



African Forest Forum

A platform for stakeholders in African forestry



Forests and Trees

**Their roles and opportunities in Africa's
economic development, food security
and environmental health**

Bjorn Lundgren

2015

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African Forest Forum
c/o World Agroforestry Centre (ICRAF)
United Nations Avenue, Gigiri
P.O.Box 30677-00100, Nairobi, Kenya
Phone: +254 20 722 4000
Fax: +254 20 722 4001
Email: exec.sec@afforum.org
Website: www.afforum.org

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Foreword and acknowledgements

There is an obvious need today to better articulate and provide a broader picture of the potential roles that forests - natural forests as well as planted forests - and trees outside forests can play in addressing many current crucial development issues. It is of particular urgency and relevance to do so in light of the Sustainable Development Goals currently being identified for the global community and to achieve truly “green economies”. The needs, and the opportunities, for forests and trees outside forests to contribute to these goals are enormous, not least for the African continent and its peoples and nations.

The **African Forest Forum** (AFF) was set up in 2007 as an independent membership-based organisation to provide analyses, advice and advocacy on the potential of forests and trees to African regions, nations, policy makers and legislators, scientists, and managers at all levels (from farmers to commercial enterprises). Today, with over 1000 members from all over the continent and beyond, AFF has carried out numerous studies, issued many reports and books on important topics, organised workshops and training events, and supported African delegates in international negotiations on forests. It is today a recognised and respected actor on the forestry scene in Africa and internationally and has several cooperation agreements and formal links and memoranda of understanding with regional and international organisations in the wide forest field, e.g. AUC, FAO, UNEP, UNFF, ITTO, IUFRO, as well as with most sub-regional economic communities in Africa.

In 2009, AFF's Governing Council (GC) set up a working group under the chairmanship of **Prof. August Temu** “to promote forestry in regional and sub-regional initiatives”, initially with the specific aim of integrating forestry into the Comprehensive African Agricultural Development Plan (CAADP), where forests and trees until then were conspicuously absent. This was partially successful, but it was soon realised that a broader promotional approach, addressing a wider audience, was required to highlight the range of opportunities and challenges were forests and trees can contribute. These include economic development, poverty alleviation and employment, food security and agriculture, climate change mitigation and adaptation, including increased carbon storage and protection against extreme climate events, biodiversity conservation/management, improved hydrology and water availability, and many others.

As a starting point, the GC of AFF commissioned **Dr. Bjorn Lundgren**, one of its members and a Founder Member of the Forum, to compile the current report on *“Forests and Trees – their roles and opportunities in Africa's economic development, food security and environmental health”*. Though Swedish by nationality, Dr. Lundgren was seen as eminently suitable for the task after having spent most of his over 45 years long professional career in Africa – as a researcher and lecturer, ten years as DG of ICRAF, ten years as Director of IFS, as chair of the board of UNU/INRA, as member of the boards of AFORNET and the “SFM in Africa” project, and as a consultant on a wide range of research and development issues, including forestry, agroforestry, agriculture, plant genetic resources, capacity building, etc., in many African countries and regions.

In carrying out the work, very valuable facts, views, inputs, comments and suggestions have been provided by numerous AFF-associated experts, not least all the authors of the range of special studies and reports on different topics quoted in the report and found in the Reference section. Special comments and inputs were provided by **Prof Godwin Kowero**, AFF's Executive Secretary, **Prof Fred Owino**, **Mr. Humphrey Ngibuini** and **Prof Demel Teketay**, all members of the AFF GC, and by **Mr. Ake Barklund** (KSLA).

It is timely that this report will be released at the occasion of the first World Forestry Congress held in Africa, in Durban in September this year. We hope that the many novel ideas presented in this document will be useful to countries, regions, enterprises and organisations that wish to more prominently feature and incorporate forests and trees in various strategies and plans.

On behalf of the African Forest Forum and its Governing Council and members, I thank Dr. Lundgren and all who have contributed to the report.

Abuja June 2015



Macarthy Oyebo

Chair of AFF Governing Council

Former Federal Director of Forestry Nigeria

Acronyms, abbreviations and web addresses

Acronyms	Full name	Web address (where applicable)
AFF	African Forest Forum	www.afforum.org
AFOLU	Agriculture, Forestry, and Other Land Uses	
AGRA	Alliance for a Green Revolution in Africa	www.agra-alliance.org
ALAP	African Landscapes Action Plan	
ANAFE	African Network for Agriculture, Agroforestry and Natural Resources Education	www.anafeafrica.org
ATIBT	Association Technique Internationale des Bois Tropicaux	www.atibt.com
ATO	African Timber Organisation	
AU	African Union	www.au.int/
CAADP	Comprehensive African Agriculture Development Plan	www.au.int/caadp
CAFO	Central African Forest Observatory	www.observatoire-comifac.net/
CBD	Convention on Biological Diversity	www.cbd.int/
CBFGs	Community Based Forest Groups	
CBFP	Congo Basin Forest Partnership	www.pfbc-cbfp.org/
CDM	Clean Development Mechanisms	
CGIAR	Consultative Group for International Agricultural Research	www.cgiar.org
CI	Conservation International	www.conservation.org
CIAT	International Centre for Tropical Agriculture	www.ciat.org
CIFOR	Centre for International Forestry Research	www.cifor.org
CILSS	Comité Permanent Interetats de Lutte Contre la Secheresse dans le Sahel	www.cilssnet.org
CIMMYT	International Maize and Wheat Improvement Centre	www.cimmyt.org
CIRAD	La Recherche Agronomique pour le Développement	www.cirad.fr
COMIFAC	Commission des Forêts d'Afrique Centrale	www.comifac.org
COP	Conference of Parties	
DRC	Democratic Republic of Congo	
EAAFRO	East African Agriculture and Forestry Research Organisation	
EAC	East African Community	www.eac.int/
ECOWAS	Economic Commission of West African States	www.ecowas.int/
EIA	Environment Investigation Agency	www.eia-international.org

FABI	Forestry and Agriculture Biotechnology Institute	www.fabinet.up.ac.za
FAO	Food and Agriculture Organisation of UN	www.fao.org
FFF	Forest and Farm Facility	www.fao.org/partnerships/forest-farm-facility/
FLEGT	Forest Law Enforcement, Governance and Trade	www.euflegt.efi.int/home/
FORIG	Forest Research Institute of Ghana	www.csir-forig.org.gh/
GDP	Gross Domestic Product	
GGWSSI	Great Green Wall of the Sahara and Sahel Initiative	information at the web-pages of FAO, Global Mechanism, AU, etc.
GPFLR	Global Partnership for Forest Landscape Restoration	www.forestlandscaperestoration.org
IAF	International Arrangements on Forests	information at UNFF web-page
ICRAF	World Agroforestry Centre	www.worldagroforestry.org
ICRISAT	International Centre for Research in the Semi-Arid Tropics	www.icrisat.org
IFIA	Inter-African Forest Industry Association	www.ifia-anglais.jimdo.com/
IFS	International Foundation for Science	www.ifs.se
IFPRI	International Food Policy Research Institute	www.ifpri.org
IIASA	International Institute for Applied Systems Analysis	www.iiasa.ac.at
IIED	International Institute for Environment and Development	www.iied.org
IITA	International Institute for Tropical Agriculture	www.iita.org
IPGRI	Bioversity, previously International Plant Genetic Resources Institute	www.bioversityinternational.org
ITTO	International Timber Trade Organisation	www.itto.int
IUCN	The International Union for Conservation of Nature	www.iucn.org
KEFRI	Kenya Forest Research Institute	www.kefri.org
KSLA	Royal Swedish Academy of Agriculture and Forestry	www.ksla.se
LULUCF	Land use, land use change and forestry	
MDGs	Millennium Development Goals	information at UN web-pages
NEPAD	New Partnership for Africa's Development	www.nepad.org
NFPF	National Forest Programme Facility	www.fao.org/forestry/nfp-facility/
NGO	Non-Governmental Organisation	
NLBI	Non Legally Binding Instrument on All Types of Forests	
NTFPs	Non-Timber Forest Products	
NWFPs	Non-Wood Forest Products	
PPP	Public-Private Partnerships	
PRSPs	Poverty Reduction Strategy Papers	

