistant, Project DACEFI-2, c/o WWF-CARPO, Gabon Country Office, Montée de Louis, P.O. 9144, Gabon.*
Email: meunierquentin@hotmail.com

[2] *Federspiel Michèle, Coordinator, Nature+ asbl, rue Bourgmestre Gilisquet, 57, 1457 Walhain, Belgique. Email: federspielmichele@gmail.com*

[3] *Moumbogou Carl, Forest Manager, Project DACEFI-2, c/o WWF-CARPO, Gabon Country Office, Montée de Louis, P.O. 9144, Gabon.*
Email: carl_moumbogou@live.fr

[4] *Grégoire Bruno, Senior Technical Assistant, Project DACEFI-2, c/o WWF-CARPO, Gabon Country Office, Montée de Louis, P.O. 9144, Gabon. Email: bgregoire1560@gmail.com*

[5] *Doucet Jean-Louis, Professor, University of Liège, ULG/Gembloux ABT, Laboratoire de Foresterie tropicale et subtropicale, Unité GRFMN, Passage des déportés, 2, 5030, Gembloux, Belgique. Email: jldoucet@ulg.ac.be*

[6] *Vermeulen Cédric : Professor, University of Liège, ULG/Gembloux ABT, Laboratoire de Foresterie tropicale et subtropicale, Unité GRFMN, Passage des déportés, 2, 5030, Gembloux, Belgique.Email: cvermeulen@ulg.ac.be*

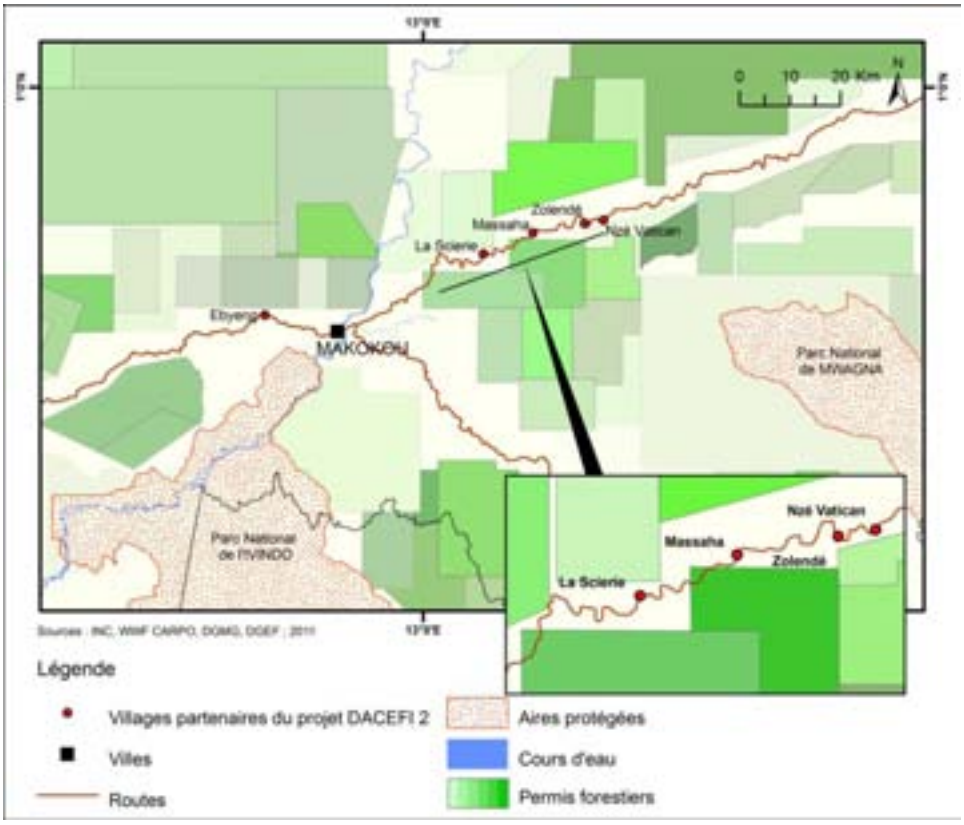


Figure 1. Map of forest concessions around Makokou, capital city of the Province of Ogooué-Ivindo, Gabon.

their customary rights apply[1]. What are the provisions made in Gabon to include rural communities in the sound management of forest resources? What are the alternatives to this imbalance?

The rural socio-economic component in logging in Gabon today

By superimposing the map of licensed forest concession (Figure 1) with map of the villages, we observe several overlapping areas; several villages are located at the center of the legal forest concessions.

In these instances, it is difficult to reconcile some rural activities such as shifting agriculture, non-wood forest products harvest and the exploitation of this same resource for its timber. Numerous conflicts emerge following the cutting of trees preserved by the populations for their fruits or medicinal properties. In order to avoid these frequent confrontations, the Gabonese government has planned to establish a rural forest estate which would restitute to villagers a forest strip (5 kilometers on both sides of the highway) within which they could engage in their traditional activities. However, this provision, applied in certain regions, has never been legalized, and numerous conflicts and misunderstandings remain regarding the exploitation of the forest resources. More often than not, village communities can rely only on the good will

[1] *Decree n° 000692/PR/MEFEPEPN establishing the conditions for enforcing forest, wildlife, hunting and fishing customary use rights.*

of logging companies to willingly retrocede the outskirts of their concession to them.

In order to integrate communities in the forest sector and promote rural economy, the government has also established a special permit, by mutual agreement, which enables villagers to perform selective cutting around the village. However these harvests are generally performed by intermediary economic operators. Often foreigners, these operators are seldom controlled and charge prices that are awfully inferior to the market value and do not hesitate to cut protected species or log beyond their minimum logging perimeter. These practices mainly result in the rapid impoverishment and degradation of the available resources. The mutual agreement permits are today denounced as an unsustainable provision of the law (Meunier *et al.,* 2011).

Another alternative of social forestry exists in the Gabonese law; inspired by community forestry experiences from Cameroon, the first steps in the long road to community forestry in Gabon started in 2006 (Vermeulen & Doucet, 2008). However, the legal texts are older; since 2001, seven sections of the law[1] and an implementing order[2] govern community forests in Gabon. According to Article 156 of the law, "*The community forest is a portion of the rural forest estate assigned to a village community for their activities or to engage in dynamic processes for the sustainable management of natural resources using a simplified management plan".* The re-appropriation of forested lands by a community enables it, on the one part, to derive some profit from the sale of wood and its byproducts, profits that can be directly invested to improve the living conditions of that community. The harvest and artisanal sawing of a single log can earn almost FCFA 500,000 (about €750[3]) or enough planks to build community structures. Since community needs are local and not industrial, this enables, on the other part, smaller scale logging for an improved management of the resource.

Develop the local economy through community forestry: a socio-economic alternative for sustainable management

By allocating a well defined rural forest estate to communities within which a village can organize itself to create a community forest, the State attempts to promote their development. By following an exploitation methodology adapted to the rural context, that is, with simplified administrative procedures and technical expertise adapted to and affordable to rural populations, they can legally benefit from substantial incomes corresponding to their needs. This includes mainly the repair of old huts, the building of dispensaries and schools, or the establishment of water boreholes or village electrification.

To that effect, the DACEFI project (Development of Community Alternatives to Illegal Logging) funded by the European Union, active in Cameroon and in Gabon, has provided villagers with simple tools and assists communities in going through the different steps of the legalization process of a community forest. Since 2006, five communities have been guided to put in place management units (Bracke *et al.,* 2008a), support the delimitation of their future community forest (Schippers *et al.,* 2008a), realize adapted inventories (Bracke *et al.,* 2008b) and finally develop a simple management plan (Schippers *et al.,* 2008b). It is important to adapt the management tools of these forests since the surface areas to be transferred to communities are limited (about 5,000 ha) and the available labor is inadequate to perform sophisticated management and exploitation inventories. Various frameworks and tools have been developed through the experience acquired

[1] *Law n° 16/01 of the Forest Code, establishing community forests in its Articles 156 and 162.*
[2] *Decree ° 001028/PR/MEFEPEPN dated 01/12/04 establishing the conditions for the creation of community forests.*
[3] *Available figures in the Province of Ogooué-Ivindo in the first quarter of 2011 in Gabon.*

from project DACEFI (Vermeulen & Doucet, 2008), however lack of enthusiasm could still be observed at the Ministerial level. In effect, even though the Gabonese law governing community forests was enacted in 2001, no community forest has been created as of yet.

If they were legally recognized, community forests would secure diversified income sources for the benefit of rural communities through the sale of timber, but also the sale of non-wood forest products, and even agricultural products. Very low removals of 1 foot per hectare at a moderated frequency, which do not exceed 40 feet per year, would produce annual inputs of more than FCFA 20,000,000 (about €30,000) for communities. Coupled with the profit derived from supplementary agricultural and agroforestry activities, this would facilitate the development of a local economy and beyond, the development of village communities, at infrastructure and service levels. Figure 2 illustrates what ten villagers were able to create after sawing half a Movingui (*Distemonathus benthamianus)* and Sapelli (*Entandrophragma cylindricum*) log over 8 days (4 days of sawing and 4 days of building).

Figure 2. Realization of a nursery and a double hut by ten villagers after the artisanal sawing of two half logs. Makokou, June 2011.

Conclusion

The challenges of putting in place the first community forests in Gabon are enormous. Even though the forest areas concerned are restricted to the national scale[1], the future community forests will be located in areas particularly disputed, along highways, the places of numerous embezzlements, where various operators abuse the credulity of villagers in order to remove protected species, disregarding any attempt at managing them. This exploitation barely benefits these populations. A well conducted collective management at local level, is one of the possible ways to check unsustainable illegal practices and to integrate villagers in a profitable economic dynamics.

In order to encourage the sound management of forest resources, the Gabonese government should intensify its engagement with rural communities so as to assist them towards a sustainable development and entrust them with the resources they depend on. However, these provisions should be accompanied with clear laws specific to community activities in order to protect them against current manipulations. These measures should be taken as early as possible because even if only slight variations of the forest cover have been observed, the quality and quantity of exploitable commercial forest tree stands are being degraded within the rural forest estate. The speed and the extent of logging of the forests have given rise, in some zones, to hectares of secondary forests with low economic value. It is now time to recognize these forest estates and legalize their community management before these forests are completely skimmed and lose their appeal.

[1] The surface area of the rural forest estate is not known since it is not clearly defined by the law. However, considering the surface areas of permits, parks and reserves, it is inferior to 15% of the country's surface.

Bibliography

ANONYME (2001). Loi n°016/01 portant code forestier en République gabonaise, Présidence de la République, Libreville, 64p.

MEFEPEPN (2004). Décret n°001028 /PR/MEFEPEPN fixant les conditions de création de forêts communautaires, Libreville-MEFEPEPN, 4p.

MEFEPEPN (2004). Décret n°000692/PR/MEFEPEPN fixant les conditions d'exercice des droits d'usage coutumiers en matière de forêt, de faune, de chasse et de pêche, Libreville-MEFEPEPN, 4p.

MEFEPEPN (2004). Décret n°0725/PR/MEFEPA fixant les conditions d'attribution de Permis de Gré à Gré, Libreville-MEFEPEPN, 4p.

BRACKE C., DOUCET JL., OVONO EDZANG N., NGANDA B., VERMEULEN C., 2008a. Rendre opérationnelles les entités de gestion : une démarche consensuelle. In *Les premières forêts communautaires du Gabon. Récits d'une expérience pilote*, FUSAGx, Nature+, WWF, VERMEULEN & DOUCET Editeurs, Gembloux-FUSAGx, pp. 39-45.

BRACKE C., SCHIPPERS C, NTCHANDI-OTIMBO PA, DEMARQUEZ B, BONNEAU O, DOUCET JL., 2008b. Rendre les inventaires forestiers accessibles aux populations. In *Les premières forêts communautaires du Gabon. Récits d'une expérience pilote*, FUSAGx, Nature+, WWF, VERMEULEN & DOUCET Editeurs, Gembloux-FUSAGx, pp. 57-67.

MEUNIER Q., VERMEULEN C., MOUMBOGOU C., 2011. Les premières forêts communautaires du Gabon sont-elles condamnées d'avance ? *Parcs et Réserves, volume 66 (1),* pp. 17-22.

SCHIPPERS C., BRACKE C., NDOUNA ANGO A., NDONGO NGUIMFACK C., MIHINDOU V., BOUROBOU F., DISSAKI A., VERMEULEN, C., 2008a. Délimiter les forêts communautaires : une approche par contraintes multiples. In *Les premières forêts communautaires du Gabon. Récits d'une*

expérience pilote, FUSAGx, Nature+, WWF, VERMEULEN & DOUCET Editeurs, Gembloux-FUSAGx, pp. 47-55.

SCHIPPERS C., DOUCET J.-L., BRACKE C., BOLDRINI S., VERMEULEN C., 2008b. Une forêt communautaire n'est pas une CFAD : adapter les plans simples de gestion. In *Les premières forêts communautaires du Gabon. Récits d'une expérience pilote*, FUSAGx, Nature+, WWF, VERMEULEN & DOUCET Editeurs, Gembloux-FUSAGx, pp. 69-80.

VERMEULEN C., DOUCET J-L. (2008). *Les premières forêts communautaires du Gabon. Récits d'une expérience pilote*. Projet DACEFI, UE, Nature plus, FUSAGx, Belgique, 101 p.

Promotion of forests and land governance by local communities: The experience of COFOR-International

Joelle Brams[1] and Jacques Plan[2]

The context of decentralization

The process of decentralizing governments was initiated in most African countries in the 1990s. It was motivated by the inability of central governments to meet the basic needs of their populations, the prescriptions of structural adjustment programmes imposed on countries and the emergence of local elites motivated by local development. Decentralization is supported by local communities appropriately skilled with executives elected by the population. Through this act, the central government formally transfers part of its authority to actors and institutions at lower levels in the political, administrative and territorial hierarchy (Ribo, 2007). Decentralization ensures an improved balance of authorities and brings citizens closer to the decision making process, thus facilitating the emergence of a local democracy. Countries consider decentralization as a major strategy for reaching development goals, producing public services and protecting the environment (Agrawal and Ostrom, 2001).

[1] Joelle Brams, Specialist in Forest, Nature and Society, AgroParisTech/ENGREF.
Email: joelle.brams@laposte.net

[2] Jacques Plan, Executive Director, COFOR-International. Fédération Nationale des Communes forestières de France, Immeuble "les Athamantes" Bat. 4 ; 740, Avenue des Apothicaires, Parc Euromédecine
34090 Montpellier, France. Email: j.plan@fncofor.fr Telephone : +33(0)4 11 75 85 17/ +33(0)6 71 40 12 95

Involvement of the French National Federation of Council Forests (FNCOFOR) in Cameroon

It is in this context that mayors of municipalities in Cameroon approached the French National Federation of Council Forest (FNCOFOR) in 2003 to request its assistance to formulate a programme for the creation of council forests in Cameroon. In effect, Cameroon was a pioneer in decentralization of forest management. Cameroon's 1994 Forest Law provided for the creation of council forests through the transfer of part of the permanent forest estate from the State to the councils. However, 10 years later, only one council forest had been created with the support of the French Cooperation (Dimako Communal forest: 17,000 ha), since the Administration and several donors favored the emergence of community forests in the non-permanent forest estate. A partnership convention was signed between FNCOFOR and the Association of Council Forests of Cameroon (ACFCAM) in June 2006 in Yaoundé. This partnership was concretized by the joint formulation of a programme for the creation and sustainable management of council forests in Cameroon, financially supported by the French Fund for the Environment (FFEM, Fonds Français pour l'Environnement Mondial) and GTZ. The programme was launched in November 2007 with the installation of the Technical Center for Council Forestry (CTFC), the implementing agency of ACFCAM. By the end of 2010, 80 municipalities were members of ACFCAM, 41 council/communal forests reserves (630,000 ha) were gazetted or in the process of being gazetted, 16 municipal/communal forests (404,000 ha) had management plans and 6 of them were being harvested (80,000 m^3 exploited in 2010). FNCOFOR assists the project manager and provides training, organization and formulation services for new programmes (including REDD + with funding from GEF 5)

FNCOFOR's support to the management of forest resources by local communities

In 2008, the Cameroonian experience reached the Republic of Benin where 5 Councils in the Moyen-Ouémé Region had constituted an association to undertake the management of natural forests, badly degraded by the illegal and uncontrolled harvesting of wood for charcoal production. A partnership agreement was thus signed by FNCOFOR and the association of Council Forest of Moyen-Ouémé Region (COFORMO - association des Communes Forestières du Moyen Ouémé) in May 2008 and a programme for the creation of 9 council forests was developed. To this day, with funding from the French Fund for the Environment (FFEM) and the World Bank, the implementing agency of COFORMO has launched its activities for the concerted delimitation and management of 5 communal forests over 300,000 ha, starting in 2011. The Economic Community of West African States (ECOWAS), was interested in the Benin initiative and requested FNCOFOR to jointly organize the first congress on council forests in West Africa. This congress was held in Ouagadougou (Burkina Faso) in June 2009 and brought together about one hundred parliamentarians, members of the administration, researchers and donors from 11 ECOWAS Member States. In the spirit of the Ouagadougou Congress, associations of Council forests were created in Côte d'Ivoire (COFOR-CI) and in Burkina Faso (COFOR-Ganzourgou). These associations have developed programmes to addressl forest degradation under the authority of local communities and have requested funding from FFEM and GEF. The down-to-earth approach of FNCOFOR in promoting forest governance by municipal communities obviously convinced the French administration since the Federation now benefits from its financial and institutional assistance to develop programmes for creating council forests.

The creation of COFOR-International

The international commitment of FNCOFOR is based on a strong conviction that elected local officials are key actors in the participatory management of natural resources and rural development. In France, FNCOFOR manages programmes and proposes tools for the development of forest lands. In Europe, the organization plays advocacy role within the Federation of European Council Forests (FECOF) and actively participates in the debate on decentralization of natural resources governance. FNCOFOR seeks to share this conviction with elected officials at all levels. It encourages elected officials to adapt and enrich the concept of communal forests and facilitates cooperation among decentralized programs, placing the forest in the heart of rural development. In this context, FNCOFOR took the initiative to create COFOR-International in November 2009, with the aim of improving the structure and development of its external actions.

COFOR-International is a non-profit association dedicated to promoting natural resources governance by municipalities, in support of States decentralization for local development, poverty alleviation in rural areas and climate changes mitigation. To this day, COFOR-International includes district and council forest associations from France, Europe, Cameroon, Benin, Burkina Faso and Côte d'Ivoire.

COFOR-International invites local communities in Europe to become members. Moreover, membership of COFOR-International is now open to associations and environmental NGOs, banks and local development agencies, educational institutes and research institutions, consulting firms and companies interested in cooperation among local authorities to manage natural resources.

Activities and perspectives of COFOR-International

In Central Africa

Under the auspices of The Central African Forests Commission (COMIFAC), COFOR-International conducted in May 2011, the first congress on communal forests in

Central Africa hosted by the Association of Communal Forests in Cameroon (ACFCAM). This congress followed the format of the Ouagadougou congress held in 2009 and the spirit initiated by the programme to support communal forests in Cameroon. Over 200 participants (local representatives, parliamentarians, experts, scientists, administration executives, NGOs) shared their experiences in the area of decentralized management of forest resources, focused on the relevance and peculiarity of communal governance of forests. A key product of the Central Africa congress is the drafting of a strategy for communal forests development. A legal and regulatory framework is being put in place in other COMIFAC Member States in the context of the decentralization process (Democratic Republic of Congo, Republic of Congo, Rwanda and Burundi).

In West Africa

In Senegal, the regions of Kaolack, Fatick, Zigenchor and Kolda support a project of participatory management of communal forests (PERACOD). The local representatives solicit the support of COFOR-International to organize themselves and provide training in the management of their local forest.

In addition to the programmes developed and supported by COFOR-International in Côte d'Ivoire and in Burkina Faso, other countries have created a conducive environment for the emergence of communal forests, however several challenges remain. Among these challenges are: (i) the sharing of forest management skills among newly constituted communities and villages, in which customs and traditions have to be respected, (ii) mechanisms for the transfer of village or clan lands to the municipalities, (iii) the emergence of intercommunality, indispensable to the concerted development of traditional lands, (iv) the relevance of a communal land development plan which includes communal forests.

In the Mediterranean Basin

During the second celebration of the Mediterranean forest week in Avignon (April 2011) organized by the "Silva mediterranea", COFOR-International presented tools for community forest governance, including: forest charter, plan for fuel wood supply at district level, development plan for woodlands.

These tools are relevant in the Mediterranean zone where forests play several roles (production of wood, fruits, fodder, hunting, tourism, soil and water protection, biodiversity conservation …). Therefore, the local representatives need to fully play their role as mediators and animators to prevent conflicts and to conciliate local development and forest protection.

The Lebanese Mayors of Donnieh and Bkassine have shown interest in experimenting with these tools in their respective territories where there are still prestigious mountain forests and where the conservation objective ought to take into account the vital needs of destitute rural population.

In Ecuador (South America)

COFOR-International currently participates in the formulation of a REDD+ programme supported by the Association of Ecuador Municipalities (AME) and the "Consorsio forestall de Manabi". This programme, supported by the representatives of the province of the *Municipios* and the *Juntas parroquiales* includes the reforestation through agroforestry of 1,500 ha and the protection of 1,000 ha of severely degraded agricultural lands.

Decentralized cooperation

COFOR-International constitutes a strong network of municipal forests of the North and associations of locally elected forest managers of the south. This peculiar position enables COFOR-International to recommend to the municipal French and other European communities a reliable institutional framework in developing

countries within which to conduct decentralized cooperation activities. These districts or communities in the developing countries are already organized in associations for the direct benefit of their people. It is also the case for forestry investments made under a commitment to offset carbon emissions, made by a community as its municipal climate plan.

In sum, the commitment of COFOR-International is part of a legal and irreversible process: the decentralization of States and the emergence of a governance of natural resources by the decentralized communities. It is the responsibility of local representatives and their partners to advocate for the relevance, legitimacy and efficiency of this peculiar type of governance without competition with more conventional modes of natural resources management (public, private or community management).

Sangha Tri-national Landscape in the Congo basin: Socioeconomic dimensions of transboundary conservation area

Chi Augustine Muam[1]

Introduction

The initiative for the establishment of a regional Trans-Boundary Conservation Area (TBCA) came from the Heads of State in Central Africa, who officially made a commitment in March 1999 to conserve and sustainable manage their forest. This was contained in a common declaration of 12 resolutions dubbed the 1999 Yaounde Declaration, later recognised by the UN's 54th General Assembly on 1/2/2000 in a UN Resolution entitled "Conservation and Sustainable Development of Central African Forest Ecosystems" (Resolution A/RES/54/214). The first item on the Declaration of the Heads of State called for the 'creation of transboundary Protected Areas' and undertook to 'reinforce management of existing protected areas'. It was within the context of the latter commitment that the Tri-National de la Sangha (TNS) Landscape was created. According to WWF (1999) the main objective of the "existing tri-national network of independent Protected Areas formally linked as the Sangha River Tri-National Park, was to enhance regional collaboration, encourage integrated conservation management and ensure the future of this important forest area". Indisputably, the TNS Landscape forest biological diversity represents a fundamental resource because it includes species and their constituent genes upon which the local population depend for subsistence. This paper will explore how management of this Landscape integrates human and conservation needs, while the ecological and economic needs are not within its scope.

Protected Areas are the cornerstone of biodiversity conservation and the TNS Landscape offers diverse sets of natural habitats for plants and animals. Vegetation-wise, the Central African Forests Commission (COMIFAC, 2006 p.160) reports that in the Congolese section more than 1,700 species are found and among the trees several species appear on the IUCN Red List of Threatened Species, including *Autranella congolensis*, *Pericopsis elata* (afromosia), *Diospyros crassiflora* (ebony) and *Swartzia fistuloides* (pao rosa or African tulip wood). As for fauna, in the Central African Republic (CAR) sector, 195 species of land mammals have been identified (Blom, 2001), in particular, the African forest elephant; sixteen species of primates, among them the gorilla, the chimpanzee and at least six small nocturnal species; fourteen species of ungulates, including the bongo antelope. COMIFAC also reports that the Avifauna includes 428 species in the Congolese section, 379 in the CAR section and 350 in the Cameroonian section.

These resources were directly threatened by human activities such as unsustainable commercial logging and hunting (ivory). This is noticeable in Cameroon and the CAR (COMIFAC 2006, p.164), where forest logging roads and industrial logging have opened up the forest to outsiders. According to some conservationists, although loggers may take only one or two of the largest trees per hectare, the canopy of tropical forests is usually so strongly linked by vines and interlocking braches that felling one tree can bring down a dozen others (Cunningham & Cunningham, 2006, p.129). Building roads to remove logs destroy more trees, but even more importantly it allows entry to the forest by farmers, miners, hunters, and others who may cause further damage to the forest. As mitigating measures, COMIFAC (2008,

[1] Chi Augustine Muam, PhD. Faculty of Law and Political Science, P.O. Box 4982, University of Douala, Republic of Cameroon, Email : chimuam@yahoo.com, Cell +237 77 70 53 57

p.284) states that the requirement to develop Management Plans approved by government has obliged a number of forests concessionaires and forestry companies to progress towards certification. Consequently, a total of 1,051,600 ha out of 3,388,803 ha of forest concessions are Forest Stewardship Council (FSC) certified as being sustainably managed.

The TNS as a bio-geographical area or Landscape

As a natural bio-geographical area, the TNS Landscape represents an entire ecosystem with its associated land, water, air and plant and wildlife resources that must be managed as a unit if we are to preserve all its values (ecological, economical and social), which values are dependent on its biological diversity and its sustainability on good governance.

Biodiversity status of the TNS Landscape

The TNS landscape is a TBCA spreading over three countries in the Congo Basin Forest (Cameroon, Central African Republic and the Republic of Congo). It is "tri-national" because these countries share the same natural resources consisting mostly of forests with contiguous (classified) Parks and Reserves in each country. These shared forests are within and not beyond national jurisdiction of the countries concerned. Arguably, countries or parties sharing the same natural system should manage that system as a single ecological unit notwithstanding national boundaries or state sovereignty. Though focus on ecosystems within the context of biological diversity is relatively new in international environmental law[1], it is imperative to focus on this because the maintenance of ecological processes is highly dependent upon maintenance of their biological diversity. Triggered by this exigency, international institutions such as WWF and National Geographic Society (NGS) (undated) have developed the concept of "Eco-region", which is defined as a relatively large unit of land or water that contains a distinct assemblage of natural communities sharing a large majority of species, dynamics and environmental conditions. But COMIFAC (2006, p.19), preferred and adopted the concept of 'Landscape', defined as a vast "ecosystem consisting of intact *core zones*, comprised of priority areas for conservation, with extraction and human impact zones increasing towards the edge" *buffer zones* (emphasis added). The TNS benefited from this appellation and became one of the 12 'Landscapes' of the Congo Basin Forest Partnership[2].

Good governance of the Landscape

The management of the TNS is governed by a year 2000 Cooperation Accord that obliges the Parties (countries) to "cooperate in the management of a complex of protected areas named Tri-National de la Sangha" (TNS)[3]. The concept of 'cooperation' is supported by Principle 24 of the 1972 Stockholm Declaration[4] that reflects a political commitment to international cooperation in matters concerning the protection of the environment and is echoed by Principle 27 of the 1992 Rio Declaration (A/COF.151/6/Rev.1, 13 June 1992). The requirement to cooperate is affirmed in virtually all international environmental

[1] see, especially Articles I and II of Antarctic Marine Living Resources Convention (1980), but also see Article II of the Polar Bears Agreement (1973), Article 2(2)(d) of ECE Transboundary Watercourses Convention (1992), and, generally, the Convention on Biological Diversity (1992). In addition, see Article 20 of the ILC Draft Articles on International Watercourses (1994);

[2] Type II partnership composed of approximately 30 government and non-governmental organisations launched at the 2002 World Summit on Sustainable Development in Johannesburg, South Africa in order to promote the sustainable management of the forest of the Congo Basin and improve the quality of life of the region's inhabitants (COMIFAC, 2006:2).

[3] 2000 Accord de Coopération

[4] *Report of the UN Conference on the Human Environment*, UN Doc.A/CONF.48/14 at 2-65, and Corr.1 (1972); 11 ILM 1416 (1972). For an excellent account of the Conference and the Declaration, see Louis B. Sohn, 'The Stockholm Declaration on the Human Environment', 14 *Harvard International Law Journal* 423 (1973).

agreements of bilateral, regional (see Article 1 of COMIFAC Treaty) and global application (see Article 5 of 1992 CBD). Such cooperation in the Landscape is demonstrated by the creation of decentralized governing cross-border institutions[1]. These are four in number: Tri-national Supervision and Arbitration Committee (CTSA) at the ministerial level assisted by a Tri-National Scientific Committee (CST); the Tri-National Monitoring Committee (CTS) at the level of the provincial administrations, which includes representatives from the agencies funding and/or executing programmes as well as the conservators or national directors of each site; and the Tri-National Planning and Execution Committee (CTPE) at the level of the sites, made up of conservators, project managers and associated technical assistants (COMIFAC 2006 pp165-166). It falls outside the scope of this article to discuss how these institutions are coordinated, but experience shows that this form of decentralized governance can improve outcomes for both local livelihoods and biodiversity protection/conservation.

TNS Landscape as compared with Biosphere Reserves

Both the TNS Landscape and Biosphere Reserves are concerned with the protection of critical areas - *core zones* to boost conserve biological diversity which in turn underpins the provision of a range of ecosystem services on which human well-being depends - and working with local communities and other stakeholders in the *buffer zone* area to ensure that the Landscape contributes to sustainable livelihoods, is outlined in the principles of Biosphere Reserves.

Defining critical areas to be protected (core zones):

One strategy in the protection of ecosystems and the conservation of biological diversity is the establishment of special legal protected areas such as 'strict nature reserves' (see Article 3 of 1968 African Convention) or 'strict wilderness reserves' (see Article 3(a) of 1940 Western Hemisphere Convention). To do this, the present 2000 Cooperation Accord delimited two areas within the TNS Landscape - 'protection zones' where all human activities are prohibited or restricted (*core zones*), and 'peripheral zones' (*buffer zones*) where participative processes for the sustainable management of forests and wildlife resources are developed[2]. The protective zones consist of three national parks - Lobéké (Cameroon), Nouabalé-Ndoki (Republic of Congo), and Dzanga-Ndoki (Central African Republic)[3] covering a total of 4,520,000 ha. These areas are certainly 'strict natural reserves' regulated by national laws and COMIFAC (2008 p.166) has clearly indicated how these laws are to be enforced. For example, mobile guard patrols and fixed surveillance posts on the access roads have been maintained over the entire extent of the Congolese sections of the landscape, in the national parks as wells as in the forest concessions. Consequently, elephant poaching in the Nouabale-Ndoki National Park (PNNN) has remained nil (COMIFAC 2006, p.166).

Transboundary wise, thanks to the signing of the 2005 Protocol Accord, bi-national patrols are organised every six months with agents from the Republic of Congo and Central African Republic (see photo 1). It is envisaged that, with the signing of the recent 2008 COMIFAC Sub-regional Accord, control on the harvesting and circulation of commercial forestry products in the sub-region (Article 3 d'Accord Sous-regional), will become a routine. It must be emphasised that this is

[1] see Article 11 supra note 4

[2] see Article 3 supra note 4

[3] Article 4 supra note 4

Photo 1. State agents on patrol stopping logging trucks to check contents

different from what occurs in the peripheral or surrounding "use zones" and professional hunting areas (*buffer zone areas*) that amount to 3,751,800 ha (COMIFAC, 2008 p.283). Therefore, if the '*buffer zone*' is combined with the *'core zone'* the TNS Landscape can be likened to a **Biosphere Reserve**, capable of integrating conservation and meeting of human needs, especially where the participation of the local population is ensured.

Working with local communities and other stakeholders

The 2000 Cooperation Accord demands Parties to involve local communities and concession holders in the management of the TNS (see Article 9). This can be done by letting the people improve their living conditions from accrued benefits from eco-tourism, trophy hunting and other income generating activities (COMIFAC 2008 p.294). Another important aspect is the granting of access to forest resources to indigenous forest people and surrounding Bantu communities (see photo 2).

Photo 2. Children playing with toys they made from forest products

As concerns traditional hunting, in Bayanga, Central African republic, a gorilla conservation project presages a new era for local people. Each year, tourists visit the area where they are offered extraordinary opportunities to accompany the BaAka pygmies on guided tours to observe western lowland gorillas and see the elusive forest elephants. Proceeds from this project are spent on the provision of health services, education and training in agricultural techniques of local people and has helped legalise traditional village hunting by BaAka pygmies in the area. COMIFAC concludes that around Lobéké National Park, trophy hunting in a community hunting area is generating some $50.000 each year. These funds are managed by a local wildlife management committee and is invested in education, construction of schools (see photo 3) and the provision of potable water. The outcome is that there is greater involvement of local communities in wildlife protection (COMIFAC 2009, p.294).

Photo 3. School built using revenues generated by sport hunting

The above type of co-management of activities, according to COMIFAC (2006, p.167) have stimulated greater local community participation in the support for conservation work in the area, in several ways. For instance the Village Chiefs and local administrative authorities have become key players. They are consulted at the time of decision-making regarding strategies for sustainable development and conservation. They are also tasked with managing the proceeds from exploitation of biodiversity: 40% of the revenue from taxes on logging and 40% of the taxes on eco-tourism are set aside for rural development organisations. This is compatible with the requirements of international law within the context of equitable sharing of benefits (see Article 1 of CBD) such as timber royalties.