REDD+	Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon	www.un-redd.org
SADC	Southern Africa Development Community	www.sadc.int
SAFCOL	South African Forest Company Ltd.	www.komatilandforests.co.za
SDGs	Sustainable Development Goals	sustainabledevelopment.un.org
SFM	Sustainable Forest Management	
TFAP	Tropical Forest Action Plan	
TSBF	Tropical Soil Biology and Fertility Program	
UNCCD	United Nation Convention on Combatting Desertification	www.unccd.int
UNCED	UN Conference on Environment and Development	
UNCSD	UN Conference on Sustainable Development (Rio+20)	
UNEP	United Nations Environment Programme	www.unep.org
UNFCCC	United Nations Framework Convention on Climate Change	www.unfccc.int
UNFF	United Nations' Forum on Forests	www.un.org/esa/forests/
UNU/INRA	United Nations University Institute for Natural Resources in Africa	www.inra.unu.edu
WB	World Bank	www.worldbank.org
WRI	World Resources Institute	www.wri.org
WSSD	World Summit on Sustainable Development (Rio+10)	
WWF	World-Wide Fund for Nature	www.wwf.org

1. Background and purpose of this paper

Originally, the preparation of this document was inspired by the realisation that major continental development documents, such as the AU/NEPAD Comprehensive Africa Agriculture Development Programme (CAADP), and its implementation plan “The Roadmap” launched in 2003, did not fully address the potential roles of trees and forests in land production systems. Stakeholders in these sectors raised the issue at various forums, resulting in the development of a companion document partially covering forestry and fisheries. However, even the environment companion document driven by Senegal concentrated more on environmental influences of trees and forests while being more or less silent on their economic development and food security enhancing roles.

Therefore, in 2008, the Governing Council (GC) of the African Forest Forum (AFF) decided that one of its activities would be to raise the profile of forestry in pan-African initiatives. A Working Group (WG) on **“Raising the Profile of Forestry in CAADP”** (Forestry in CAADP) was established, which looked at various ways of introducing forestry aspects into the four CAADP “pillars”. A number of concrete recommendations on how to achieve a higher profile for forestry, and a more integrated way of introducing forests and trees into CAADP, were proposed. The working group was subsequently renamed **“WG to promote forestry in regional and sub-regional initiatives”** with a wider mandate, not only addressing CAADP but also meant to provide inputs and suggestions for other regional and sub-regional, as well as national, strategies related to the roles of natural resources, agriculture and environment on how to incorporate aspects of forests, trees and agroforestry.

To date, the level of interest in and commitment to such aspects being incorporated in the CAADP and other strategies and plans has been somewhat lacking among responsible institutions, even if there are signs of a growing awareness of forest aspects today. In this situation, the AFF GC felt that it would be worthwhile to develop the current report on the *“roles and opportunities of forests, and trees for Africa’s economic development, food security and environmental health”*. It is hoped that it can form the basis for forest development programmes in their own rights, but also that it may be merged and integrated with other land use and economic development strategies.

Thus, the **purposes** of this report are to:

- outline current features and trends in the forest and tree related sectors in Africa;
- indicate and provide an appropriate understanding of, and structure for dealing with, the opportunities and challenges of forests and trees in Africa in today’s dynamic economic, social and environmental situation;
- highlight technical, institutional and policy improvements/changes required to realise the opportunities and address the challenges; and,
- indicate steps required in a “way forward” for Governments, regional bodies and other stakeholders.

2. The African forest sector

2.1 Facts and figures on forest and tree resources

Available quantitative and qualitative information on forest areas and resources, and their use, in Africa (FAO 2010, 2011, 2014b; World Bank 2012) is often based on country assessment reports, many of which are unreliable. This is partly because they are compiled from submissions of statistics from countries that have not, or only partly, undertaken complete and recent forest inventories, and partly because definitions of what constitute different forms of “forests” varies and changes over time and among countries. More recently, the question of definitions have been further confused as individual countries are making cases for trade in carbon, e.g. through the REDD+ mechanism. In addition, significant proportions of the cutting of wood and use of wood-based products fall outside the formal sectors of the economy, and are therefore not captured in official statistics.

Nevertheless, using the most often quoted figures (from references above) Africa today has a forest area of c. 675 million ha, which equals c. 23% of the land area of the continent. In addition, there is c. 350 million ha (13% of area) of “other wooded land” (wooded savannahs, thickets and shrub-lands, etc.). Finally, there is a considerable, and apparently growing, volume of wood contained in “trees outside forests”, which include trees and other woody plants in rural landscapes (farms, pastures, agroforestry and horticultural systems, etc.) as well as in urban settings, on private land, along roads, etc. This latter category is difficult to quantify but an attempt was made by ICRAF using modern remote sensing techniques (Zomer *et al.* 2009). The study showed that there is a considerable volume and extent of trees in farming and pastoral systems (agroforestry), with more volumes the more humid the climate becomes. The main types of forest are the many forms of “dryland forests” of Southern (e.g. miombo wood-lands) and Eastern (e.g. wooded savannas) Africa and the Sahel region (parklands), and the Rain forests of the Congo Basin and parts of West Africa. Other types of forests do not cover large areas but are often very important, e.g. the mangrove forests along the coasts which cover a total of only 3 million ha, but are essential in protecting coastal ecosystems and inland areas from erosion, or the often small areas of mountain forests in the highlands of East Africa which act as “water towers” and regulate the hydrology of surrounding areas. Botanical and ecological characteristics of the various forest and woodland formations in Africa can be found in White (1983).

The area of planted forests in Africa is today given as c. 15 million ha. However, this includes large areas of even-aged but, strictly speaking, managed natural stands of *gum arabic* gardens (mainly made up of *Acacia senegal* in Sudan) and sometimes also rubber trees, oil and coconut palms and other horticultural plantations. Plantations established for wood production and/or protection purposes are probably less than 10 million ha, of which 2 million ha are commercial plantations in South Africa (Chamshama *et al.* 2009; Chamshama 2011). The rate of plantation establishment is moderate but has increased in recent years (Jacovelli 2014).

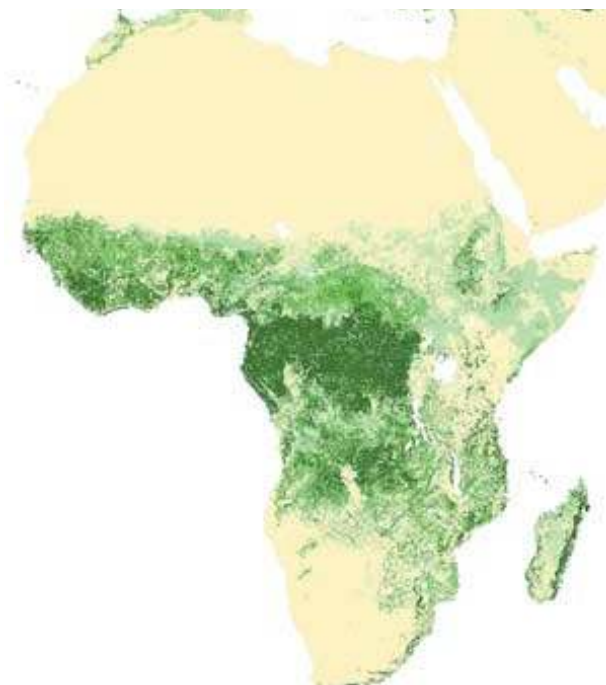


Figure 1. *FAO's forest map of Africa. Note that only the darker shades of green are closed forests and woodlands proper, other shades of green indicates degraded forests or land under other forms of use with significant tree growth, including agroforestry systems.*

2.2 Uses of forests and trees in Africa today

It is essential for the understanding of the “forest sector” in Africa to realise that more than 80%, or c. 615 million m³ annually, of all wood removals from forests, woodlands, trees outside forests and trees on farms is still used for ***fuelwood and charcoal***. It is estimated that 82% of household energy in Africa is derived from wood. In particular, the charcoal market makes up a very large part of the informal economy in many African countries (from references in 2.1 first para above).

This should be compared to the officially reported 72 million m³ of wood removed annually as ***industrial timber*** from the whole continent, i.e. roughly the same volume as harvested annually in Sweden alone. The figure, however, is probably a substantial underestimation in view of the large-scale illegal felling and trade of logs that is reported from many countries. For example, it was recently reported (EIA 2013) that almost half of the timber (c. 200 000 m³) exported from Mozambique to China was illegally felled. Likewise, there is substantial illegal trade in valuable hardwood timber from DRC through Uganda, Kenya and Tanzania, as well as from Liberia and South Sudan to various recipients.

The ***formal forest industry*** is small. With a few exceptions, e.g. the Mufindi Paper Mill in Tanzania, only South Africa has a significant, plantation-based mechanical wood and pulp/paper industry. In parts of West and Central Africa there are some medium-sized sawmills and other mechanical wood industries based on raw material from rain forest logging concessions and, much less, from plantations (Asumado 2004). Likewise, there is a limited sawmilling and board industry in East and Southern Africa, based on raw material supply from, normally, Government plantations.



Figure 2. Examples of the multitude of primary, secondary and tertiary wood products which normally fall outside formal markets and official statistics and, thereby, taxation. Still, a number of necessities are produced outside the official market, and millions of people derive their livelihood or part of it from such endeavours (photos 1, 3 and 4 FAO, 2 author).

Again, there is also substantial **informal secondary and tertiary tree and wood products activities**, e.g. in the chainsaw milling and pit-sawing, building material (scaffolding), furniture, wood carvings, and other sectors. Actually, the main sources of forest-based employment and economic activities, including in value adding and trade of wood products, in most countries are found in these informal and domestic sectors. These are normally not captured in official statistics and therefore their economic importance is difficult to quantify. For example, FAO estimated that c. half a million people in Africa are directly employed in the formal primary wood production and wood industry sector in SSA (FAO 2014b), while at least three times more people are employed in the informal sector, mainly related to fuelwood and charcoal (FAO 2014a).

A very interesting, long-term and still ongoing study by CIFOR and CIRAD (Cerutti *et al.* 2015) in several Central and West African countries sheds more light on the importance and magnitude of these forest activities. Looking at the domestic, informal and often illegal wood markets – from logging by small-scale forest farmers, via chainsaw millers, local timber merchants to local consumers – the study shows that the sector employs hundreds of thousands of people, involves millions of m³ of timber and supplies millions of consumers with essential goods. The conclusion is that instead of continuing to regard this sector as illegal (and feeding corruption) it should be brought under organised and sustainable forms with proper support and taxation.



Figure 3. “Informal” wood for sale at a market in Yaoundé. Today illegal but giving employment to thousands of people and providing more with essential wood products. (Photo from CIFOR Forest News blog).

The value of **non-timber forest products** (NTFPs), i.e. food, fodder, medicines, gums and resins, etc., is even more difficult to get reliable figures on, more than the fact that in large parts of Africa such NTFPs constitute a major source of nutrition and income for, particularly, rural people (Agustino *et al.* 2011). A very coarse and unreliable estimate puts the annual value of trade in NTFPs in Africa at USD 500 million (FAO 2014b), which undoubtedly is a gross underestimate.

Apart from the provision of wood and non-wood products, **forest land** itself has many, essential and varied uses, not least for environmental and ecosystem services, but also as a land reserve for agricultural and infrastructure expansion. Some of the crucially important functions of forest ecosystems and trees in landscapes in Africa include:

- harbouring and protection of a rich biodiversity, which in turn is the basis for a flourishing tourism industry, and a potential source of genetic resources for economic, social and environmental development;
- serving as an essential hydrologic regulator through its watershed functions;
- enhancing agricultural soil fertility (through “fertiliser trees” in agroforestry systems and as fallows); and,
- as carbon sinks.

It is encouraging to note that not less than 55 million ha of forests and woodlands were designated primarily for biodiversity conservation (national parks, game reserves) in 2010 and c. 20 million ha for protection of soil and water resources. Africa’s forests contribute 21% of total global carbon stock held in forests. The potential of using trees for soil fertility enhancement and agricultural productivity increases through landscape restoration approaches has been shown to be substantial.

It is worth noting that most of these productive and service functions are provided by Africa’s dry forests and woodlands, and not, as is sometimes believed, by the closed rainforests. This is in part because they cover a larger area, but mainly because the agro-ecological zones they occur in harbour a much larger part of Africa’s human population – more than 500 million against just around 80 million in the Congo Basin area (Chidumayo 2004). This, in turn, depends on the fact that the semi-arid to sub-humid zones of Africa have higher agricultural and livestock production potentials than the humid rainforest zone.

2.3 Current major trends and issues influencing the forest sector

It goes without saying that any attempt to make generally valid statements about current features and trends regarding forests and trees, as well as the cause and effect mechanisms behind such features and trends, runs the risk of over-simplifications. Africa is enormously big and varied with regard to economic, social and ecological conditions – from multi-million mega-cities to very sparsely populated arid areas, from raw material- and industry-based economies to traditional subsistence agriculture, from deserts to moist humid regions to alpine meadows, from a relatively wealthy middle class to abject poverty in some rural areas and city slums, from well-functioning democracies to disintegrating countries, etc. Nevertheless, it is permissible to identify some overall current trends, issues and needs (see also *Nair and Tieguhong 2004; Kowero et al. 2009*) which set the scene for analysing the roles of forests and trees in the coming decades, as discussed below.



Figure 4. Deforestation is still rampant in many parts of Africa, still predominantly caused by clearing of forests and woodland for small-scale agriculture.

Deforestation and forest degradation

In spite of the growing awareness about the importance of forests, deforestation and forest degradation are still rampant in many parts of Africa, notably in West and East Africa, even if the rate has gone down marginally in the last decade – from c. 4.1 million ha/y (0.56%) in the 1990-2000 period to 3.4 million (0.49%) in the 2000-2010 decade (*FAO 2011*). Still, in some countries deforestation remains rampant. In Tanzania alone, for example, it is estimated that 400 000 ha are cut and not replanted annually, i.e. 10% of the total loss of forests and woodlands in Africa.

It is, however, essential to bear in mind that deforestation and forest degradation occur for often very compelling reasons – by far the most important ones in Africa are the needs of farmers to extend their crop production and livestock keeping areas, and for local communities to harvest their needs of fuelwood, building material, and other forest products for subsistence needs, but also to access logs, sawn timber and non-wood forest products (NWFPs) for sale. Today, there is also an increasing contribution of commercial agricultural and forestry interests behind deforestation and forest degradation processes. Through both subsistence and commercial drivers, forest resources and land are made available for human use by supplying forest products, supporting food production and livelihoods, creating employment, contributing to national incomes and supporting other sectors (trade/industry). The only realistic strategies for reducing deforestation and forest degradation are

to increase food production outside forest lands and develop economically viable and attractive sustainable forest management and conservation practices.