Concerning working with other stakeholders, mentioned in Article 9 of the 2000 Cooperation Accord, the Congo Basin Forest Partnership (CBFP) is seriously involved. For instance various partners of the CBFP are currently active in the management of Landscapes in the Congo Basin forests, notably the European Union and a number of NGOs. According to COMIFAC (2006 p,19), CBPF Landscapes cover about 685,400 km2, that is, approximately 38% of the forests in the Congo Basin, and contain around 30 important protected areas (national parks and wildlife reserves), amongst which are those of the TNS. It should be noted that one of the priorities of the CBFP is to provide people sustainable means of livelihood through well managed forest concessions, sustainable agriculture and integrated eco-tourism programs (WWF & NGS undated).

Bibliography

Accord de Coopération entre les gouvernements de La République du Cameroun, La République Centrafricaine, La République du Congo, relatif a la mise en place du Tri-National de la Sangha du 7 Décembre 2000, COMIFAC, Yaounde, Cameroun.

Accord Sous-Regional sur le contrôle Forestier en Afrique Central du 26/10/2008, COMIFAC, FAO, Yaounde, Cameroun.

Blom, A. (2001). *Ecological and economic impacts of gorilla-based tourism in Dzanga Sangha,* Central African Republic. Thesis. Wageningen University, The Netherlands.

COMIFAC (2006). The Forests of the Congo Basin, State of the Forest 2006, COMIFAC, Yaounde, Cameroon.

COMIFAC (2008). The Forests of the Congo Basin, State of the Forest 2008, COMIFAC, Yaounde, Cameroon.

1992 United Nations Convention on Biological Diversity (CBD)

2005 Central African Forests Commission (COMIFAC) Treaty

1968 African Convention on the Conservation of Nature and Natural Resources, *1001 UNTS 4* (1968)

940 Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere, *161 UNTS 193* (1940)

Cunningham, W.P., & Cunningham, M.A; (2006). Principles of Environmental Science, Inquiry & Applications, Third Edition, McGraw Hill, New York.

Protocole d'Accord sur la circulation du personnel TNS entre les gouvernements de la République du Cameroun, la République Centrafricaine, la République du Congo dans le cadre de l'Accord de Coopération relatif a mise en place du Tri-National de la Sangha (TNS), 2005, COMIFAC, Yaounde, Cameroun.

Resolution A/RES/54/214:http://www.undemocracy.com/A-RES-54-214.pdf

WWF & National Geographic Society (undated) Conserving the Western Congo Basin Moist Forest Eco-region, WWF, Cameroon.

WWF (1999). New proposals for forest protection, The Yaounde Forest Summit, WWF, Cameroon.

Challenges of managing forest reserves: case study of Atewa range forest reserve, Ghana.

Jesse S. Ayivor[1], Christopher Gordon[2], James K. Adomako[3]and Yaa Ntiamoa-Baidu[4]

Summary

Forests provide livelihoods to considerable numbers of rural communities in Africa. Unfortunately, most of the continent's forests and their resources are under intense pressure and threat from inimical human activities associated with high population growth and economic demands. Efforts at regulating overexploitation and conversion of forests through the bio-reserves concept face several challenges due to livelihood pressures. The importance of forest as a repository of biodiversity, provider of ecosystems services, bequest value, cultural importance and intrinsic value cannot be compromised. Using the Atewa Range forest reserve as a case study, this paper examines the various challenges faced by the Forest Services Division of Forestry Commission of Ghana in managing forest reserves in Ghana in the face of pressure from other users. It discusses the concept of protected area establishment as a way of in-situ biodiversity conservation and highlights the institutional arrangements put in place for their effective management. The study identified several challenges facing the Atewa Range forest reserve despite the efforts of the Forest Services Division to maintain its integrity. The study concludes that greater support for law enforcement and greater inclusiveness of local people as well as support from private sector that provides increased livelihood opportunities for the poor would help reduce forest exploitation.

[1] *Jesse S. Ayivor*. Institute for Environment and Sanitation Studies, P. O. Box LG 209, University of Ghana, Legon, Accra, Ghana. E-mail: jsayivor@ug.edu.gh

[2] *Christopher Gordon*. Institute for Environment and Sanitation Studies, P. O. Box LG 209, University of Ghana, Legon, Accra, Ghana. E-mail: cgordon@ug.edu.gh

[3] *James K. Adomako*. Department of Botany, P. O. Box LG 55, University of Ghana, Legon, Accra, Ghana. E-mail: jadomako@ug.edu.gh

[4] *Yaa Ntiamoa-Baidu*. Department of Animal Science and Conservation Biology, P. O. Box LG 67, University of Ghana, Legon, Accra, Ghana. E-mail: ynbaidu@ug.edu.gh

Introduction

Forests and forest resources play a significant role in the socio-economic development of most African countries. The continents' forest cover has, however, come under intense pressure as a result of human activities (Giliba *et al.,* 2011). From 1990 to 2005 for instance, Africa's forest cover reduced from 699.361 million ha to 635.412 million ha, with annual reduction rate of about 4% (FAO, 2009). In Ghana, population induced pressures, weak institutions and national economic aspirations have exposed the nation's forests to excessive exploitation and conversion to other uses leading to a drastic reduction in its cover (Fairhead and Leach, 1998). Within the last century alone, Ghana's forest cover reduced from 8.2 million ha to 1.7 million ha (Glastra, 1999). This obviously has a direct impact on the over 2.5 million people who depend on the forest for its services. Forestry in Ghana accounts for 6% of the GDP, 11% of export earnings, and employs a labor force of 100,000 people (Forestry Department, 2001; Ghana Statistical Services, 2007).

Protected areas are geographical areas set aside by the state, community or private entities for the purpose of biodiversity conservation (IUCN, 1999). Protection of tropical forests is particularly important because they contain about two-thirds of the world's plant and animal species (Raven 1980). Globally, protected areas cover about 12% of the world's total area, constituting over 460 million hectares (FRA, 2010).

Within the high forest zone of Ghana, approximately 1.76 million ha of forest, constituting about 21% of the land area, are permanently protected. Out of this total, about 126,600 ha are under the jurisdiction of the Wildlife Division as wildlife protected areas. In total, there are about 282 forest reserves where wood harvesting is regulated, and 24 wildlife protected areas (National Parks, Strict Nature Reserves, Resource Reserves, Wildlife Sanctuaries and Ramsar Sites) established by law in Ghana. Unfortunately, most the protected areas have come under severe pressure as institutions tasked to ensure their effective management are poorly resourced and unable to execute their mandate effectively (Jachmann, 2008; Ntiamoa-Baidu, 2008). This study focuses on Atewa Range forest reserve in the south-eastern part of Ghana, which has suffered massive degradation over the years as a result of illegal human activities.

The paper examines the challenges of managing the Atewa Range forest reserve, with specific reference to the institutional context, pressures and threats facing the reserves, as well as forest management and livelihood-conflicts. Ghana is signatory to several international conventions on the environment including the ***United Nations Convention on Biological Diversity,*** and has an obligation to implement national programmes under these conventions. It is therefore important to investigate the challenges militating against effective implementation of these programmes, notably management challenges of protected areas.

Methods

The data for this paper were derived from three different surveys conducted between November 2007 and January 2011. The first set of data was collected through questionnaire administration of 73 respondents in thirteen nearby communities of the Atewa Range reserve in 2007. The second data set came from a protected area effective management assessment exercise, which employed the rapid assessment and prioritization of protected areas methodology (RAPPAM) (Hockings *et al*. 2006), conducted in April 2009. The last set was derived from focus group discussions conducted in four nearby communities involving a total of 30 individuals, as well as interviews with five forestry officials in charge of the Atewa range forest reserve in January 2011. Secondary data to supplement primary data sources was extracted from the relevant literature. The analysis was carried out in the context of the bio-reserves concept under the land allocation strategy, relating to do the designation of geographical areas for biodiversity protection (Noss, 1994).

The Atewa Range Forest Reserve

The Atewa Range forest reserve (Atewa RFR) presents a classical example of forest protection and resource-use conflict typical of most bio-reserves in Africa. The reserve is located in the Eastern Region of Ghana, off the Accra–Kumasi road about 75 km from Accra (Fig. 1).

Fig. 1. Locational Map of Atewa Reserve

It is the largest forest reserve in Ghana covering a total of 23,663 hectares and lies

within the moist semi-deciduous forest zone. The reserve, together with Tano Offin is one of the only two reserves in the country that contains upland evergreen forest. These two reserves together hold about 95% of the upland evergreen forest in the country with Atewa reserve alone containing about 17,400 ha of this unique forest (Ntiamoa-Baidu *et al*, 2001). It contains nationally rare avifauna including *Columbus unicincta, Cercococcyx olivinus, Indicator exiilis*, and *Smiththornis capensis*, among others. The forest is also endemic to six butterfly species namely *Mylothris atewa, Deudorix* sp., nov., *Cupidesthes* sp. nov., *Anthene aurea*, *A. helpsi* and *Acraea kibi,* out of a total of 460 butterfly species that are found in the forest. This makes the reserve the smallest single forest in West Africa with such large number of butterfly species (Ntiamoa-Baidu *et al*, 2001). Atewa RFR has therefore been officially classified as Globally Significant Biodiversity Area (GSBA) in 1999 and listed in 2001 as an Important Bird Area (IBA) (Ntiamoa-Baidu *et al*, 2000; Ntiamoa-Baidu *et al,* 2001; Rapid Assessment Porgram, 2007). The reserve is also very significant for the ecosystem services which it provides. It serves as the main watershed for three nationally important river systems namely, the Ayensu River, the Densu River and the Birim River, all of which play significant roles in both rural and urban water supplies to parts of southern Ghana (Ntiamoa-Baidu *et al,* 2001, Rapid Assessment Program, 2007).

The Atewa RFR contains valuable economic resources, including rare tropical timber species like mahogany (*Kyaya* sp.) and odum (*Milicia excels*) and habours a variety of forest wood and non-wood products useful for local livelihood enhancement. Parts of the reserve contain deposits of gold and bauxite. Indications during fieldwork are that the government has granted license for the exploitation of bauxite in the reserve to feed the national aluminum industry. The forest further has cultural significance as some rivers within the forest are considered as deities and objects of worship by the local population. Most inhabitants within the area admitted during the field survey that they treasure the forest for its intrinsic value, enhancement of micro-climate and the freshness it provides.

Atewa RFR is, therefore, of vital importance both to conservationists and economic users. There is however intense pressure from individual community members, private companies and government to exploit the economic resources of the forest whilst conservationists, on the other hand, advocate strongly for its protection.

Institutional context

The Forest Services Division is one of the five main divisions of the Ghana Forestry Commission, in charge of forestry in Ghana. The Division has four main units namely administration, development, management and working plans, and rural forestry, each of them administered by a deputy chief conservator of forests (Asante, 2005). It has the mandate to ensure effective management and protection of the country's forests. The other related divisions include the Wildlife Division, responsible for the conservation and management of wildlife in general, and the management of wildlife protected areas in particular, within representative ecological zones of the country; and the Timber Industry Development Division responsible for development and utilization of the nation's timber resources. The other divisions are the Wood Industries Training Centre and the Resource Management Support Centre, both of which provide training support to the Forestry Commission.

The Atewa RFR is under the authority of the Fanteakwa District (Eastern Region) of the Forest Services Division. The reserve is divided into three Ranges, namely the Suhum Range in the south, the Kibi Range in the centre and the Anyinam Range in the north. Each of the three Ranges is headed by a Range Supervisor who is accountable to the District Manager. At least four forest guards are assigned to each Range Supervisor to help maintain law and order and to clean the reserve boundaries. Each of

the Range Supervisors is tasked to manage, protect and develop the portions of the forest reserves under their control.

Since the Atewa RFR was declared by Conservation International as a Globally Significant Biodiversity Area (GSBA), funds to finance activities in the reserve come directly from the government through the Forestry Commission. By its status as GSBA, Atewa RFR is supposed to enjoy total protection excluding every human activity apart from education and research. However, the reality is that the reserve is under severe pressure and risks losing its status as a GSBA in the near future.

Socio-economic significance of the Atewa RFR

The Atewa RFR provides livelihood enhancement opportunities for most local community members, who are farmers. As Morgan (1996) indicated, most peasant farmers will carry out parallel activities like hunting and gathering to supplement their earnings and dietary needs. During the field survey, respondents admitted that they extract wood products from the forest for the local handicraft industry to produce items like pestles, mortars and cane baskets for the market. Chewing sticks and sponges (for brushing the teeth), wrapping leaves used by market women and construction poles are also collected. Non-timber products extracted from the forest include wild honey, wild fruits, herbs for medicine, mushrooms and spices. Trade in bush-meat, including snails, is also a very lucrative venture in the area. Collectively, 95% of the sampled population who reported that they were farmers engaged in one or more of these activities. Such supplementary activities were reported to be very rewarding to most of the respondents whose average consumption of forest products for the year 2007 was worth about US$234 per household.

The dilemma here is whether to prioritize the needs of the rural poor whose lands were taken over by the government for protection, without providing any compensation to the individuals who used the areas before, or protect the forest with all the benefits that goes with it. This is a conflict situation for which Sommerville *et al*. (2009) suggested that, unless there is fairness and transparency in benefit sharing, “win-win” solutions or the “win-win-win” solutions suggested by Meffe (2002) (in which the needs of local people, institutions and ecosystems are met) cannot be achieved.

Management challenges of Atewa Range Forest Reserve

Based on the RAPPAM methodology, the research findings revealed that the Atewa RFR is faced with pressures and varying degrees of threats. As illustrated in Fig. 2, illegal logging constituted the highest scoring pressure and the biggest threat to conservation, followed by agricultural encroachment and adjacent land-use. "Adjacent land-use", in this context, refers to other types of land use outside the reserve, which make protected areas isolated "islands" in the landscape, especially in the absence of buffer zones established around them. Such activities include small scale mining, farming and logging. Other pressures and threats with high scores included mining, illegal entry including poaching, high human population density and poverty in nearby communities.

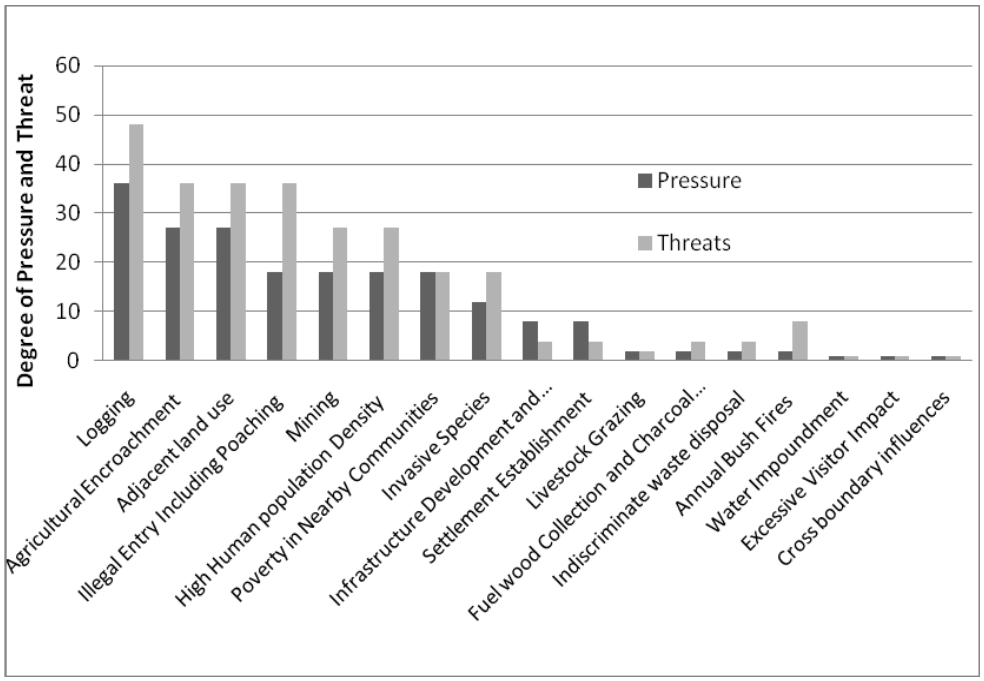


Fig. 2. Pressure and Threat in the Atewa Range Forest Reserve

Responses from the interviews with the forestry officials managing the Atewa RFR confirmed the results illustrated in Fig. 2. According to these interviews, illegal chainsaw operations, illegal farming, poaching and mining were the most serious management problems. Chainsaw operators without licenses often walk deep into the forest and carry out their activities mostly at night. The forest guards on duty sometimes only look on helplessly especially when overwhelmed by the numbers of the operators, who can be very hostile. The field survey however revealed that, in some areas, illegal chainsaw operation seems to have reduced tremendously after licenses to operate were granted to small scale mining companies in the area. The reason for this was that most of the young men hired by illegal chainsaw operators to transport sawn timber out of the forest have changed to working in the mines. The greater majority of the youth however remain unemployed, which remains a great source of worry.