Economic development

A more positive trend is the rapid economic development in many African countries – there was an average annual growth rate in GDP of 4.8% in the 2001-2010 decade, and the trend continues – Sub-Saharan Africa was predicted to have a growth of 5.2% in 2014. Following this is a quick growth in middle income groups (in 2011, 60 million African households earned at least USD 3 000), and in urbanisation (40% of the population live in cities). This has resulted in a very significant rise in demand for wood- and fibre-based products, e.g. charcoal, construction wood, paper products and standard furniture and interior design features (flooring, doors, window frames, etc.), as well as for a variety of NWFPs, including cash crops from trees and shrubs (tea, coffee, oil and coconut palms, rubber, *gum arabic* and frankincense, energy crops, etc.). A large part of these increased demands are still imported but more and more investors, both local and international, see the potential in the forest and tree crop sectors in Africa. The globalisation of trade and markets, Africa's strategic geographical position and its apparent potential for exporting wood-based products (and not only logs as today) further underline this trend. Countries like China (*Sun et al. 2014*), India and Brazil have vastly increased their investments on the continent, so far mainly in the energy (oil, gas and hydropower), mineral, construction and infrastructure, mechanical industry and agricultural sectors, but increasingly also in the forest sector. Investments in other sectors may also influence forests, e.g. by opening up previously inaccessible forest land for exploitation (*Weng et al. 2013; Edward et al. 2014*). An interesting study by CIFOR in the three countries Mozambique, Zambia and Zimbabwe makes an in-depth analysis of how Chinese investments in different land and mine related sectors have influenced the miombo woodlands of the region (*German et al. 2011*).

Competition for land

The latter point leads us to a more controversial trend affecting the future of forestry in Africa, viz. that of increasing competition for good land between food crops, commercial bio-energy production and forests/forestry (the so called 3F-question – *food, fibre and fuel*), which is a rather recently highlighted development (*KSLA 2012; Chipeta 2012*). Africa is a continent which certainly has vast expanses of land with sparse population and extensive current land use - e.g. the miombo woodlands of Southern Africa, savanna woodlands in Eastern Africa and the rain forest regions of Central Africa – all moderately suitable for large scale production of food and energy crops and timber plantations.



Figure 5. Growing competition for land for food, fibre and fuel in Africa is a major concern, but also an opportunity to attract valuable investments (photo Green Resources Ltd.).

The “scramble” for such land, both by local and foreign investors, has exploded in the last 10-15 years. Investors from all over the world are looking for opportunities to grow food for export to their home countries or world markets, energy plants (soy beans, grains, oil palms, sugar cane, trees, etc.) for biofuel use, or tree plantations for timber and pulp production. The International Food Policy Research Institute (IFPRI), for example, calculated that only in the three years between 2006 and 2009, 15-20 million ha of land in “poor countries” have been sold/leased or were under negotiation for sale to foreign buyers, most of this in Africa (the figure today is very likely considerably higher). It has led to many conflicts and disagreements between investors, governments and local communities, and the characterisation of such investments as “land grabbing” is often heard. However, there are an increasing number of very good examples where investors, local communities, and local and national governments have come to very satisfactory arrangements with benefits to all concerned (see, for example, the case from Ghana under Section 3.2 below).

The International Institute of Applied Systems Analysis (IIASA) has made some very thought-provoking studies and models, which clearly indicate that the “three F issue” rapidly deserves the attention of politicians, international organisations and regional/national bodies in many parts of the world (Nilsson 2012). However, it is also worth noting that the World Resources Institute (WRI) and partners in the Global Partnership on Forest Landscape Restoration have shown that there are close to 2 billion ha of degraded or partly degraded lands which are suitable for forest and land restoration worldwide, of which more than 700 million ha in Africa alone (GPFLR 2011). The great challenge and potential of forest landscape restoration is currently hardly addressed by African countries.

Tree production by farms and communities

Another trend worth highlighting, partly addressing similar problems and potentials as that of land availability, but mainly operating in more densely populated areas, is that of a shift in commercial tree production towards farms and communities and to trees and other woody plants outside forests. As a result of increased demands for timber, but also of improved land tenure conditions and declining real prices of agricultural cash crops, farmers in many areas in Africa have realised the potential of investing in tree growing for sale – as timber to local sawmills, scaffolding poles to building companies, transmission poles for electricity companies, charcoal for urban people, etc. - as a source of income comparable to other crops. For example, in the Southern Highlands of Tanzania, small farmers are increasingly earning a better income from sale of trees and increasing the value of their land – whereas a hectare of “normal” semi-degraded crop or grazing land is valued at c. USD 125, the value increases manifold (up to ten times) when a good stand of 4-6 year old pines or eucalypts grows on the land¹.

Sometimes, farmers grow trees on a contractual basis as out-growers to forest industries, e.g. in South Africa. The trend of increased interest in tree growing by farmers and communities has also resulted in, and been made possible by, a rapid increase in tree grower associations, community based forest user and producer groups (CBFGs) and cooperatives, e.g. in Eastern and Southern Africa (Johansson *et al.* 2013; Odera 2009). Multi-purpose trees (for fodder, soil fertility, fuelwood, fruits, etc.) are also increasingly established in agriculture and pasture systems (agro-forestry)

¹ Personal communication Mwaniki Ngibuini.

Forests and climate change

On the international policy and development scene, a very strong trend in the last decade has been to increasingly and singularly regard forests and their management in relation to climate change and the ongoing discussions on this topic. This is also of relevance to and affects Africa (*Chidumayo et al. 2011*) – no forest-related development and economic undertaking, new policy, research and education programme, conservation effort, etc., can today be launched without predominantly justifying it for its impact on climate change mitigation and/or adaptation. While this may be positive in that it puts a new focus on forests and forestry, and attracts previously unheard of amounts of funds for “forest-climate” initiatives, it also has drawbacks. The most problematic one is that this focus on climate change takes attention away from the enormously important current and potential roles of sustainably managed forests and trees as drivers of economic development and poverty alleviation. It also tends to distract attention from more immediately important needs of conserving forests for biodiversity protection and hydrology enhancement.

Another complication relates to the difficulties for farmers and local companies to benefit from the many new “carbon credit” schemes – the procedures are complicated, transaction costs are high and time consuming and benefit sharing systems are not transparent. As a result of these factors and falling prices of carbon, many of the REDD+ pilot projects in Africa have not been successful when focussing on carbon alone. However, there are positive signs today that funders of various REDD+, carbon credit through “clean development mechanisms” (CDM) and climate mitigation programmes realise that without putting economic and “conventional” conservation effects in the foreground, it will not be realistic to achieve major positive impacts on climate through “forest-climate” programmes (*Broekhoven & Wit 2014*).

3. Potential roles of forests and trees in Africa

3.1 A suggested structure for analysing and highlighting roles of forests and trees

For the sake of clarity in analyses and advocacy, and for incorporating forests and trees into regional and national economic development and conservation strategies, it is useful to look at the roles and opportunities of forests and trees in addressing many of the above mentioned potentials and challenges under three main categories, viz.:

- as contributors to **economic development** and **poverty alleviation**,
- as contributors to improved **food security**, and,
- as contributors to enhanced **environmental stability** and **values**.