Another challenge is illegal gold mining. Areas outside the reserve have been given out by government as mining concessions to small scale mining companies (Plate 1). Most of these companies have exhausted their concessions and are encroaching upon the reserve to prospect for gold. The operators cut down trees, clear the forest, divert stream courses and completely remove the top soil that might support re-growth. These activities have also lead to the opening up of numerous access routes into the reserve, through which encroachers entered.

Plate 1. Abandoned licensed surface gold mine at the fringe of Atewa RFR near Kibi

Yet another major potential threat is the on-going discussions by government to open up the reserve for bauxite mining. Several attempts by conservationists and civil society organizations to discourage the government from this have so far not yielded any positive results. The government's short term economic gains appear to supersede long term environmental benefits of the reserve and should be reconsidered.

Lack of cooperation from village elders and chiefs, is another major challenge according to the respondents. The forest was regarded by most of the local people living close to the forest as a major source of livelihood. Some of the chiefs, therefore, looked on unconcerned as the forest was being over exploited on daily basis. Others cooperated with the illegal operators for their own parochial interest.

Military support was brought in occasionally to maintain law and order in the reserve and to confiscate illegal lumber. This approach of law enforcement is however difficult to maintain since the district office, which hosted the military, was not well resourced to maintain the military presence over time. Support from other security agencies, notably the police, also did not achieve the required results because these agencies are under-staffed and have other duties to carry out. Penalties prescribed for forest offences under section 17 of the Timber Resource Management Act, 1997 (Act 547), and regulation 41 of LI 1649, are not severe enough to stop the illegality.

It was clear from the discussions carried out during the survey that local people will continue to exploit forest resources as long as the fundamental issues of institutional weaknesses and poverty in the rural areas remain unaddressed. Habitat destruction, disruption of ecosystem services and erosion of biodiversity is likely to continue under the prevailing conditions. It is therefore incumbent on policy makers to understand the complexities of these challenges especially the local context so as to adopt appropriate strategies to address them.

Conclusions and the Way Forward

Forest conservation in Ghana has played a significant role in protecting the remaining forests, especially in the high forest zone. Local livelihood issues and national economic aspirations coupled with weak institutions have, however, posed major challenges to the effective conservation of the reserves. Given the challenges confronting institutions mandated to manage the reserves, it is obvious that the success of any intervention measures would depend greatly on institutional capacity to address the challenges. Greater involvement of local people and support to the private sector that provides increased livelihood opportunities for the poor especially those living close to forest reserves would help reduce forest exploitation.

There is also the need to enhance staff capacity to enable them handle illegal encroachment more professionally. This calls for better training and possibly arming forest guards since the poachers and intruders they have to face are often well armed. An alternative is to deploy a permanent military task force to protect the forest reserves from insistent encroachers. The task force could include both the police and forest guards to ensure constant surveillance.

Regulations in Ghana's statute books, such as those under section 17 of the Timber Resource Management Act, 1997 (Act 547), now considered obsolete, should also be repealed and new ones enacted to ensure that stiffer penalties are imposed on offenders.

Community education also needs to be intensified and the dangers of forest loss and its negative impacts should be carefully explained to local people through local radio stations and other channels of communication. Already there have been reported cases of hitherto perennial streams, which take their sources from the Atewa RFR, drying up during the dry season because of loss of forest cover. There were also reports that the area in which the butterfly sanctuary within the reserve is found has been cleared and it is not known where the butterflies have moved. Community education is therefore necessary for biodiversity protection in the reserve.

Finally, traditional authorities namely village elders and chiefs should be empowered to prosecute offenders when caught. Chiefs known to be in the habit of condoning illegal activities should face severe sanctions.

References

Asante, M. S. 2005. Deforestation in Ghana: Explaining the chronic failure of forest preservation policies in a developing country. University Press of America. Lanham, Maryland.

Fairhead, J., Leach, M. 1998. Reframing deforestation: Global analysis and local realities – Cases from West Africa. London: Routledge.

Forest Resources Assessment (FRA). 2010. Key findings of global forest resources assessment, FAO Media Centre. http://www.fao.org/forestry/fra/fra2010/en/.

Food and Agriculture Organization (FAO). 2009. State of the World's Forest 2009. Food and Agriculture Organization of the United Nations, Rome.

Forestry Department. 2001. Forestry sector outlook studies: Ghana Ministry of Lands and Forestry Country Report. FOSA/WP/12. Accra.

Ghana Statistical Service. 2007. Economic Survey 2001-2005, Ghana Statistical Service, Accra, Ghana.131 pp.

Giliba, R. A., Celestine, S., Mafuru, C. S., Paul, M., Kayombo, C. J., Kashindye, A. M., Leonard, I. Chirenje, L. I. and Musamba, E. B. 2011. Human activities influencing deforestation on Meru catchment forest reserve, Tanzania. J Hum Ecol, 33(1): 17-20.

Glastra, Rob. (ed). 1999. Cut and run: Illegal logging and timber trade in the tropics. International Development Research Centre. Ottawa Cairo Dakar Johannesburg Montevideo Nairobi New Delhi Singapore.

Hockings, M., Stolton, S., Leverington, F., Dudley, N., and Corrau, J. 2006. Evaluating effectiveness: A framework for assessing management effectiveness of protected areas. 2nd Edition, IUCN WCPA and University of Queensland, Gland Switzerland and Brisane Australia. IUCN, 2003.

IUCN, 1999. *Parks for Biodiversity.* Policy Guidance based on experience in ACP countries. Prepared by the World Commission on Protected Areas of IUCN—The World Conservation Union. European Commission, Directorate-General for Development (DGVIII), Brussels. 119 pp.

Jachmann, Hugo, 2008. Illegal wildlife use and protected area management in Ghana. Biological Conservation 141 1906 – 1918.

Meffe, G., Nielsen, L., Knight, R. and Schenborn, D. 2002. Ecosystem management: Adaptive, community-based conservation. Washington, D.C.: Island Press.

Morgan, W. B. 1996. "Poverty, vulnerability and rural development" in Benneh, G., W. B. Morgan, and J. I. Uitto (eds). Sustaining the Future; Economic

Social & Environmental Change in Sub-Saharan African U.N.U. Press, Tokyo, pp 17-51.

Noss, R. F., and Cooperrider, A. 1994. Saving nature's legacy: Protecting and restoring biodiversity. Defenders of Wildlife and Island Press, Washington, D.C.

Ntiamoa-Baidu, Yaa. 2008. Managing Ghana's natural resources and the environment since independence: a critical assessment, In: K. Gyekye Ed. Ghana@50 Anniversary pp 133-166, G-Pak Ltd, Accra.

Ntiamoa-Baidu, Y., Owusu, E. H., Daramani, D. T. & Nuoh, A. A. 2001. Important Bird Areas of Ghana. Chapter in Fishpool, L. D. C & Evans, M. I. (eds.) *Important Bird Areas in Africa and Associated Islands, Priority sites for Conservation* pp 367-389.

Ntiamoa-Baidu, Y., Asamoah, S., Owusu, E. H. & Owusu-Boateng, K. 2000. Avifauna of two upland evergreen forest reserves, the Atewa Range and Tano Offin in Ghana. *Ostrich*, **71**: 277-281.

Rapid Assessment Program. 2007. Biodiversity in the Atewa Range Forest Reserve, Ghana. Conservation International, Arlington, VA, USA.

Raven, P. 1980. Research priorities in tropical biology. National Academy of Sciences Press, Washington, D.C., USA.

Sommerville, M., Jones, J.P.G., Rahajaharison, M. & Milner-Gulland, E. 2009. Local perceptions of fairness and benefit distribution in a Payment for Environmental Services intervention, Menabe, Madagascar. Ecological Economics, doi:10.1016/j.ecolecon.2009.11.

FAO REGIONAL OFFICE FOR AFRICA

Harvesting and commercialization of *Gnetum spp*. (Okok) for poverty alleviation and food security in Cameroon

Julius Chupezi Tieguhong[1], William Armand Mala[2], Ousseynou Ndoye[3] and Sophie Grouwels[4]

Summary

A survey was undertaken in the Centre Region of Cameroon (Lekié Division), where the harvesting of a leafy forest vegetable known as Gnetum spp. (okok) is commonplace. The results showed that the collectors of okok were mostly young people (mean age = 25 years), 89% of whom were women and 51% native to the area. The analysis of the income portfolios of okok harvesters showed eight income sources classified as major or minor sources according to individuals. Okok harvesting was considered by 29% of harvesters as a major occupation. Typically, gross annual income from okok varied from one harvester to another with 58% of them getting less than 200,000 CFAF and 17% getting more than 400,000 CFAF annually. The article highlights some challenges facing the sustainability of the resource and the opportunities it offers for poverty alleviation and food security in Cameroon.

[1] Tieguhong Julius Chupezi, PhD. Regional Coordinator GCP/RAF/408/EC FAO-PFNL Yaoundé. Cameroon. Tel: +237 75622222 Email: chupezi@yahoo.co.uk

[2] William Armand Mala. FAO-NWFP, BP 281 Yaoundé, Cameroon. Email: williammala@yahoo.fr

[3] Ousseynou Ndoye, FAO-NWFP, BP 281 Yaoundé, Cameroon. Email: Ousseynou.Ndoye@fao.org

[4] Sophie Grouwels, Forestry Officer, FAO, Rome, Italy. Email: Sophie.Grouwels@fao.org

Introduction

Gnetum spp. is a non-wood forest product found naturally in the humid forest zone of Nigeria, Cameroon, Central African Republic (CAR), Gabon, Democratic Republic of Congo (DRC), Equatorial Guinea, Angola and Mozambique (Hoare, 2007; Bamoninga, 2006). *Gnetum* spp have a number of vernacular names: koko in the CAR, Gabon, Congo and Angola; fumbwa in DRC; okazi and afang in Igbo and Efik/Ibibio tribes of Nigeria, eru and okok in Anglophone and Francophone parts of Cameroon respectively. Okok is an indigenous leafy vegetable largely consumed because, nutritionally, its protein richness (eight essential amino acids) makes it useful as a meat substitute in areas where meat is scarce, thus good for fighting against malnutrition and certain ailments (Abia *et al*., 2007). Okok comprises two species of climbing vines (*Gnetum africanum* and *Gnetum buchholzianum*), found in farms, fallows, secondary and primary forests, available year-round. Its abundance is however presently declining (Tieguhong et al., 2009a, 2009b; Ndoye et al., 2006; Shiembo, 2000).

Economically, okok plays an important role in the national economy, where a significant quantity is sold to raise income for local populations, providing employment opportunities to many women (Noubissie *et al*., 2008). Moreover, large quantities are exported and sold in other countries such as Nigeria, many European countries and the United States of America (Tabuna, 2007). In 2007, 4,180 tons from the Southwest, Littoral and Centre regions of Cameroon were harvested, with 2,000 tons worth US$ 13.8 million exported to Europe (Tabuna, 2007).

Major threats to this important forest vegetable include: the use of unsustainable harvesting techniques, forest clearance for farmlands (loss of habitat), increasing demand and a low level of domestication and lack of integration of the species in the agroecosystems (Shiembo, 2000). Despite the importance of this forest vegetable, the challenges facing its year-round availability

have not been fully documented and precise data on its contribution to poverty alleviation and food security of those households that depend on this species is lacking. The article aims at filling this knowledge gap as well as making suggestions on ways forward to promote the use and sustainability of this valuable food source.

Methodology

The study was conducted in the Centre Region of Cameroon, a biogeographical zone characterised by humid forest and forest landscape mosaics with a high level of natural resource use and population density. The region also encompasses significant spatial variation in market access, soils and climate. The Lekié Division was selected within the Centre Region because it is one of the main areas for the collection of okok in Cameroon. Thirty-eight villages from three sub-divisions were selected for the study: Sa'a (25), Monatélé (8) and Ebebda (5). In each selected village, two to four households were randomly sampled for detailed questionnaire interviews, giving a total of 101 household interviews.

Results

Collectors of okok were mostly young people with mean age of 25 years (Standard deviation (SD)=11 years) with overall range of 11-60 years. 89% of them are women. The locals of the area represented 51% of the harvesters while 45 percent were settlers and 4% migrants. Only 3% of the respondents had no formal schooling, 51% had attended primary school, 21% secondary and 25% higher school; typifying a relatively literate group of people involved in the harvesting of okok. For the 101 harvesters, their total household members was 1087 people, with an average household size of 11 persons (SD=6). The contributions of okok's harvesting and commercialization to the livelihoods of harvesters are discussed below in terms of poverty alleviation and food security.

Poverty alleviation

The analysis of the income sources of okok harvesters showed eight different occupational categories as major or minor sources of income (farmers, okok harvesters, traders, students, collectors of other forest products, tailors, hair dressers and carpenters). Okok harvesting was considered by 29% of those interviewed as a major occupation. Farmers, students, traders and collectors of other forest products_represented 31%, 29%, 5% and 2% of harvesters respectively. The study showed that the gross income of households was influenced by both major and minor occupations. Most respondents with earnings between 10000-50000 CFAF and above 200000 CFAF got their gross income from major occupations. Respondents with gross income between 50000 CFAF and 200000 CFAF got an appreciable proportion of their income from minor occupations.

Students were mostly minor harvesters of okok, 17% of whom earned between 10000-50000 CFAF, 37% between 50000 – 100000 CFAF and 34% between 100000 -200000 CFAF; appreciable income for meeting school needs. Typically, gross annual income from okok varied considerably from one harvester to another with about 58% of them getting less than 200000 CFAF and 17% getting more than 400000 CFAF per annum (Figure 1). For most harvesters that earned more than 400,000 CFAF annually, their income from okok was influenced by the quantity harvested per trip, number of trips made per month, number of months worked per year and distance to harvesting sites.

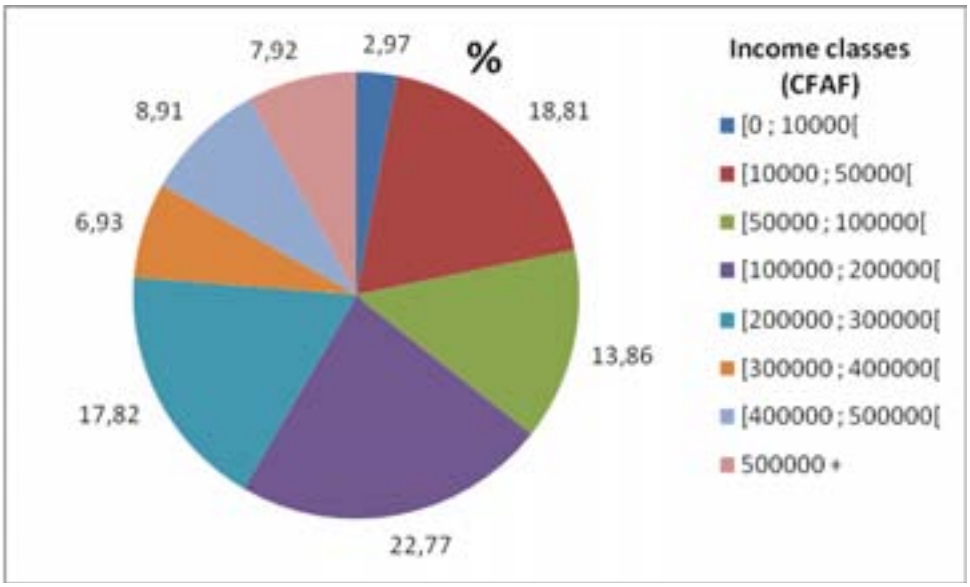


Figure 1: Gross annual income from okok harvesting per year (CFAF)

Food security

The role of okok in food security was reviewed in terms of proportion consumed/used at the household level and the use of the income earned from selling the product to buy other food items. For the 101 harvesters studied, 80.2% retained part of the okok harvested for personal use, mostly for cooking (74%); the rest was given as gifts to friends and relatives. Total monthly income from okok was estimated at 1 623 480 CFAF; of this, 79.5% was used for buying food for personal or household use, 8.8% for paying school fees, 4% for paying house rents and the remainder for meeting other needs such as buying clothes and funerals (Figure 2).

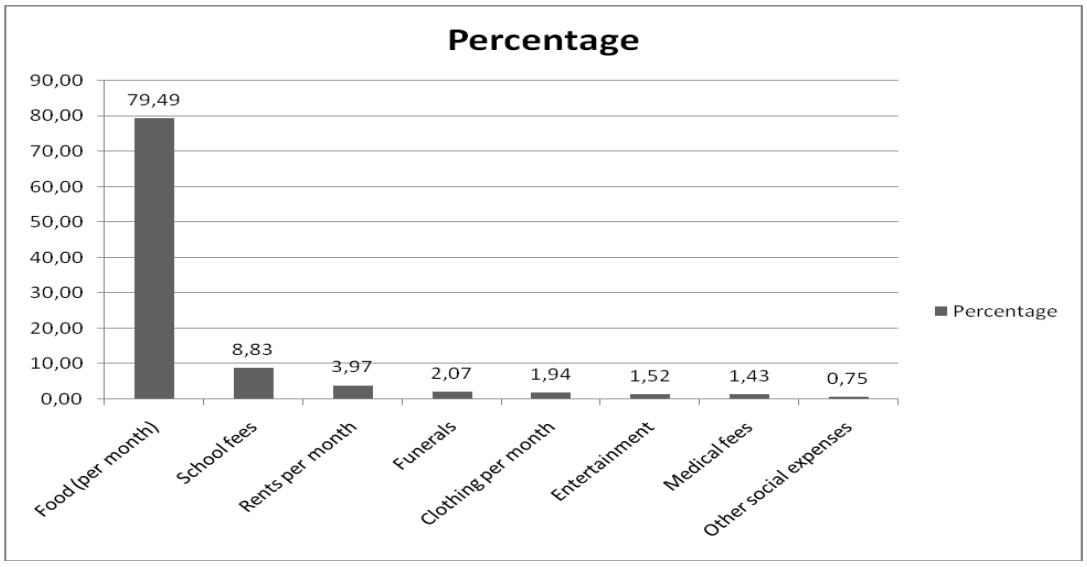


Figure 2: Use of income from okok harvesting

Conclusions

The harvesting and commecialisation of okok contributes substantially to the livelihoods of people, especially women, in the Lekié Division of Cameroon, in terms of increase of incomes and diversification of diets. This is especially important for Cameroon where 50.6% of the population lives on less than US$2/day. With dwindling availability of okok resources in natural forests, and in order to perpetuate benefits from okok harvesting, the integration of okok within traditional land use systems requires urgent attention. Fortunately, research over the last 15 years on the domestication of okok has provided promising results. Some questions arise, however, as to the social and economic implications of domestication of okok on local people, presently dependent on wild populations for livelihoods. These include the need to review present land tenure impediments related to women; and the distinction between domesticated and wild-harvested okok with reference to the prevailing government taxation system (10 CFAF per kilogram of product harvested and sold in Cameroon, giving that domesticated products are not supposed to be taxed, similar to agricultural crops).

References

1. ABIA W. A., NUMFOR F., WANJI S., TCHEUNTUE F., 2007. Energy and nutrient contents of "waterfufu and eru". African Journal of Food Science, October 2007, 016-019.
2. BAMONINGA, B.T. 2006. Analyse de l'état de lieux du secteur Produits forestiers non ligneux et leur évaluation à la contribution de la sécurité alimentaire en République Démocratique du Congo. Rapport d'étude. FAO, Kinshasa.
3. HOARE A.L., 2007. The use of non-timber forest products in the Congo Basin: Constraints and Opportunities. The Rainforest Foundation, 56 p.
4. NDOYE O., AWONO A. PREECE L., 2006. Contribution of Non-Timber Forest Products to MDGs Evidence from CIFOR research in Central and West Africa. Communication made in CIFOR, Yaoundé, March 2006.
5. NLEND V.G.B., 2007. L'exploitation de l'okok (*Gnetum africanum*) par les femmes au Cameroun. Analyse sociologique de l'émergence d'une cueillette de rente et de ses implications socioéconomiques et environnementales dans la région forestière de Sa'a. Mémoire de DEA. Université de Neuchâtel.
6. NOUBISSIE E., TIEGUHONG J. C., NDOYE O., 2008. Analyse des aspects socio-économiques des produits forestiers non-ligneux (PFNL) en Afrique Centrale. FAO/GCP/RAF/398/GER. FAO/CIFOR, Yaoundé.
7. SHIEMBO N.P., 2000. Pour une gestion durable des Okok (*Gnetum africanum et Gnetum buchholzianum*) : des produits forestiers non ligneux surexploités dans les forêts d'Afrique Centrale. FAO, Rome.
8. TABUNA J., 2007. Commerce régional et international des produits forestiers non ligneux alimentaires et des produits agricoles traditionnels en Afrique Centrale. FAO, Rome. 139p.
9. TIEGUHONG J.C., NDOYE O., TCHATAT M., CHIKAMAI B., 2009a. Processing and Marketing of Non-Wood Forest Products for Poverty Alleviation in Africa. Discovery and Innovation 21(SFM Special Edition No.1): 60-65.
10. TIEGUHONG J.C., NDOYE O., VANTOMME P., GROUWELS S., ZWOLINSKI J., MASUCH J., 2009b. Coping with crisis in Central Africa: enhanced role for non-wood forest products. *Unasylva* 233(60) 2009/3: 49-54.

Utilization of non-timber forest products (NTFPs) for economic development in Nigeria

Borokini Temitope Israel [1]

Summary
Non-timber forest products (NTFPs) contribute immensely to food security, poverty alleviation, economic development, and household and national income generation among many other benefits. This paper gives a synopsis of ntfps in Nigeria, their diversity and diverse uses, with specific examples of the economic potentials of Moringa oleifera, Lonchocarpus cyanescens, Vitellaria paradoxa, Acacia senegal and Dacryodes edulis. The paper highlights the challenges facing the economic utilization of ntfps in Nigeria and solutions were suggested.

Introduction

The term 'non-timber forest product', also called 'non-wood forest products' (NWFPs) in some regions of the world has been used (of recent) to replace minor forest product as it was formerly particularized (Aiyeloja and Ajewole, 2006). Non-timber forest products (NTFPs) are defined as all the biological material (other than industrial round wood and derived sawn timber, wood chips, wood-based panel and pulp) that may be extracted from natural ecosystems, managed plantations etc and can be utilized within the household, be marketed or have social, cultural or religious significance (Wickens, 1991). The NTFPs, also described as the Non-wood forest products (NWFPs) by the FAO (1995, 2001), include all goods or items of biological origin as well as services derived from forest or any land under similar use, and exclude wood in all its forms. Furthermore, Andel (2006) defined Non-timber forest products (NTFPs) as wild plant and animal products harvested from forests, such as wild fruits, vegetables, nuts, edible roots, honey, palm and medicinal plants, poisons snails and bush meat. However, ntfps should not be limited to those from the forests, but also covers those from the savannah woodlands and other wooded lands.

NTFPs have contributed immensely to sustainable development and growth in Africa. Pimentel *et al* (1997), for instance, estimated that some 300 million people obtain part or all of their livelihood and food from forests, while ntfps worth about US $90 billion are harvested each year. FAO (2004) reported that more than 1.3 billion people depend on fisheries, forests and agriculture for employment – close to half of all jobs worldwide.

Selected Nigerian NTFPs and their economic potentials

Nigeria is blessed with vast biodiversity, mostly in the forest ecosystems, many of which are used as ntfps. Okafor (1980) gave an account of 150 edible indigenous plant species of ntfps in the rainforest and 51 species of food and fodder trees and shrubs in the savannah, while Isichei (1995) also identified over 200 plants and animal species used as ntfps inside the Omo Biosphere reserve, Southwest Nigeria. Some selected ntfps used in Nigeria and their economic potentials are stated in table 1.

[1] *Borokini Temitope Israel. Scientific Officer, National Centre for Genetic Resources and Biotechnology (NACGRAB), Moor Plantation, Ibadan, Nigeria. Email: tbisrael@gmail.com Telephone: +2348054506902*

Table 1: Selected Nigerian NTFPs and their economic potentials

S/N	Plant name	Economic uses and potentials
1	*Moringa oleifera*	Parts sold for medicinal uses, seed for water purification, biogas production, seed oil used in cosmetic industries (Foidl *et al*, 2001). In the case of water purification alone, the use of *Moringa* seed for water purification was reported to have 99% success of bacteria removal and also used for tanning leather (Ozumba *pers. comm.*). This will save Nigeria up to US$2.25 million a year used for importing alum.
2	*Acacia senegal*	Nigeria is the third largest gum Arabic producer in the world, producing 17,000 metric tonnes as at 2003, reaping about US$12.75 million in export. However, gum Arabic farmers claim only 40% of the capacity is tapped (NGARA, 2004). A tree has the capacity to produce up to 500g of gum Arabic, and up to 200kg/ha. Gum Arabic is used as preservatives in soft drinks. Most of the production comes from the wild, Acacia plantation should be encouraged to increase production, hence economic potentials.
3	*Lonchocarpus cyanescens*	The plant yields an indigo dye for making popular *adire* cloth (Oyelola, 1992). The textile was very popular in the 1950s and 1960s, but is fading away in Nigeria due to popular acceptance of other textiles. A huge investment in this area can yield hundreds of thousands of US dollars, especially in sales to international tourists, who like them.
4	*Vitellaria paradoxa*	Nigeria is the world's highest producer of shea butter, producing about 414,000 metric tonnes in 2005 (FAO, 2005), but most of it is rejected in the international market. There is no record of revenue from shea butter for Nigeria since 1995, but as at 1995, the revenue generated from shea sector was N3.58 billion (above US$23 million, based on current exchange rate) (OSAN, 1997). The potentials in this tree are yet to be fully utilized. Butter highly demanded in international markets for cosmetics.
5	*Dacryodes edulis*	Widely eaten as food, seeds proteinous, source of income from exportation to Europe. Mature trees yield between 1,500 and 10,000 fruits a year, generating US$75-150 in cash income. 1kg of fresh *Dacryodes edulis* costs 10-13 Euro (US$14-15) (Adewusi, 2004). The export of *Dacryodes edulis* from Central Africa and Nigeria to France, Belgium and the UK was estimated to be over 326 tonnes in 1999, worth over US$2 million (Awono *et al.,* 2002).

Challenges facing economic development of NTFPs in Nigeria

It should be noted that income are being generated from ntfps at local, national and international levels, but over 90% of NTFPs respond to market failures and consequently, they are not taken into account in GDP calculations (Osemeobo & Ujor, 1999). The following challenges have been identified as affecting the sustainable development of NTFPs in Nigeria:

1. **Technology Incubation:** In Nigeria, most research work end on the tables of the scientists or at most on the pages of journals

(Ragasa *et al*, 2010). Not much has been achieved in the area of technology incubation for industrial application to improve the economy, especially the technologies that can improve and increase the production of these ntfps.

2. **Manufacturing Sector:** The manufacturing sector of Nigeria is faced with a lot of challenges, mainly erratic power supply and importation of manufactured goods, which have forced over 850 big and small-scale industries to close down in the past 10 years.

3. **Dependence on oil sector:** Since the oil boom of the late 1970s, the contribution of agricultural sector to the GDP has declined and remained between 37.8% and 41.5% from 1990 and 2001 (Okonjo-Iweala & Osafo-Kwaako, 2006) and less than 28% (World Bank, 2003). Today, the Nigerian economy is been described as monoculture in that crude oil accounts for about 95% of national export earning and about 65% of government revenues (World Bank, 2003).

4. **Quantity of Raw Materials:** Some of the ntfps, such as medicinal plants, are not available in large quantity in the wild. Any exploitation for industrial use will threaten the survival of the plants. Furthermore, many of these plants have poor germination rates, poor regeneration rates and slow growth rates. In spite of their uses and economic potentials, their present wild populations do not make them economically viable as raw materials for industries and sustainable development.

Suggested solutions

- **Domestication of wild plants:** There is the need to select, genetically improve and domesticate some of the wild plants with high economic potentials and possibly put them into cultivation or integrate them into agroforestry, as a way to ensure steady supply of raw materials to industries, reduce pressure on the wild stock and provide jobs for thousands of people.
- **Community-based Natural Resources Management (CBNRM):** Rural communities are found inside and all around all the protected areas in Nigeria. They do not only depend on the forests for their livelihoods, but also 'claim' the ownership of the forests. For instance, all efforts, including court actions, to relocate the communities inside the Omo Biosphere reserve, Southwest Nigeria had failed. The best solution is to integrate these communities into forest management.
- **Government Intervention:** The Nigerian Government has a large role to play to encourage industrialization for sustainable development, through provision of steady power supply, capital and land for entrepreneurs.
- **Standardization of local products:** For instance, despite the fact that Nigeria is the highest producer of shea butter in the world, most of it is rejected in the international market. Research and industrial efforts need to be focused on post-harvest processing of our ntfps in order to boost trade, export and revenue generation for the nation's economic development.

In conclusion, Nigeria has a lot of resources – renewable and non-renewable – that can be used for sustainable development and economic advancement. Efforts should be channelled into the sustainable utilization of ntfps as a source of income generation, poverty alleviation, export earnings, employment and food security for the nation in actualization of the Millennium Development Goals and the vision 20:20 of the nation.

References

Aiyeloja A.A and Ajewole O.I (2006). Non-timber forest products' marketing in Nigeria. A case study of Osun state. *Educational Research and Reviews* 1 (2): 52-58.

Adewusi, H.G (2004). Bush Plum, Nigerian case. *In:* Lopez, C and Shanley, P (eds.). Riches of the Forest: For health, life and spirit in Africa, 25 – 28pp.

Andel T.V (2006). Non-timber forest products the value of wild plants. Agromisa Publication and CTA, the Netherlands.

Awono, A., Ndoye, O., Schreckenberg, K., Tabuna, H., Isseri, F. and Temple L. (2002). Production and marketing of Safou (*Dacryodes edulis*) in Cameroon and internationally: market development issues. *Forest Trees and Livelihoods* 12: 125–148.

FAO (1995). Non-wood forest products for rural income and sustainable forestry. Food and Agriculture Organization of the United Nations, Rome. Series No 7.

FAO (2001). State of the World's Forests 2001. Food and Agriculture Organization of the United Nations, Rome. ISBN 92-5-104590-9.

FAO (2004). The State of Food and Agriculture 2003 – 2004: Agriculture Biotechnology – Meeting the needs of the Poor? Rome, FAO.

FAO (2005). State of the World's Forests 2005. Food and Agriculture Organization of the United Nations, Rome. ftp://ftp.fao.org/docrep/fao/007/y5574e/y5574e00.pdf

FAO (2009). State of the World's Forests 2009. Food and Agriculture Organization, Rome.

Foidl, N., Makkar, H.P.S. and Becker K (2001). The potential of Moringa oleifera for agricultural and industrial uses. *In:* "The Miracle Tree/ The Multiple Attributes of Moringa" (Ed. Lowell J Fuglie). CTA. USA.

Isichei, A.O (1995). Omo Biosphere Reserve, Current Status, Utilization of Biological Resources and Sustainable Management. South-South Cooperation Programme on Environmentally Sound Socio-Economic Development in the Humid Tropics, Working paper no. 11, UNESCO.

NGARA (2004). Production and Marketing of Gum Arabic. NGARA Publication series 2. Network for Natural Gums and Resins in Africa (NGARA), September 2004. 88p.

Okafor, J.C (1980). Trees for food and fodder in the savannah areas of Nigeria. The *International Tree crops Journal* 1: 131 – 141.

Okonjo-Iweala, N. and Osafo-Kwaako, P. (2006). Nigeria's economic reforms: Progress and challenges. The Brookings Institution Working paper no 6, The Brookings Institution, 1775 Massachusetts Ave, NW Washington DC 20036.

Osemeobo, G.J and Ujor, G. (1999). The Non-wood Forest Products of Nigeria. EC-FAO Partnership Programme.

Oyelola, P. (1992). The beautiful and the useful: the Contribution of Yoruba women to indigo-dyed textiles. *Nigerian Field* 57, 61 – 66.

Pimentel, D., McNair, M., Buck, L., Pimentel, M. and Kamil, J. (1997). The value of forests to World Food Security. *Human Ecology* 25 (1): 91 – 120.

Ragasa, C., Babu, S., Abdullahi, A.S and Abubakar, B.Y (2010). Strengthening Innovation Capacity of Nigerian Agricultural Research Organizations. IFPRI Discussion Paper no 01050. International Food Policy Research Institute.

Wickens, G.E (1991). Management issues for Development of Non-Timber Forest Products. *Unasylvia* 42(165): 3-8

World Bank (2003). Nigeria Policy options for growth and stability. Report no 26215 – NGA, Washington DC: The World Bank.

FAO REGIONAL OFFICE FOR AFRICA

Impact of Mangrove Forest Destruction on the Fisheries Resources of the Niger Delta, Nigeria

Blessing J. Oribhabor[1] and Mfon T. Udo[2]

Summary

The mangrove forest of the Niger Delta, the largest in Africa and the fourth largest in the world has witnessed serious depletion, primarily due to the fact that the rural livelihood of the area depends on the exploitation of the forest and its resources for nutritional and economic needs. The mangroves are threatened by the exotic Nypa or mangrove palm (Nypa fruticans) displacement, and oil pollution among other environmental pressures. The loss of mangrove habitats in the Niger Delta, particularly due to impact from oil exploration and exploitation has resulted in declining fishery resources, due to loss of breeding grounds, livelihood, and biodiversity loss. The inevitable consequences of uncontrolled destruction of mangrove forest and sand filling of wetlands for urbanization and industrialization are gradually erupting in Nigeria. World mangrove experts are of the opinion that the long term survival of mangroves is at great risk due to fragmentation of the habitats and that the services offered by the mangroves may likely be totally lost within 100 years. It is therefore imperative to initiate a global strategy for sustainable utilization and management of mangrove forest resources. There is the need to put an end to the destruction of mangrove forests in the Niger Delta and other mangrove habitats in Nigeria, for sustainable utilization, and recovery of biodiversity loss.