Using similar terminology and concepts as in CAADP, we chose to envisage these as **three pillars**, each with its specific sets of goals and opportunities, as well as aspects of policy, management, socio-economics, research and education needs. Naturally, there are cross-cutting issues as well, and in many concrete situations, goals and actions within different pillars will interact and necessitate integrated approaches to addressing them. And, equally important, each pillar and the whole sector will need to be seen as integrated components of total development, land use and conservation strategies. Thus, the pillars are:

Pillar I. The contribution of forests and trees outside forests to economic and social development and to poverty alleviation. In this pillar, the many ways and opportunities in which wood and non-wood forest products form the basis for income generation through production, value adding and sale of a large variety of items is the focus. The production and economic potential for farmers, communities and private enterprise, as well as for governments in the form of increased tax incomes, will be highlighted.

Pillar II. The contribution of forests and trees outside forests to food security. In this pillar, the focus is on the many ways that forests and trees can support food security and production – as an income supplement for rural people, as a soil fertility improver, producing food and fodder, contributing to water availability in agricultural landscapes, providing a more amenable micro-climate for crops and domestic animals, etc.

Pillar III. The contribution of forests and trees outside forests to environmental health. In this pillar, the focus is on the relation between forests and hydrological dynamics, biodiversity conservation and, not least, climate change issues. Topics such as REDD+, watershed management, ecosystem services, and ecotourism potentials will be treated. These aspects of forests have been in international focus in recent years, not least in the context of international negotiations on climate (UNFCCC) and biodiversity (CBD).

Below follow some elaboration on these three pillars, and challenges and potentials to consider in addressing them.

3.2 Economic development

Reducing poverty by increasing poor peoples' income, and achieving economic development in general, are obvious goals in national (e.g. as expressed in Poverty Reduction Strategies – PRSPs), regional (e.g. the objectives of the New Economic Partnership for Africa's Development – NEPAD), and international (e.g. Agenda 21, the UN Millennium Development Goals/MDGs, and, after 2015, the UN Sustainable Development Goals/SDGs) policies. Unfortunately, at all these goal levels, neither the real current value nor the potential importance of forests and trees and the vast array of goods and utilities derived from them (wood/fibre, energy, food, fodder, medicines, ecosystem services, etc.) are fully appreciated. This is mainly because most of these goods and utilities, and the trade and sales of them, are not captured in national or international statistics. Sometimes this is because production, trade and/or consumption of them are officially illegal, sometimes because the whole value chain for products falls outside the measured and taxed market. This applies to locally collected, produced and sold furniture and building material, NWFPs and, not least, firewood and charcoal. What is captured in official statistics is what is produced through larger secondary and tertiary industry and through legal trade, export and import, which, with the possible exceptions of the forest-rich countries of the Congo Basin and the plantation-based forest industry of South Africa, is quite modest. For example, FAO estimates that the average contribution of the formal forest sector to the GDP of countries in SSA is 1.2% - in 14 countries it exceeds 3% - while it would probably more than double if the informal forest sector was added (FAO 2014b).

The charcoal market

As illustrations of what we mean, let us look at three examples from the charcoal markets in East Africa. In the capital of Rwanda, Kigali, with its c 800 000 inhabitants and where almost all households use charcoal for cooking and heating, it was estimated (*by the author, unpublished*) in 2007 that the annual sale of charcoal was valued at USD 25-30 million. This was close to the country's biggest export income earner at the time, coffee, which brought in USD 35 million in 2006. About half of the sales value in Kigali of charcoal goes to the rural producers, half to the transport and trade entrepreneurs involved. In all, it is likely that tens of thousands of people earn their livelihood from charcoal production and trade. Nothing of this shows up in official statistics and, obviously, there is no tax income for the state from this trade.

Even more staggering figures were revealed in reports from Kenya and Tanzania in 2008 and 2009, respectively. In the Kenyan study², it was claimed that *"The charcoal industry represents an estimated annual market value of USD 425 million that is not visible to the government because of its informal nature. The government loses over USD 68 million annually as a result of not having any regulatory and VAT tax collection mechanisms for the charcoal industry"*. Equally interesting are the social and livelihood aspects of this production and trade: *"The charcoal industry employs over 700 000 people who support over 2 million dependants. Where wood supply is not a constraint, fulltime charcoal producers can earn between Kshs 20 000 and 30 000 per month making it a wellpaying proposition."* Actually, this was well above the then national average family income and it is important to realise that 75% of the charcoal come from dry areas of the country, normally seen as the most poverty stricken regions.

2 For Kenya, the basis for the figures is an unpublished consultancy report: *"Miti Mingi Maisha Bora – Support to Forest Sector Reform in Kenya"* (2008).



Figure 6. The production, transport and sale of charcoal are probably the largest informal wood-based economic sectors in Africa today.

The Tanzanian study indicates a similar magnitude in charcoal trade and in its income earning potential with an annual value of USD 650 million per year, creating 2 million full- or part-time jobs. For example, it is estimated that the city of Dar es Salaam alone uses in excess of 1.6 million bags of charcoal annually! Neither of these figures ends up in official GDP or employment statistics, and the estimated loss to GoT was USD 100 million as a result of missed taxation incomes (*World Bank 2009*). Also in Uganda, a recent study showed a great economic value in the production, transport and sale of charcoal (*Shively et al. 2010*).

A more sinister example of the value of charcoal trade is the alleged income it gives to the terrorist organisation al-Shabaab in Somalia, through export worth of USD 25 million annually to various Gulf countries, particularly Yemen.

Building poles and other products

Another tree-based product which has exploded in economic value in the “informal” sector is that of scaffolding poles for the burgeoning construction sector in some of the rapidly growing big cities of Africa. In Addis Ababa, Ethiopia, it was noted in early 2014 (*by the author*) that enormous quantities of such scaffolding poles from *Eucalyptus spp.* were transported into the city from thousands of farms in the surrounding countryside. Each pole was said to cost Birr 50 (c. USD 2.5) in the city. No studies had been made of this trade but it must have a turn-over of many million USD. How much of this that benefitted those farmers growing the poles is not known, but ought to be very significant (see pictures below). The concern expressed that the *Eucalyptus* trees exhaust the fertility of soils seem to be exaggerated, at least for one of the more commonly used species in Ethiopia, *E. camaldulensis* (*Desalegn Tadele et al. 2014*).



Figure 7. The market chain of Eucalyptus scaffolding poles for the construction boom in Addis Ababa – from small farmer woodlots, sale along the roads, transport to AA, sale to builders (at USD 2.50 per pole!) for use in construction work, and finally ending up as excellent firewood - is a huge and expanding but largely unquantified business (photos by Jurgen Blaser).

Another high value product that many farmers in Eastern Africa today benefit from producing are electricity transmission poles from *Eucalyptus spp.* It is estimated that for East Africa alone (Kenya, Tanzania and Uganda) there is a market of 3 million such poles per year and it is growing³.

There are several *ad hoc* studies and estimates from all over Africa for other wood and non-wood forest derived products - e.g. artisan furniture, wood carvings, implements and tools, fruit and nuts, spices, etc. - and their more or less obscure market and value chains from production to consumption. Although virtually all studies point at the growing economic importance of such products, and their significant roles in rural livelihoods, the overall view is normally that they represent a major *problem* in that the raw material is often derived from unsustainably and illegally managed resources.

This is obviously in part true, but equally true, and considerably much more constructive and challenging, is to look upon the growing production and trade of wood and non-wood forest-/tree-derived items as an enormous *potential* for poverty reduction and economic growth. Because the needs and demand for these products will not go away, they will instead grow very rapidly. Africa's population is increasing, urbanisation is growing even faster, and the recent upturn of many African economies, all contribute to rapidly growing domestic and intra-regional markets for these products. There are also growing export markets, e.g. in East Africa of charcoal to the Gulf States.

³ Personal communication Mwaniki Ngibuini.