[1] *Blessing Oribhabor PhD, Department of Fisheries and Aquaculture, Faculty of Agriculture, University of Uyo, PMB 1017,Akwa Ibom State, Nigeria. Email: oribhaborblessjuls@yahoo.com , Phone: +2348033558270*

[2] *Mfon T. Udo PhD, Department of Fisheries and Aquaculture, Faculty of Agriculture, University of Uyo, PMB 1017,Akwa Ibom State, Nigeria. Email: udomfon@yahoo.com Phone: +2348028901377*

Introduction

Mangrove forests known as 'rainforest' by the sea' are one of the most important coastal ecosystems in the world in terms of primary production and coastal protection (http:///www.envfor.nic.m).

Mangrove forest dominates the low-energy intertidal zones of lagoons, estuaries, and coastal systems in the tropics, subtropics, and along some temperate coast (Twilley *et al*., 1996). Mangrove forests are the most typical forest formations of sheltered coastlines in the tropics and subtropics.

Mangrove forest may be felled for uses such as aquaculture ponds, salt pans, agricultural use including rice fields, airport and road construction, port and industrial development, resettlement and village development . Moreover they are important factors in stabilizing the shoreline (http://www.panda.org). A number of endangered and potentially vulnerable species are endemic in this mangrove area. The importance of mangrove as fish nurseries has been one of the reasons advanced to support its conservation and management (Sheridan and Hays, 2003). Mangroves are rich in fishery resources, and provide breeding grounds for various species of finfish, prawns and as habitats for crabs and mollusks.

In the past 20 years, the world has lost almost 50 percent of its mangrove forests, making them one of the most endangered landscapes. It is essential to use them as a shield against tsunami and as a resource to secure optimal socio-economic, ecological and environmental benefits (Osti *et al*., 2009).

It is obvious and alarming that the mangrove forest of the Niger Delta has witnessed serious depletion, due to the fact that rural livelihood in this region depends on the exploitation of the mangrove forest and its resources, and the adverse anthropogenic impacts. Based on the field experience of the authors, encounter with fishermen, and literature review, this paper presents information on the impact of mangrove forest destruction on the fisheries resources and people of the Niger Delta, Nigeria.

Location, area of mangrove forest and population size in the Niger Delta

The Niger Delta is located in the southern part of Nigeria bordering the Atlantic Ocean in the Gulf of Guinea ecoregion (Fig.1). The environment has been reported to be highly diverse and sensitive being the home of the largest stands of mangrove in Africa (over 1 million ha) and the fourth largest in the world (Spalding *et al*., 1997). The vegetation is dominated by *Rhizophora racemosa* (http://www.panda.org).

The Niger Delta covers 20,000km within wetlands of 70,000km^2. It is home to 20 million people and 40 different ethnic groups.

Causes of mangrove forest destruction in the Niger Delta

Habitat destruction through human encroachment has been the primary cause of mangrove loss. Mangrove forests in the Niger Delta is fast being replaced by Nipa palm (*Nypa fruticians*) which was introduced from Singapore to Nigeria in 1906 to control coastal erosion, yet no result oriented action plan has been put in place to conserve the mangrove. The significant threat of oil pollution, over-exploitation of

Figure 1: Map of Nigeria showing Niger Delta

fisheries and mangrove resources among other environmental pressures coupled with poor interest and recognition for brackish water bodies and aquaculture pose a great danger to the sustainability of the Niger Delta mangrove forests and the diverse fish resources, and consequently the coastal communities. Urbanisation of coastal communities is another significant threat to the mangrove of the Niger Delta. Mangrove forests are felled and mangrove areas sand filled for this purposes.

Impact of mangrove forest destruction on fisheries resources and people of the Niger Delta.

The growing human population and economic activities of the Niger Delta have been described (Mmom, 2007). The impact of human activities on the mangrove forest during the pre-colonial era was minimal due to the low population densities, rudimentary technology and subsistence agriculture. However, the case is different today. There is presently high human population/density, commercial agricultural practices, sophisticated technology as well as industrialization. The cummulative effects of these contribute to the depletion of the forests and biodiversity decimation. Mmom and Arokoyu (2010) have also described the mangrove forest depletion, biodiversity loss and traditional resources management practices. They posited that the rural livelihood of the area depends on the exploitation of the mangrove resources, resulting in over exploitation and rapid loss of these resources; that the mangrove forest is not in any known form of protection; and that the local people have an efficient was of protecting and conserving their resources which could be exploited to enhance mangrove resource conservation of the region.

The loss of mangrove habitats in the Niger Delta, particularly due to impact from oil exploration and exploitation has resulted in declined fishery resources, livelihood, and biodiversity loss. It has been estimated that 60% of the fish in the Gulf of Guinea breed in the mangrove forest of the Niger Delta (Adeyemo *et al*., 2009). Oil spillage has been found to be impacting the fisheries resources adversely. Oil spills and development projects have led to large mortalities of invertebrates and fishes, total decimation of shell fish, polychaete worms and crustaceans in the mangrove areas. Defoliation and death or oiled red mangrove *(Rhizophora racemosa)* occurs 2 – 3 months after oil spills in the mangrove swamp. Damage is due to the smothering of pneumatophores of mangroves. Prop roots and attached fauna are killed, and breeding grounds for fish are lost. The economic conditions in the Niger Delta reflect unequivocally that poverty is endemic in the region and it is getting worse as a result of oil pollution of the coastal water that provides fish consumed by the people. Over recent years, there have been public outcry by fishermen of the region over decline in fish catches as a result of oil pollution and they resort to fishing offshore. This has contributed to the unrest and abating militancy in the Niger Delta.

There is a decline in the population and size of *Typanotonus* spp (periwinkle), *Crassostrea gasar* (oyster) and mudskippers which are easy source of protein and part of cuisine for the people of the core Niger Delta, due to uncontrolled destruction of the mangrove forest and overfishing due to increasing population density. Oribhabor and Ogbeibu (2010) have reported that decline in predatory fish assemblage was due to joint impacts of pedestrian bridge crossing, dumping of domestic wastes and regular cutting of mangrove. Cutting of mangrove, sandfilling of mangrove habitats for human settlement, oil pollution among other anthropogenic activities resulting in environmental degradation cause loss of habitat for the diverse shell and fin fish resources of the Niger Delta, and consequently decline in the diversity and abundance of the species.

Conservation, management and sustainable use of the mangrove forest

All conservation efforts require efficient legislation to control activities that might

adversely affect the ecosystem. Several countries, notably in the Asian region, have established national mangrove committees (NATMANCON) to provide the necessary input for adequate mangrove management. For example, the Malaysian NATMANCOM recommended that not more than 20 percent of existing mangrove in a given district should be cleared for pond construction, and that there should be a 100 – metre butter zone along the main high-water, level of the sea. Efforts have been made to abate the depletion of mangrove forest in Nigeria, but such efforts are grossly inadequate. Such efforts include designation of protected areas, legislation, Environmental Impact Assessment (EIA), Environmental evaluation and alternative use of mangrove.

World mangrove experts are of the opinion that the long term survival of mangroves is at risk due to fragmentation of the habitats and that the services offered by the mangroves may likely be totally lost within 100 years (Duke *et al*., 2007). It is therefore imperative to initiate a global strategy for sustainable utilization and management of mangrove forest resources.

Conclusion

While there is record of estimated loss of mangrove forest in Asia and America, there is little or no record of the extent of mangrove decline in Africa. There is the need to put an end to destruction of mangrove forest in the Niger Delta and the other mangrove habitats in Nigeria, for sustainable utilization, and recovery of biodiversity loss. There is the need to intensity effort in the protection of the Niger Delta mangrove forest. The government of Nigeria should enact stringent laws for sustainable utilization of mangrove resources. Mangrove areas should be included in marine and coastal protected areas. Monitoring and research is necessary. Further uncontrolled cutting of mangrove and sandfilling of mangrove areas for urban development should be discouraged. Nypa fruticans should be exploited for the many goods and services for which it is used. Its distribution should be controlled and its unwanted migration should be blocked through coastal development.

References

Adeyemo, O. K., Ubiogoro, O. E. and Adedeji, O. B. 2009. Oil exploitation, fisheries resources and sustainable livelihood in the Niger Delta, Nigeria. *Nature and Faune*, 24(1): 56-61.

Dennis, G. D. 1992. Island mangrove habits as spawning and nursery area for commercially important fishes in the Caribbean. *Gulf and Caribbean fisheries Institute*, 41: 205-225.

Duke, N. C., Meynecke, O. J., Dittmann, S., Ellison, A. M.,, Anger, K., Berger, U., Cannic, S., Eiele, K., Ewel, K. C., Field, C. D., Kodedam, N., Lee, S. Y., Marchand, C., Nordhanus, L. and Dahdough-Guebas. 2007. A world without mangroves? Letters.www.sciencemag.org.

Mmom, P. C. and Arokoyu, S. B., 2010. Mangrove forest depletion, biodiversity loss and traditional resources management practices in the Niger Delta, Nigeria. *Research Journal of Applied Sciences, Engineering and Technology*, 2(1): 28-34.

Mmon, P. C., 2007. Impact of human density and economic activities on the mangrove forest of the Niger Delta. Paper presented at the Annual Conference of the International Association for Impact Assessment, held in Seoul South Korea, 1 – 9th June.

Moffat, D. and Linden, O., 1995. Perception and reality: assessing sustainable development in the Niger River Delta. *Ambio*, 24: 527-538.

Oribhabor, B. J. and Ogbeibu, A. E., 2010. The ecological impact of anthropogenic activities on the predatory fish assemblage of a tidal creek in the Niger Delta, Nigeria. *Research Journal of Environmental Sciences*, 4(3): 271-279.

Osti, R., Tanaka, S. and Tokioka, T., 2009. The importance of mangrove forest in tsunami disaster mitigation. *Disasters*, 33(2): 203-213.

Sheridan, P. and Hay, C. 2003. Are mangroves nursery habitat for transient fishes and decapods? Wetlands, 23(2): 449-458.

Spalding, M., Blasco, F. and Field, C., 1997. World mangrove ecosystem atlas. The International Society of Mangrove Ecosystem (ISME), Japan.

Twilley, R. R., Snedaker, S. C., Yáñex – Arancibia and Medina, E. 1996. Biodiversity and ecosystem processes in tropical estuaries: perspectives of mangrove ecosystems. P. 327-370. In H. A. Mooney, J. H. Cushman, E. Medina, O. E. Sala, and E. D. Schulze (eds). *Functional roles of biodiversity: a global perspective*. John Wiley and Sons Ltd. New York, NY, USA.

FAO REGIONAL OFFICE FOR AFRICA

Impact of laws and regulations on the use of non-wood forest products and the wellbeing of forest dependent communities in Central Africa

Juliane Masuch[1], Ousseynou Ndoye[2], Julius Chupezi Tieguhong[3], William Armand Mala[4] and Armand Asseng Zé[5]

Summary

Non-wood forest products (NWFP) comprise a variety of natural resources and represent a valuable source of food, medicine, income and employment for local communities in Central Africa. Despite their importance, NWFP are not properly taken into account by national policies and legal and regulatory frameworks e.g. access to NWFP resources for local communities is limited to their own consumption needs and excludes commercial use; the tax system and administrative procedures for trade licenses are not adapted to the realities of small and medium scale enterprises; quotas for exploitation of NWFP do not exist or do not enforce the sustainable use of endangered species. A set of sub-regional guidelines from the Central African Forests Commission (COMIFAC) for the sustainable management of NWFP of plant origin provides an orientation for governments on how to improve their legal and regulatory frameworks. Lessons learnt from consequent national efforts led by governments in Central Africa and the Food and Agriculture Organization of the United Nations (FAO) are documented.

[1] *Juliane Masuch, FAO Representation, P.O. Box 281, Yaoundé, Cameroon. Tel.: +237-22-202 742, Email: juliane.masuch@fao.org*

[2] *Ousseynou Ndoye, FAO Representation, P.O. Box 281, Yaoundé, Cameroon, Tel. +237-22-202 742, Email: ousseynou.ndoye@fao.org*

[3] *Julius Chupezi Tieguhong, FAO Representation, P.O. Box 281, Yaoundé, Cameroon, Tel: . +237-22-202 742 Email: julius.tieguhong@fao.org*

[4] *William Armand Mala, c/o FAO Representation, P.O. Box 281, Yaoundé, Cameroon, Tel: . +237-22-202 742, Email: williammala@yahoo.fr*

[5] *Armand Asseng Zé, FAO Representation, P.O. Box 281, Yaoundé, Cameroon. Tel.: +237-22-202 74 Email: armand.assengze@fao.org*

Introduction

Non-wood forest products (NWFP) provide sources of food and income for forest-dependant people and revenue for small and medium scale enterprises (SME) involved in the national, regional and even international trade. FAO defines non-wood forest products as "goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests" (FAO 1999). They are also used for medicinal purpose, construction, tools, furniture and cultural traditions. In economic crises or during food shortages, NWFP often serve as a safety net for urban and rural dwellers and contribute to the stability dimension of food security (Tieguhong et al. 2009).

Although, it is well-known that NWFP contribute to household livelihoods and generate revenues for SME (Sunderland et al. 2004), existing legislation neither promotes the sector's development to tap their economic potentials, nor does it promote sustainability. This article documents regional and national efforts to improve legal and regulatory frameworks in Central Africa and the lessons learned.

Methodology

Most of the information used in this article is based on FAO's work on NWFP in Central Africa conducted since 2005 in collaboration with the German Agency for International Cooperation (GIZ), the Centre for International Forestry Research (CIFOR), the World Agroforestry Center (ICRAF) and the Netherlands Development Organisation (SNV) under the supervision of the Central African Forests Commission (COMIFAC).

Analyses of national legal and regulatory frameworks governing the NWFP sector in Cameroon, Central African Republic (CAR), Democratic Republic of Congo (DRC), Congo, Equatorial-Guinea and Gabon were conducted between 2006 and 2007 and summarized in a regional synthesis (FAO 2007). Based on a regional workshop in 2006, decision-makers, politicians, scientists and partners from development cooperation discussed the findings of the studies.

An interdisciplinary working group has analyzed constraints for the development of the NWFP sector in order to elaborate a regional model law that was geared at giving an orientation to COMIFAC member countries on how to improve their laws, policies and institutions. In 2008, the so-called Sub-regional guidelines on the sustainable management of NWFP of plant origin in Central Africa were validated by all stakeholders and officially approved by COMIFAC's Ministerial Council (COMIFAC 2010).

Results

The majority of laws and attributed forestry codes in Central Africa have the following common elements related to NWFP (Ndoye et al.):

- Land-use and forest legislation stem from colonial times. The state has inalienable rights on lands and sub-soils which are superimposed on all other land-use related legislation. Forests of the permanent domain are state-owned and comprise logging concessions, protected areas, communal forests, etc. Forests belonging to private parties and community enterprises are restricted to non-permanent domains.

- Although the indigenous right to "use, fructify, and abuse" is recognized in modern law, its interpretation and application raises considerable difficulties due to contradictions between legal texts at different hierarchical levels. Generally, forest codes limit these rights to auto-consumption excluding commercial use.

- Legislations regarding forests are focused on the exploitation of timber for exports; the forest codes generally make reference to NWFP as secondary or accessory products and list only some key NWFP of national importance. In contrast to COMIFAC's commitment towards a harmonisation of forest and fiscal policies, a harmonized definition for NWFP in national laws is missing.

- Harvesters and traders of NWFP need to legalise their entrepreneurial status and have to obtain licences for their activities. Administrative procedures are often oriented to the timber value chain and not adapted to local realities. Most small and medium scale producers and traders operate illegally; both, legal and illegal traders are subjected to illegitimate payments at numerous roadblocks.

- The NWFP tax system distinguishes upstream taxes to be paid on the quota or quantities allocated and downstream taxes to be paid on exported products; the first having a low recovery rate and the latter having a higher recovery rate. In the context of domestication as a key element for a sustainable NWFP use, no tax difference is made between products collected in the forests and products harvested from agricultural lands.

- Statistics on the potential of NWFP and their exploitation in the production areas as well as on their trade do not exist. Quotas are allocated without knowledge of the resource base and are not adapted to the specific regeneration rates of the species.

- Private and government investments for the development of the NWFP sector are not encouraged as these products are not included in poverty reduction and food security strategies. At the moment of analyzing the legal frameworks, no national or sub-regional strategies for an effective valorisation of NWFP existed.