Conventional forest products

Although wood for fuel, including charcoal, still accounts for the bulk of both volume and value of tree-derived products, conventional forest products, such as timber and pulpwood, are rapidly increasing in importance. Since long, plantation-based forest industry in Southern Africa, timber from concessions in Central Africa, and pockets of natural timber stands and plantations (often government owned) feeding a small-scale sawmilling industry in some parts of Eastern and West Africa, are the main forms of commercial, formal, primary and secondary forest operations. Today, such activities are rapidly increasing and private, cooperative and community investments in forest plantations and forest industry are visible in many parts of the continent.



Figure 8. The importation of wood, both in the form of logs and sawn timber, to China has increased by 7-10% per year for the last two decades. Timber from Africa, not always legally cut and exported, form an increasing part of this import. Picture from a harbour in China (photo Forest Trends).

There are several reasons for this increased interest in forestry. The most obvious is the rapidly expanding local and regional markets and demand for forest products in the wake of growing economic wealth, urbanisation and population increase. The export potential of forest products - from round wood via chips for pulp to processed sawn timber and more value added products - is enormous and we are only at the beginning of realising this potential. Not least the great demand for wood products in China, India, the Middle East and SE Asia places, particularly, East and Southern Africa in favourable positions to capture such markets. Particularly, the rapidly expanding role of China as an export market for Africa is staggering, both in general terms and for timber export in particular. Today, China is Africa's largest trading partner - over the past decade African trade with China has risen from USD 11 billion to USD 166 billion. And, in 2009, 78% of Africa's timber exports were bound for the Chinese market, having risen from 35% in 2000 (IIED 2014).

The rapid development of these international wood markets in combination with weak legislation, and lack of enforcement where legislation regulating use and trade of forest products exist, and deficient institutional regulatory mechanisms in many African countries, have contributed to a widespread illegal cutting and trade. It was, for example, recently calculated by the Environmental Investigation Agency (EIA 2013) that almost half of the timber exported from Mozambique to China was harvested illegally. Similar assessments have been made for timber exports from Tanzania, and it is a well-known fact that illegally felled and exported timber from currently or recently civil war torn countries like DRC and Liberia have helped finance these wars.

Unfortunately, these negative examples of forestry operations have tended to over-shadow the enormous positive potentials that lie in expanded and well-functioning, sustainably managed forest and tree resources for Africa, be they natural forests and woodlands, plantations or trees on farm.

There is a multitude of ways in which wood and non-wood forest/tree products can contribute to income generation and economic development - through production, value adding, sale of and trade in a large variety of goods and services. This applies to both basic necessities (fuel, fodder, building material, furniture, paper products, etc.) and more “luxury” and esoteric items (such as finer furniture, wood-based craft, exclusive floor boards, etc.). There are niches to be exploited for farmers, communities, small and large private enterprises, and for governments (taxes and public enterprises). Such potentials have never been more obvious than today with the rapid economic development in other sectors of the economies, urbanisation and growing middle classes, and export potentials following the globalisation of trade.

It is interesting and relevant to note also the growing interest in investing not only in timber concessions and round-wood and sawn-wood trade, as in the case of China mentioned above, but also in long-term investments in building up forest resources and forest industries in Africa. A very interesting case is the huge and long-term investment in forest plantations and forest industry recently initiated in Ghana by the African Plantations for Sustainable Development Ghana Ltd. (APSD) and its sister company Ashanti Pulp Company Ltd. (APCL). On a 320 000 ha large lease from seven local councils, 200 000+ ha of fast-growing *Acacia* and *Eucalyptus spp.* plantations will eventually provide raw material for one biomass-fuelled electric power plant with an output of 600 MWe and a pulp/paper mill with a capacity of 1.5 million tons/a. There will also be investments in improved agriculture and agroforestry, health and school facilities, as well as joint ventures with the local councils for commercial production of charcoal. The magnitude of the total investments in plantation establishment and industries will be a staggering 4.5 billion USD! But also the gains will be impressive if plans are realised – in 2035, it is estimated that 20 000 people will be employed in forest management and in the industries, and there will be an annual income flow of 1.5 billion USD. If successful, it will be the largest single investment in commercial forestry in Africa to date⁴.

3.3 Strengthened food security

With the sharp increases that occurred in food prices in 2008 and 2011, and the many, and increasingly frequent, droughts, fires and floods in Africa, the issue of food security and agricultural improvement have regained their rightful places among international and regional priorities. At first sight, the relations between the forests/trees and food security may not be apparent. However, there are at least three very direct, crucially important, and partly interrelated such groups of connections. A systematic review of the subject is currently conducted by CIFOR (*Foli et al. 2015*).

Supplementary incomes

First, there is the obvious relation between reduced poverty through supplementary income from trees and wood products and from NWFPs, and thereby an increased ability of people involved with such production and trade to buy part of their food needs, rather than producing all themselves. Likewise, in many parts of the continent, food from trees and shrubs, also outside farms, in the form of fruits, nuts and leaves (*Katende et al. 1999; Maunda et al. 1999; Ruffo et al. 2002; Teketay et al. 2010*) also play an important role in food security and nutrition, a role that very rarely is developed to its full potential through genetic improvement, domestication, improved management, etc., of trees yielding edible products.

⁴ Personal communication Per Olsson



Figure 9. Edible products from the forest are essential components of food security in many parts of Africa (photo ICRAF).

This also applies to the very significant role of leaves, twigs and shoots for fodder for domestic animals. Thus, the dual economic and nutritional potential of forests and trees can, and does already, contribute to food security among rural and urban poor. The potential of significantly increasing such contributions, e.g. from charcoal and building poles, was highlighted above.

Increased soil fertility

Second, there is the ability of trees and shrubs to restore soil fertility to agricultural fields by bringing up mineral nutrients from deeper soil layers and depositing them with decaying organic material on the soil surface and in the top-soil. These are the mechanisms behind traditional shifting cultivation and bush fallow systems, which have been practised since pre-historic times and are still in use in many parts of Africa.

Of considerably more interest today are the multitude of research and development efforts carried out on various agroforestry and integrated soil management systems to improve soil fertility, e.g. through improved fallow systems, use of “fertiliser trees”, “re-greening” campaigns, “evergreen agriculture”, etc., normally using N-fixing leguminous trees and shrubs. Research by ICRAF and other CGIAR Centres (IITA, CIAT, CIMMYT, ICRISAT) and international research programmes such as TSBF, in collaboration with numerous African agriculture and forestry research institutions, has provided ample evidence of the important role of trees in food production to both increase productivity of food and other agricultural crops and livestock, as well as enhancing the sustainability and stability of such systems (Ajayi *et al.* 2007; Akinnifesi *et al.* 2008a; Woomer 2012; Leakey 2014).

The crucial importance in Africa to increase productivity of food crops, not only through agro-forestry but also through conventional means of using more mineral fertilisers (see for example the recent important meeting of the Montpellier Panel, *Agriculture for Impact* 2014), is evidenced by looking at facts related to global cereal production, productivity increases and deforestation. Thus, in the period 1961-1999, 78% of global cereal production increases could be attributed to productivity increases (mainly through the “Green Revolution”) and 22% to expansion of agricultural land. In Africa, on the other hand, the figures were basically reversed with 34% of increases depending on better productivity (mainly in the commercial agriculture sector of Southern Africa) while 66% depended on area expansion, mainly through converting forest land to agriculture.

It is obviously difficult to put reliable monetary values on the potential importance of using trees to improve soil fertility, but one recent example from southern Niger is impressive. Here, a “re-greening” campaign through Farmer Managed Natural Regeneration (FMNR) of trees/shrubs on 5 million ha of degraded land led to a doubling of agricultural yields and the N-fertiliser equivalent of the trees’ impact was estimated at USD 500 million (Reij et al. 2009; Pye-Smith 2013; Sendzimir et al. 2012). A major regional initiative today that has multiple goals of improving food production, enhanced local economies and improve the environment through tree planting, agro-forestry and land restoration techniques is the Great Green Wall of Sahara and Sahel Initiative (GGWSSI), supported by the African Union, FAO, the World Bank and others (Abdou 2014a).