Lessons learned

The studies showed that policies and legislations governing the NWFP sector in Central Africa do not encourage its economic

development due to a multitude of reasons, key of which are (i) local communities bear the socio-economic risks of illegal NWFP trade, and benefits such as purchase of food, medicine, payment of transport or school fees are kept marginal due to limited NWFP user rights; (ii) small-and medium scale traders pass costs of illegitimate payments at roadblocks, due to high administrative hurdles and unclear taxation, on to producers by decreasing purchase prices or to consumers by increasing retail prices; and (iii) ministries in charge of forests allocate quotas for NWFP exploitation without profound ecological knowledge and detailed economic statistics for concerned species leading to unsustainable use of certain species. In order to stimulate a pro-poor oriented development of national NWFP sectors and to promote the regional integration and trade of NWFP and their sustainable management, COMIFAC's Sub-regional guidelines on the sustainable management of NWFP of plant origin in Central Africa propose common bases for their inclusion in the political, legislative, fiscal and institutional frameworks. The set of guidelines focus on the extension of traditional user rights of local communities allowing a low-level commercial use, simplified procedures for the delivery of exploitation permits, improved tax and trade regulations and the need for NWFP inventories for a sustainable allocation of exploitation quotas (COMIFAC 2010).

Since 2010, integration of COMIFAC's guidelines in the forestry laws of Cameroon, Congo, Gabon and CAR is underway with FAO's support. Experiences show that this process needs to be adapted to the country specific context: In Cameroon and Congo, ongoing forestry law reviews allows integrating NWFP-related changes into the overall revision process whereas the Central African forestry code dates from 2008 and changes are focused on by-laws and regulations. In Gabon, single articles of the forestry code are added and consequently by-laws adapted.

In addition, FAO supports governments to develop national strategies and action plans for a sound sector development. Such strategy already exists in Congo and is currently elaborated in a multi-stakeholder dialogue in Gabon and the CAR. Although, the implementation of these strategies is government's responsibility, the realization of planned activities tends to be slow due to missing financial resources and only step-by-step changing priorities on stakeholders' agendas. It is necessary to extend the limited sector view towards a wider approach including different sectors involved in NWFP value chains. National NWFP advisory committees initiated by FAO in Cameroon, Congo, DRC, CAR and Gabon respond to this idea and involve stakeholders from ministries and civil society related forest, agriculture, small and medium scale enterprises, food security and environment, etc.

References

All FAO documents are available online at http://www.fao.org/forestry/50255/en/ (Project GCP/RAF/398/GER), http://www.fao.org/forestry/enterprises/nwfp-centralafrica-eu/en/ (Project GCP/RAF/408/EC) and http://www.fao.org/forestry/nwfp/55079/en/ (Project GCP/RAF/441/GER).

COMIFAC (2010). Directives sous-régionales relatives à la gestion durable des produits forestiers non ligneux d'origine végétale en Afrique centrale. Série politique No. 2. Also available at http://www.comifac.org/Members/tvtchuante/directives-sous-regionales-relatives-a-la-gestion-durable-des-pfnl-dorigine-vegetal

FAO (2007f). Le cadre législatif et réglementaire régissant l'utilisation des produits forestiers non ligneux (PFNL) en Afrique centrale. Produits Forestiers Non Ligneux Document de travail No.6, also available at ftp://ftp.fao.org/docrep/fao/012/ak426f/ak426f00.pdf

FAO (1999). Towards a harmonized definition of non-wood forest products. In: Unasylva, Vol. 50, Issue 198, no page, also available at http://www.fao.org/docrep/x2450e/x2450e0d.htm#fao%20forestry

Ndoye, O., Ebamane, S., Grouwels, S., Knoop, D., Asseng Zé, A. (2008). Impact of regulation on the performance of small and medium forest enterprises (SMFE) in Central Africa. Unpublished manuscript.

Sunderland, T. C.H., Harrison, S. T. Ndoye, O. (2004). Commercialisaton of non-timber forest products in Africa: history, context and prospects. In: Sunderland, T. C.H., Ndoye, O. (eds.), Forest Products, Livelihoods and Conservation. Case Studies of Non-Timber Forest Product Systems. Volume 2 - Africa. 3 Volumes. Jakarta: Indonesia Printer (2), Vol. 1, p. 1–24.

Tieguhong, J. C., Ndoye, O., Vantomme, P. Grouwels, S., Zwolinski, J., Masuch, J. (2009). Coping with crisis in Central Africa: enhanced role for non-wood forest products. Unasylva, Vol. 60, Issue 233, p. 49–54, also available at http://www.fao.org/docrep/012/i1025e/i1025e10.htm

COUNTRY FOCUS: Lesotho

The Kingdom of Lesotho covers 30,355km². It is the only independent state in the world that lies entirely above 1,400 metres in elevation. Over 80% of the country lies above 1,800 metres. Lesotho is also the southernmost landlocked country in the world. It lies between latitudes 28⁰ and 31⁰ S, and longitudes 27⁰ and 30⁰ E.

***Nchemo Maile*[1]**

***Nature & Faune*: Please describe Lesotho in the context of its forest endowment.**

Nchemo Maile: Of Lesotho's total land area, less than 1% is under forest cover. Despite its scantiness, the patches of remaining indigenous trees and shrubs fulfill important socio-economic and ecological functions. Many rural people rely on indigenous trees and shrubs for fuel and other products. Large numbers of livestock obtain fodder, shade and shelter from the meager indigenous woody vegetation. By providing vegetative cover, indigenous trees and shrubs play a critical role in protecting land from soil erosion, particularly as such forests mainly occur in catchments and river valleys.

What is the economic significance of forests in your country's sustainable development?

Nchemo Maile: Lesotho's rural population is dependant upon biomass resources including shrubs, cow-dung and crop residues to meet their own energy needs. Lesotho's harsh winters have meant that people require substantial energy for warmth in addition to food preparation. The overwhelming reliance of rural households on biomass fuels has placed tremendous pressure on biomass resources, while the use of dung and crop residues as alternatives to fuel wood has had adverse implication on soil fertility. In real terms, firewood provides 64% of the household energy in rural areas, with cow-dung and crop residues accounting for over 27% of the balance.

Forest Reserve

Basotho (the people of Lesotho) utilize trees to provide a wide range of values in addition to fuel. Studies have shown that trees in Lesotho provide edible fruits (especially peaches); serve as windbreaks and shelter for houses, people and livestock; are a source of tools, furniture, fencing, browse for animals and medicines.

Lesotho imports most timber products from South Africa. Available 1999 figures on imports indicate that over US$30 million

---

[1] *Nchemo Maile, Deputy Principal Secretary of the Ministry of Forestry and Land Reclamation, P.O. Box 774 Maseru 100. Lesotho. Tel.: (+266) 22312826; Fax:(+266) 22310515. Email:nchemo@yahoo.co.uk*

worth of timber products are imported every year. Hence, a demand, supply and consumption study of forest products in Lesotho is essential. It is worth noting again that the Ministry of Forestry bought a mobile sawmill to demonstrate to Basotho that structural timber comes from trees in order to instill interest in planting more for the future generations.

Demonstration sawn timber with Pinus radiata grown in Lesotho

It must also be noted that the statistics given has been collected by value and not by volume (quantities).There are no exports of forest products such as structural timber and furniture from Lesotho. All trade in forest produce and service relate to imports, except for firewood and treated poles.

How would you rate the social worth of forests in Lesotho? This year the world is celebrating the International Year of the Forests under the theme forests for people, what in particular would the majority of the people in Lesotho hold dear when they think of their forests?

Nchemo Maile: The social worth of forests is rated very high in Lesotho given the fact that the country is virtually treeless. Hence, the government established the Ministry of Forestry and Land Reclamation separate from its sister Ministry of Agriculture and Food Security. This stresses the vital role that forests and trees play in addressing problems faced by the rural communities. The majority of the people in Lesotho think of their forests as sources of firewood and, to a lesser extent, as sources of building material given that Lesotho experiences very harsh winters and again because other alternatives fuels such as paraffin are expensive. This mindset is changing day by day as a result of awareness campaigns mounted by the government with the aim to show that forests and trees are an integral part of the global environment and human well being.

Celebrations of the International Year of Forests at Kolo, Mafeteng (Photograph by Roland Hilbert 2011)

Describe briefly forest administration in your country in terms of responsibility for forest management, policy formulation and implementation to improve the socio-economic contribution of forests to the well being of the people of Lesotho.

Nchemo Maile: Primary responsibility for national forest development within government lies with the Forestry Department which is institutionally domiciled within the Ministry of Forestry and Land Reclamation. The latter was established on the 21 March 2003 with a four-pronged mandate i.e. afforestation, soil and water conservation and range resources management. The Ministry operates in all ten districts of the country through District Forestry and Land reclamation offices. With the advent of decentralization, implementation is done jointly with the local authorities and major groups at community level.

To what degree are the local communities involved in the management of the forests resources of Lesotho? Any new policy and/or law to facilitate this?

Nchemo Maile: The adoption of a National Forestry Policy in 1997, which was subsequently reviewed and translated into the local language in 2008, marks a radical shift in direction, by emphasizing the role of communities in forest management. In this policy, the government firmly committed itself to local ownership of forest resources. The Policy seeks to maximize, through actions consistent with other sectoral policies and development goals, the contribution of forests towards poverty alleviation, livelihood security and environmental protection. The Policy further recognizes the participation of rural communities, NGO's, the Private Sector and the marginalized groups in forest development. The enactment of the Forestry

Act of 1998 supports the notion of "forest for people". The Act recognizes the entitlement of different groups of individuals and communities in taking ownership of various types of forests.

Army involved in tree planting activities

What are the major drivers of deforestation in Lesotho and how is the country fighting deforestation?

Nchemo Maile: Currently, deforestation in Lesotho is mainly due to fuelwood collection rather than agricultural activities such as shifting cultivation. A much larger area of the scrublands is being removed than can naturally re-grow, in order to meet the demand of fuelwood. In order to address this problem Government has, over the years embarked on a massive afforestation programme using fast growing tree species. This noble idea has gone a long way in trying to address the problem because even the most unwanted tree species such as wattle in Lesotho can still be contained due to high firewood collection activity that keep it within special sites where it checks soil erosion.

Enlighten us on the activities your country intends to undertake or have already carried out in respect of celebrating the International Year of the Forests 2011.

Nchemo Maile: In March 2011 Basotho Nation joined hands with His Majesty the King to plant more than 100,000 trees across the country in one day as part of the celebration of the International Year of Forests (IYF) 2011. Various NGO's and the business community have already contacted the Forestry Department and preparations are underway to plant many more trees. An action plan has been drawn specifically for IYF 2011 and among other things awareness campaigns, through public gatherings and media, are key planned activities.

His Majesty King Letsie III

Celebrations of the International Year of Forests 2011 - Local communities and schools planting trees on top of a hill - Photograph by Roland Hilbert

On the platform of International Year of the Forests 2011, would you want to share with our readers any specific issues of concerns you may have on the fate of the Lesotho's forests.

Nchemo Maile: The areas where patches and groves of wild (that is unplanted and unmanaged) indigenous trees and shrubs exist are invariably open to grazing. It is very likely that this will continue in practice. The forest groves or patches will have to be managed in a way suitable for both grazing and wood production whether protected by law or not. They may also have to be managed for environmental protection, the maintenance of biodiversity, etc. However, maximum productivity of existing silvopastoralism (wood production/livestock grazing system) has still to be determined, as there is little control of livestock in Lesotho. In fact, neither the grazing productivity nor wood productivity of any particular existing forest grove or patch has been individually determined.

At present, no silvicultural treatment is given to groves and patches of growing indigenous trees and shrubs in Lesotho to ensure that they will give the maximum benefits to rural people on a fully-sustainable basis. As already recorded, the only form of management given to some of the areas of the wild trees and shrubs is the traditional control of cutting which is exercised by some chiefs. Generally, the main aim of this is to allocate cutting areas during the year, or to allocate cutting areas in different years to ensure sustainability.

The daunting challenge facing government regarding both the indigenous forest

patches and the 485 planted forest reserves in Lesotho is to prepare and implement a sustainable ecosystem management plan based on a sound understanding and integration of biological and socio-economic issues. Furthermore there is an overriding need to assess and quantify the multiple benefits that Basotho society derives from its forest resources. This data will establish a solid baseline essential to institutionalizing communal responsibility toward sustainable forest management within the context of participatory decision-making.

Thank you Mr Nchemo Maile for shedding light on key forestry issues in the Kingdom of Lesotho.

FAO Activities

Forestry in improving food security and nutrition: FAO's work in Africa

Kafeero Fred[1], Gauthier Michelle[2], Grouwels Sophie[3], Steierer Florian[4], Berrahmouni Nora[5] and Vantomme Paul[6]

Summary

Forests and trees make a big contribution to improved diets and nutritional quality, by adding variety to diets, improving taste and palatability of staples, by providing essential vitamins, protein and calories. They provide a great range of edible foods such as seeds, fruits, leaves, roots, mushrooms, gums; are habitat for wild animals, insects, rodents, and fish; provide fodder for livestock; and fuelwood for food processing (FAO, 1991). Forestry contributes significantly to food security through its role in maintaining agricultural systems which are the basis of cropping. In the last two decades, there has been more and more interest in the role that forests play in food security and improved nutrition, as a result of increased realization of the dependence of local people on forests and trees to meet important needs like food and income. The FAO Forestry department provides to countries, legislative and policy support, capacity development, and technical guidance on sustainable forest management, including trees outside forests, and sustainable management of wildlife within and outside of protected areas. The aim of this work is to support improved livelihoods and poverty alleviation. There are some challenges related to policy environment, lack of hard data on contribution of non wood forest products to diets, and other governance constraints that mask the visibility of forestry and its important role in national Food security and Nutrition policies and strategies.

Background

Forests, trees on farms and rangelands are a source of cash and subsistence benefits through the various products directly harvested, or indirectly through protecting the environment and therefore maintaining agricultural production systems. These benefits come from both trees that are planted or managed on farms as well as from forest resources in communally managed, open-access or state-managed areas. The most direct way in which forests and trees contribute to food security is through contributions to diets and nutrition. Fruits, seeds and roots of trees and other plants found in forests provide important nutrient and vitamin-rich supplements for rural households. They do this by adding variety to diets, improving taste and palatability of staples and by providing essential vitamins, protein and calories. Forest foods often form a small but critical part of otherwise bland and nutritionally poor diets (FAO, 2011). Poor households in particular depend on non-wood forest products (NWFPs) for essential food and nutrition, medicine, fodder, fuel, thatch and construction materials, and nonfarm income.

[1]*Kafeero Fred. Forestry Officer (Participatory forestry), FAO Headquarters, Rome.*
E-mail: Fred.Kafeero@fao.org
[2] *Gauthier Michelle. Forestry Officer (Landuse and agroforestry), FAO Headquarters, Rome.*
E-mail: Michelle.Gauthier@fao.org
[3] *Grouwels Sophie. Forestry Officer (Community – based enterprise Development), FAO Headquarters, Rome.*
E-mail: Sophie.Grouwels@fao.org
[4] *Steierer Florian. Forestry Officer (Wood Energy), FAO Headquarters, Rome.*
E-mail: Florian.Steierer@fao.org
[5] *Berrahmouni Nora. Forestry Officer (Arid Zones), FAO Headquarters, Rome*
E-mail: Nora.Berrahmouni@fao.org
[6] *Vantomme Paul. Senior Forestry Officer (Non-Wood Forest Products),FAO Headquarters, Rome.*
Email: Paul.Vantomme@fao.org

The FAO Forestry department work ranges from legislative and policy support, to capacity development and technical support. It assists countries in developing income-generating tree and forest product enterprises while also having greater incentive to sustainably manage and protect those resources. The work aims to improve livelihoods and takes different forms, including:

- FAO –led projects in remote rural areas, Agroforestry in peri-urban and urban areas, and also in diverse ecological zones including in dense tropical forests, in arid and semi arid woodlands, and in mangroves.
- FAO National Forest Monitoring and Assessment Programme which undertakes national forest assessments that include specific information on trees outside forests, namely agroforestry systems and tree-based systems in urban environments.
- Developing practical guidelines such as the FAO forestry paper, 149 - Better forestry, less poverty – which offer guidance to practitioners in setting up forestry interventions aimed at reducing poverty, including Non-wood forest products for food and better nutrition.
- Developing guidance material for countries, to undertake systematic integration of agroforestry systems in rural and urban environment.
- Carrying out studies aimed at supporting FAO's 5-yearly Forest Resources Assessments to incorporate data about the reliance of local people on forests for food, income, and poverty alleviation in a broader sense.
- Strengthening understanding amongst policy makers, donors and senior officials from other development sectors on the importance of forestry to improved nutrition and food security.

This paper shares some of the selected examples of FAO-led field projects on the contribution of forestry to better livelihoods, in general and specifically to food security and nutrition. The paper concentrates on forests and tree products, and does not address other important contributions related to enahnced agricultural production systems.

Forestry for better nutrition

Many botanical and anthropological studies have documented edible forest products gathered by forest dwellers and non-forest dwellers alike (forexample Arnold et al 1985, FAO 1983, Gura 1986, Malaisse and Parent 1985). Agroforestry systems also integrate woody species to landscapes, and allow for a sustainable and diversified production, and social, economic and environmental benefits (Leakey, 1996). They contribute substantially to nutrition by proposing solutions that integrate food security (diversification of household production and family diet), public health (conservation of traditional medicinal plants and) and social protection (source of other incomes).