Figure 10. In much of Africa there is a rather dense tree cover in various agroforestry and silvo-pastoral land use systems. Much R&D efforts today, e.g. by ICRAF in collaboration with national institutions, aim at improving such tree components and systems (photos ICRAF).

Much research, development and scaling up efforts remain to be done to fully develop the potential of trees in general and agroforestry in particular to contribute to productivity increases, direct food production and improved incomes, work that will very suitably be addressed through regional networking efforts.

Agricultural environment macro-influences

Third, there are the macro-influences on the agricultural production systems associated with adjacent or up-stream forests, or the destructive removal or absence of them. The presence of forests, wood groves and trees are essential to the stability in water supply for irrigation, enhancement of meso-climate (temperatures and winds), and supply of supplementary inputs in the form of fodder, grazing, energy, and edible plants. Conversely, destruction of crucial watershed forests will cause erosion, irregular water flow in rivers and streams, flooding and more destructive fluctuations in local climate.

Although these relations are well known since very long, they tend to be overlooked in short-sighted decisions both by land users themselves and, often even more damaging, by politicians for whom excision of forest lands for other uses is tempting for a variety of reasons. The recent much publicised debate and actions related to the destruction of the Mau Forest watershed in Kenya and the ensuing, necessary but tragic, forced removal of people is evidence of the political dynamite in the forest-water issue! In recent years, the emergence of so called “landscape approaches” to rural development recognises the need to look upon the larger picture and the close relations and inter-actions between crop production, livestock rearing, forests and forestry, and other large-scale interactions influencing the sustainable access to natural resources (soil, water and biodiversity) – see, for example, Minang et al. 2015.

In summary, forests and trees interact with food security issues at many scales and in many essential ways. To ignore or underestimate these relations and the challenges and opportunities associated with them could lead to unnecessary negative impacts on food security, whereas a systematic enhancement of the positive interactions could be a powerful tool in improving food security and nutrition for both rural and urban poor in Africa (FAO Regional Office for Africa 2014).

3.4 Climate and environment enhancement

Finally, the environmental roles, problems and opportunities associated with forests are enormous and the only reason why they are treated as “pillar” III in this report is that they already attract very significant attention in virtually all international, regional and national fora, and, as stated above, tend to obscure the many economic and social roles, and the potential enhancement of food security, of Sustainable Forest Management as described in sections 3.2 and 3.3 above.

Climate change

Today, this obviously applies to the climate change issue and the actual and potential roles that forests and trees will/can play in both mitigation and adaptation efforts. The African Forest Forum (AFF) is, in collaboration with, and with support from, several partners (including Sweden, Switzerland, FAO, UNEP, CIFOR, ICRAF and many of the sub-regional organisations in Africa) heavily involved with the issue. In fact, there are few, if any, issues that have attracted as much effort by AFF in its short existence as the interactions between climate change and forests from an African perspective (Chidumayo et al. 2011).

In view of the importance of the issues, and the huge economic potentials and risks, as well as impacts on the continents’ forest resources, associated with the many instruments put in place by the international community today (for example, REDD+, CDM, the WB’s Carbon Finance Unit, and various other Carbon Funds – actually, it was calculated that, a few years ago, fourteen such environmental funds have sprung up to address mitigation and adaptation, emission trade, etc.) it will remain a top priority for the foreseeable future. Early on, already in 2009, AFF produced a position paper on the issue, in which, among other things was stated:

More significantly, the current and proposed mechanisms (e.g. REDD+, CDM) do not appear to address sufficiently the drivers of deforestation and degradation on the continent. Without significant improvements in crop and livestock agriculture, domestic and industrial energy efficiency, wood and non-wood harvesting and processing, and diversification of livelihood options for the poor, measures to reduce deforestation and degradation through these mechanisms hold very limited potential for impact on climate change mitigation and adaptation in Africa. For REDD or any other mechanism to be effective in Africa it should take into account activities in the full range of Agriculture, Forestry, and Other Land Uses (AFOLU)."

Although much has been written about forests, trees outside forests and climate since then (see, for example, Minang et al. 2015), and many international meetings have been held, e.g. the various UNFCCC meetings, including the 20th COP meeting in late 2014, at which much keep on being said about the roles of forests, the statement above still basically holds true.

Biodiversity

One environmental aspect of forests in Africa that remains important but which seems to have lost some of the prominence given to it only ten years ago (no doubt related to the emerging focus on climate change issues), is the role of forests and other tree-dominated ecosystems in biodiversity conservation and management. Biodiversity, in the sense of the variation of species and varieties of plants and animals, the genetic variation within them, as well as variations in their habitats have been in the focus of international attention and programmes since the Convention of Biological Diversity (CBD) was put in place following the 1992 meeting in Rio de Janeiro.



Figure 11. *Efforts to protect mountain gorillas and their montane forest habitat seem to have had a modest success in recent years in spite of disturbances caused by civil war (photo WWF).*

The biodiversity value of Africa's rainforests, woodlands and wooded savannahs, and of area-wise smaller but crucially important systems such as montane, mangrove and gallery forests, has been ascertained through numerous studies, and so has the documentation of the rapid destruction of these values through deforestation and degradation. In spite of local success stories of conserving and protecting, or sustainably utilising such biodiversity through ecotourism (in national parks or reserves), the picture remains bleak. Efforts championed by local national authorities and NGOs, private enterprises and international organisations such as WWF, IUCN and CI have met with mixed success and too often are not sustainable when external funding ceases.

Where population pressure is building up and where armed conflicts are reaching into forested and wooded areas, no matter earlier intentions of protecting forests, efforts to protect biodiversity are failing. However, there are also glimmers of hope, e.g. the developments in the previous disaster areas of the Mau Forest in Kenya, where eviction of illegal squatters and massive reforestation efforts seems to hold potential to turn the tide, and the Virunga volcanoes between DRC, Uganda and Rwanda, where recent counts actually reports increases in the population of mountain gorillas.

There are undeniably "biodiversity hotspots" where complete protection and conservation is the only feasible guarantee to protect valuable plant and animal species, or entire ecosystems. However, the way forward in biodiversity conservation and management must lie in multiple land use, recognition of the economic values in wild biodiversity (food, medicines, honey, gums and resins, chemicals, etc.) and the legitimate interest in exploiting some of this, the participation of local communities in the use and protection of the resources, and in approaches that look upon whole landscapes.

Hydrology

Finally, an old and well known environmental relation involving forests is coming into prominence again, viz. the role of forest vegetation and trees on the hydrology of river and lake basins (see also section above on food security). Already a hundred years ago, when colonial powers started to create forest reserves in African countries, the explicit justification was to protect water sources (and, of course, also to safeguard the supply of timber). Rapid population increase and resulting deforestation caused by the need for new agricultural land have put a new focus on the issue of water availability and hydrology.



Figure 12. All major rivers in Africa originate in forested or wooded areas. The protection and wise management of these forests are crucially important for the continent's future water supply.

There has been a continuous and accelerating process of deforestation for at least 50-75 years, which, in combination with the apparent increase in more recent decades of severe droughts, floods and fires, and the resulting food shortages and human sufferings, are issues of serious concern. Many experts predict water shortages to be the worst environmental, social and political problem in parts of Africa in the immediate future.