FAO's field projects on dryland forestry, Non-wood forest products (NWFPs), community based forest enterprise development, wildlife management, and trees outside forests (including urban and peri-urban forestry) promote the use of forests and trees for income, food security and better nutrition. Within poor households, gender unevenness in ownership and access to productive resources, such as land, causes women to rely heavily on NWFPs for income and nutrition.

Below are specific examples of the contribution of forests and trees to improved nutrition.

Leaves

Wild leaves, either fresh or dried, are one of the most widely consumed forest foods. They are often used as the basis for cooking soups, stews, and relishes which accompany carbohydrate staples such as rice or maize. This is important as it adds both flavour and nutritional value to diets. Wild leaves and leaves from planted trees in agro-forestry

systems can be excellent sources of vitamins A and C, protein, as well as micronutrients such as calcium and iron that are commonly deficient in diets of nutritionally vulnerable communities. Common "leaf vegetable" species eaten across different parts of Africa and rich in minerals and in Vitamin A & C include, *Gnetum africanum, Adansonia digitata*, *Cassia obtusifolia and Moringa Oleifera.*

Fruits

Fruit is most commonly consumed raw, as a snack or dietary supplement. Forest fruits are also widely used for making beverages, most notably beer. Fruits are especially good

Photo 2: Mixed cropping of papaya with cassava, Maldives (courtesy of S. Braatz)

Photo 1. Woman in Democratic Republic of Congo selling fruits. (Photo courtesy of Ndoye)

sources of minerals and vitamins and sometimes contribute significant quantities of calories. A study by Campbell (1986), on the consumption of wild fruits in Zimbabwe, found that three species (*Diospyros mespiliformis, Strychnos cocculoides,* and *Azanza garckeana*) were the most frequently consumed and also the most highly prized. In Senegal, wild fruit species such as *Boscia*, which fruits all year round and *Sclerocarya,* which fruits at the end of the dry season, are most commonly used to meet seasonal shortages of vitamins, which occur at the beginning of the wet season. Agroforestry trees like *Psidium guajava*, *Annona squamosa*, *Papaya sp, Mangifera indica* are important sources of Vitamin C to many households.

Seeds and Nuts

Seeds and nuts generally provide important contributions to diet through the addition of calories, oil, and protein. Edible oil (fat) consumption is often low in developing countries, and often constitutes a major household food purchase, (Truscott 1986). In addition to the energy they provide, fats and oils are also important for the absorption of vitamins A, D, E and K. There are numerous examples of nutritionally important nuts and seeds gathered in forests, for example the nuts gathered from pine-nuts (*Pinus pinea, P. edulis, P. koreensis*), Cola- (*Cola edulis*) and chestnuts (*Castanea sativa*).

The Shea Tree (*Vitellaria paradoxa* and *Vitellaria nilotica*) which grows naturally across the West African Sahel region is an important household resource in savanna regions of Cote d'Ivoire, Ghana, Burkina Faso, Mali, Togo, Benin and Nigeria, where it is used as cooking oil/fat, food accompaniments and topical treatments of various skin conditions. There are more than 500 million fruiting shea trees across the production belt and FAO, estimate that total shea nut production is approximately 600,000 metric tonnes per year, (Ferris et al. 2001).

Roots and tubers

A big variety of forest plants (climbers) have edible roots and tubers. These provide carbohydrates and some minerals. In Swaziland, Ogle and Grivetti, 1985 found that approximately 10% of edible wild species commonly eaten were either bulbs or roots. The only species used commonly were the bulbs of Aloe *saponaria.*

Mushrooms

Mushrooms, gathered wild from forests and woodlands, are favourites in many cultures, where they are added to sauces and relishes for flavouring. In many cases they provide substitutes for meat.

Honey

Trees in agroforestry systems and other plants growing in forests often play an important role in honey production as they provide year-round fodder for bees because of different flowering times. In some cultures, honey is collected from wild colonies, although most honey is harvested from hives placed around farms or in neighbouring woodlands or forests. FAO has supported projects in Uganda, and several West African countries to produce honey from forest ecosystems. Honey is a good source of sugar and is also an important ingredient in many traditional medicines.

Gums and sap

Sap is frequently tapped for beverages, and is often high in sugars and minerals. Gum is used as a food supplement, has medicinal uses and can be a good source of energy. Palm wine tapped from *Raphia hookeri* is popular in W. Africa as an important cultural beverage consumed in households several times a week, FAO 1989. FAO projects in the arid zones promote the collection and processing of Gum Arabic (*Acacia senegal*) for food and source of income for pastrolists.

Animal foods from forests and farm trees

Wild animals and fish are other important forest food products. Forested areas, mangroves, streams provide a habitat for many wild animal species and fish. The range of species consumed includes birds and their eggs, insects, rodents, and other larger mammals. For people living in close proximity to forests and fallow areas, wild animals are often an important part of their diet and in some cases supply the only source of animal protein. In West Africa, where the consumption of "bush meat" is high, the most important game meat species are small animals (such as rodents) due to their natural abundance and unrestricted hunting.

Fodder and browse for livestock

Many species of trees found on-farm, (as well as those in forests and associated under-storey shrubs and grasses) are used for animal feed, providing protein, minerals and vitamins - either as browse or fodder. It has been estimated that 75% of the tree species (7,000-10,000) of tropical Africa are used as browse (Wikens et al. 1985). Fodder trees make a significant contribution to domestic livestock production, which in turn influences milk and meat supply. Fodder contributes to maintaining draught animals and producing manure for organic fertilizer, thereby boosting agricultural production. Tree fodder may consist of leaves, small branches, seeds, pods and fruits, all of which supplement other feeds and which can be a crucial component of livestock diets during the dry season.

Fuel for cooking and processing of food

Fuelwood is the main energy source for cooking and/or heating in most developing countries. Fuelwood and charcoal often represent the only domestically available and affordable sources of energy. Since many dishes require cooking to make them digestible, fuelwood supplies indirectly affect the stability, quality and even quantity of food consumed. Taste is another strong reason for using woody biomass for cooking - grilled or smoked dishes have their place in diets in every society. Traditional meals and dishes evolved around characteristics and energy content of available biomass.

FAO's work on community forestry, Agroforestry and trees outside forests therefore enhances the access by local

people to sustainable sources of fuelwood. This work also involves augmenting energy efficiency of wood fuel and charcoal cooking systems, as well as improved production of charcoal to abate the pressure on natural resources.

Generating income from forests and trees

Food insecurity is generally related to poverty and limited opportunities from employment or income generation. Where poor households are able to get some income, this is often directed towards improving food security. Trees on farms and forests have been shown across the world to provide important and often unrecognized sources of household income. In some cases this comes from employment in forest industries or from the collection and sale of unprocessed tree and forest - derived products. The production of Non-Wood forest products (NWFPs) for local markets can provide part-time, seasonal, occasional, or full-time year-round employment, depending on the product, location, and individual household. This flexibility makes NWFP-related activities particularly appealing to women, enabling them to combine collection and trade of these products with their other domestic duties and responsibilities. Incomes can be substantially increased through the establishment of small or medium forest-based enterprises, which may secure better market access and share, or add value to harvested products.

Conclusion

Although forests and trees outside forests make significant contributions to food security, improved quality of diets and prevention of malnutrition in many parts of the world, this contribution is generally little known, especially outside of the forest sector. Therefore, they are rarely taken into account in food security policies. The lack of data on consumption of forest products is equally responsible for the general under-reporting on the vital role forests and trees play in improving local diets. There is need for case studies to be carried out to quantify the contribution of forests and trees in food security and improved nutrition, in different ecological zones and cultures of Africa. It is important to raise the awareness among decision and policy-makers on the need for development programmes on food and nutrition that consider the contribution of Non Wood Forest Products (NWFPs) to local consumption patterns. Better inter-sectoral and inter-institutional coordination is vital in fostering the integration of agriculture, pastoralism, forestry, water, energy and other land-use sectors at policy, management and research levels.

References

Arnold T.H. et al 1985. Khoisan food plants: Taa with potential for future economic exploitation. In G.E Wickens et al (eds.), Plants for Arid land. Allen and Unwin, London.

Campbell, B.M 1986. The importance of wild fruits for peasant households in Zimbabwe. Food and Nutrition 12(1): 38-44

FAO, 1983. Food and fruit bearing species. Examples from East Africa. FAO Forestry paper no. 44:3, Rome.

FAO, 1989.The major significance of "minor" forest products: Local people's uses and values of forests in the West African Humid zone, Rome.

FAO, 1991. Household Food Security and Forestry – an analysis of socio-economic issues. Rome.

Ferris R.S.B et al. 2001.Evaluating the Marketing Opportunities for Shea nut and Shea nut processed products in Uganda. Natural Resource Institute and FoodNet

Gura, S. 1986. A note on traditional food plants in East Africa. Their value of Nutrition and agriculture. Food and nutrition. 12(1): 18-26.

Leakey, R.R.B. 1996. "Definition of agroforestry revisited". Agroforestry Today 8(1): 5–7.

Malaisse, F. and G. Parent 1985. Edible wild vegetable products in the Zambian woodland area : A nutritional and ecological approach. Ecology of Food and Nutrition. 18:43-82.

Ogle B. M. and L.E Grivetti 1985. Legacy of the chameleon edible wild plants in the kingdom of Swaziland, S. Africa. A cultural, ecological, nutritional study. Ecology of food and nutrition. 16(3): 193-208.

Truscott, K. 1986. Socio – economic factors in food production and consumption. Food and Nutrition. 12 (1): 27-37.

Wikens, G.E et al. (eds.) 1985. Plants for arid lands. Proceedings of Kew international conference on Economic plants for arid lands. Allen and Unwin, London.

LINK

Forestry investments in emerging markets - new video

About 50 investors, investment advisors, and forest business developers attended the meeting "Forestry Investments in Emerging Countries." The meeting took place from May 17th to the 19th 2011 in the Netherlands, and was organized by FAO and the NFP Facility together with Tropenbos International, the Business in Development (BID) Network, and the Ministry of Economic Affairs, Agriculture and Innovation of the Netherlands. Seventeen business fact sheets from seven countries provided the basis to discuss the risks and opportunities to invest in forestry in emerging and frontier markets in concrete terms. The cases included plantation forestry, natural forest management, processing and alternative businesses. Impressions and perspectives from participants have been summarized in a video:
http://www.youtube.com/watch?v=m_To727wN3A.

For further information, please see:
http://www.tropenbos.org/index.php/en/news/news-outcomes-bussines-event

Growing forest partnerships – Briefing papers - Published January 2011

- Empowering communities through forest partnerships
- Sustainable forestry: connecting local to global and vice versa
- Investing in locally controlled forestry
- Making local voices heard: the Three Rights holders Group

The 4 Briefing papers can be down loaded from:
http://www.growingforestpartnerships.org/resources-and-downloads

Can fragile states reduce their deforestation? This is the title of an article about to appear in *Forest Policy and Economics.* The originality of the REDD proposal is its incentives-based mechanism designed to reward the governments of developing countries for their performance in reducing deforestation as measured against a baseline. This mechanism is founded on the hypothesis that developing countries 'pay' an opportunity cost to conserve their forests and would prefer other choices and convert their wooden lands to other uses. The basic idea is, therefore, to pay rents to these countries to compensate for the anticipated foregone revenues. The reference to the theory of incentives (in its principal–agent version) is implicit but clear. In this REDD-related framework, the Government is taken as any economic agent who behaves rationally i.e. taking decisions after comparing the relative prices associated to various alternatives, then deciding to take action and implement effective measures to tackle deforestation and shift the nation-wide development path.

Such an approach ignores the political economy of the state, especially when dealing with "fragile" or even "failing" states facing severe but chronic institutional crises. Two assumptions underlying the REDD proposal are particularly critical: (i) the idea that the government of such a state is in a position to *make a decision* to shift its development pathway on the basis of a cost–benefit analysis that anticipates financial rewards, and (ii) the idea that, once such a decision has been made, the "fragile" state is capable, thanks to the financial rewards, to *implement and enforce the appropriate policies and measures* which could translate into deforestation reduction. The first sections of the article discuss the pertinence of applying such a REDD version of the theory of incentives to Governments, and particularly to Governments in fragile states, with respect to the historical patterns and the practical way those states work. The last sections discuss the possibility of alternative architecture for REDD, focusing on policies and measures targeting the drivers of

deforestation, and investments for intensifying agriculture, reforming land tenure and enhancing the functioning of the judicial system. The article seeks to show why incentive mechanisms should be used at another scale, for the benefits of local economic agents (companies, rural households, communities, etc.), and how a scaling down is likely to alleviate some of the constraints faced by incentives when operating at Government level.

For the whole abstract, visit: http://www.sciencedirect.com/science/article/pii/S1389934111000748

Source: **Alain Karsenty ;** *CIRAD, Département "Environnements et Sociétés", UPR 36*
TA C-36/D, Campus de Baillarguet. 34398 Montpellier Cedex 5 France. Tel : +33 (0)467 59 39 48. Fax: +33 (0)467 59 39 09. Mobile: +33 (0)6 72 88 47 03
Email: alain.karsenty@cirad.fr Website : *www.cirad.fr/ur/ressources_forestieres*

Theme and deadline for Next Issue

The prevailing world economic order is regarded by many as a system in crisis, in which economic gains have come at the expense of depleted natural resources and the degradation of the environmental well being of our planet. Africans know all too well the detrimental impact of these prevailing patterns. As part of the efforts to reverse this situation, and in order to work toward the establishment of more environmentally sustainable production and manufacturing processes, the "Rio+20" agenda has adopted " green economy" as a key theme in the context of sustainable development and poverty eradication. Further, the United Nations General Assembly declared 2011 as the International Year of Forests (IYF 2011) to raise awareness on sustainable management, conservation and sustainable development of all types of forests[1]. In this context, the African Forestry Wildlife Commission and the FAO have dedicated the December 2011 edition of Nature and Faune to examining how the forest sector has met and will continue to meet the needs of the green economy in Africa. The theme of the December 2011 edition of Nature & Faune is therefore "***The forest sector in the green economy in Africa***".

UNEP defines a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities[2]. The Global Citizens Center, led by Kevin Danaher, defines green economy as a global aggregate of individual communities meeting the needs of its citizens through the responsible, local production and exchange of goods and services.

The theme selected for the next issue will incorporate a wide range of issues highlighting sustainable natural resources management related activities including:

- the issues surrounding small and medium enterprises, and how to be economically profitable and still in the vanguard of the sustainable green economy;
- multipurpose management of forests for products and services allowing for articles in carbon as a potentially important new economically viable commodity from forests;
- aspects of urban and peri-urban forestry, benefits of green spaces;
- how a 'green economic approach' can satisfy the huge demand of forest products for African cities, now a source of negative pressures on the forest resources;
- there will be room to explore how well the management tools are being applied and how best to remove barriers to application of prescribed rules and policy that aim for realization of sustainable forest management objectives.

Overall, our theme embraces topics related to forests and food, agroforestry, sustainable intensification of smallholder crop production, water management and conservation, institutional arrangements and legal frameworks for the forest sector in the green economy in Africa;

We are wrapping up celebration of IYF 2011 and heading to the Earth Summit in 2012 (Rio + 20), thus we need to track experiences in and articulate plans for the *forest sector in the green economy in Africa.*

[1] http://www.un.org/en/events/iyof2011/

[2] UNEP, 2011, Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication - A Synthesis for Policy Makers, www.unep.org/greeneconomy

Nature & Faune invites you to submit manuscript(s) on successes, problems and concerns related to the above theme. In order to facilitate contributions from potential authors, we have created guidelines for the preparation of manuscripts for Nature & Faune. Short and succinct papers are preferred. Please visit our website or send us an email to receive a copy of the 'Guidelines for Authors'.
Email: **nature-faune@fao.org** / **Ada.Ndesoatanga@fao.org**
Website: http://www.fao.org/africa/publications/nature-and-faune-magazine/

Deadline for submission of manuscript(s) and other contributions is 30th September 2011.

Guideline for authors, Subscription and Correspondence

For our subscribers, readers and contributors:
Guidelines for Authors - In order to facilitate contributions from potential authors, we have created guidelines for the preparation of manuscripts for Nature & Faune. Please visit our website or send us an email to receive a copy of the 'Guidelines for Authors'.
Submission of articles - Send us your articles, news items, announcements and reports. Please know how important and delightful it is to receive your contributions and thank you for the many ways in which you continue to support Nature & Faune magazine as we all work to expand the reach and impact of conservation efforts in Africa.
Subscribe/unsubscribe - To subscribe or unsubscribe from future mailings, please send an email.

Contact Details:

Nature & Faune
FAO Regional Office for Africa
Gamel Abdul Nasser Road
P.O. Box GP 1628 Accra. GHANA

Tel.: (+233-302) 675000 / (+233-302) 7010930
Fax: (+233-302) 7010943 / (+233-302) 668 427
E-mail: nature-faune@fao.org
Website: *http://www.fao.org/africa/publications/nature-and-faune-magazine*