It is quite logical that some of the biggest cross-boundary and interregional development efforts in Africa in recent decades are focussing on “hydrological land/water units”, e.g. the various River Basin programmes or authorities (e.g. the Zambezi and Nile river basins), or the great lakes (e.g. the Lake Victoria Basin Commission). All big rivers in Africa, without exception, have their origin in forested areas, either the rain forest (Congo and Niger), the miombo or savanna woodlands (Ruaha, Rufiji, Limpopo and Zambezi) or the “montane forest water towers” of East Africa (Mara, Pangani, Athi and Tana), or a combination of all (the Nile). The decline in the macro-hydrological conditions is a much more serious threat than to agriculture alone (see above), it will affect all aspects of societal development and cause serious conflicts between people and nations. To address this emerging threat, determined efforts on a large scale must be made, including establishing the role(s) of the type, extent and management of forests in watershed stabilisation, and to work at all levels to achieve such forest-based watershed improvements.

4. Requirements to realise the potentials

Many of the actions and resources required in order to fully realising the potential of forests and trees to contribute to economic growth, food security and environmental health in Africa are obvious and uncontroversial, though rarely easy to accomplish and implement. They relate to available finance, appropriate and better knowledge and information, functioning markets, well organised institutions, enabling policies, clear tenure and user rights, effective and enforced legislation, etc. Furthermore, one needs to address questions on how to:

- run an efficient, participatory and consensus-driven process of developing forest policies and legislation;
- involve institutions and stakeholders, and which ones;
- identify problems and opportunities;
- set priorities and resolve disputes;
- support the process with facts and figures;
- implement and enforce results;
- handle multiple- and conflicting goals, e.g. economic gains versus environmental protection, food production versus wood production; and,
- put monitoring and evaluation systems in place, etc.

Naturally, such needs and requirements are not identical throughout the continent, but it is safe to say that they all must be addressed with various degrees of urgency in most countries and regions. This is an enormous challenge but, at least in broad terms, we know quite well what needs to be done and, equally important, we know where we need to know and do more. Below follows a brief listing with comments on some key such needs. It is not exhaustive but can serve as an entry point, or checklist, for governments and other actors responsible for developing the potential of forests and trees.

4.1 Policy and legislation

Policies

Forest policies were developed and adopted by most countries in Africa early on after independence in the 1950s-1970s. Most of these policies built on regulations and ideas introduced in colonial times, with emphasis on identifying and setting aside forest and woodland reserves for various purposes, government ownership of forests, protection against encroachment, securing timber and water sources and, later, conservation of wildlife resources. In some countries, policies also included the establishment of plantation forests to secure availability of utility timber. With few exceptions, many of these policies failed under the combined influence of lacking government commitment and resources, low priority given to forest issues, and rapid rural population increases with associated exploding needs for more agricultural land and food. Many governments tried to counter this with land reforms, by which earlier larger estates and government land were allocated to small-holders, but this has rarely been enough. Instead, massive encroachments into forests, increased illegal logging and tree cutting activities (mainly for firewood and charcoal, but also for commercial timber) have been predominant in the last four-five decades.

From the early 1970s and onwards, there has been a rapidly growing concern internationally about the rates and forms of deforestation and forest degradation, not only in Africa, of course, but globally. The realisation that part of the problem had to be addressed by rural people – farmers and communities – being more actively engaged in sustainably producing their own subsistence and commercial requirements of wood, led to an increasing focus on and interest in approaches such as “community forestry”, “farm forestry”, “social forestry” and “agro-forestry”, with different degrees of integration with farming activities. Attempts were made, although rarely successful, to incorporate some of these approaches in forest policies. The main problem was, and still is, that many aspects of tree and forest management by farmers and communities outside forest reserves interact, and sometimes are in conflict, with policies related to agriculture and environment.

Plans

The need to accompany policies with plans for how to manage, use and protect different types of forests and tree resources led to the very ambitious programme, spearheaded by FAO and with support from a number of bilateral and multilateral financing agencies, called *Tropical Forest Action Plans* (TFAPs), according to which each country should develop a plan for how to reduce and preferably stop deforestation. Large teams of consultants and experts travelled to different countries and developed, with normally grossly understaffed national teams, very ambitious “forest plans”. The problem, not entirely surprising, often turned out to be that the “forest action plans” were far too ambitious in relation to the resources and capacities, and often also commitments, available at national levels.

A more realistic and integrated approach were the *National Forest Programmes* (NFPs) used in the period 2002-2012, considering not only deforestation but also SFM in general, more involvement of concerned stake-holders, institutional reforms, relations with other sectors, etc. They were developed with the assistance of the NFP Facility based at FAO, recently reshaped as the Forest and Farm Facility (FFF). Through this effort, c. 20 African countries acquired such plans, some of which are currently under implementation.

Partly as a result of the work by the NFP Facility, partly emanating from the many forest-related international processes that came out of the Rio 1992 meeting (see below), and partly on their own, many African governments and regional organisations have increasingly recognised the importance of both the economic, social and environmental roles of forests and trees outside forests outlined in the previous chapter. This has brought about changes and new processes regarding policies and plans for management of and thinking around forest and tree resources, for example:

- decentralisation and devolution of administration and increased emphasis on participation by communities in forest management;
- changes in forest administrations towards more autonomous boards/authorities/commissions, and separation between law enforcement, advisory/extension and management roles;
- increasing roles of the private sector in forest production and industry; in some countries this has resulted in privatisation of public-owned enterprises and plantations;
- increasing roles of civil society, e.g. national and international NGOs, in influencing forest resources management through advocacy for and support of community participation; and,
- more clearly identifying roles of forests and how they interact with other land use and economic sectors.

Economic value

One overriding issue, often neglected and not fully appreciated, is that in order to effectively stop deforestation and forest degradation, and achieve long-term sustainable management of forest and tree resources on a large scale, these resources must acquire a significant, expanding and acknowledged economic value. All historical evidence from countries and regions which have halted deforestation and restored and expanded their forest resources in the last 100-150 years, without exception, bear witness to this (good examples are countries in the Nordic region, and more recently, parts of East and SE Asia).

It is not only, but mainly, in the form of the primary and added value of wood and non-wood forest products, but may also include direct financial benefits of conservation through, for example, eco-tourism, or ecosystem services such as soil fertility enhancement and water availability, all of which can be expressed and measured in quantitative and economic terms. All other values and roles of forests, including essential and desired ones, such as carbon sequestration, aesthetic and scientific values, biodiversity and species protection, etc. can only be significantly fulfilled in combination with economic values (which is often possible, but requires compromises), or by political and moral commitments from governments to compensate for lost economic opportunities where conflicting uses cannot be reconciled.



Figure 13. In recent decades, there has been an explosion of demand for electricity transmission poles, which has created a very lucrative economic business for farmers, particularly in Eastern and Southern Africa (photo Green Resources Ltd.).

Land and tree tenure

There are two aspects related to forest policy and legislation that are of particular importance in Africa in order to realise the economic potential of forests and trees - others are related to institutions, technical know-how and markets, which are dealt with in subsequent sections.

The first one is the need for land and tree tenure reforms. Throughout much of Africa, more than in other continents, the combined effect of traditional land tenure (with user rights vested in and distributed by local community mechanisms) and colonial traditions (with governments, national as well as local, *owning* forest land) have resulted in more or less serious constraints to the development

of sustainable and economically rewarding use of forest and tree resources. Added to this is a commonly occurring separation between land and tree tenure rights, with restrictions on owner- and user-rights to trees planted by farmers and communities. For activities which normally have an investment horizon of more than ten years, sometimes much longer, such restrictions in land and tree tenure rights are obviously negative to the willingness to engage in forest management and tree planting activities.

Today, many governments are trying to make capital and work investments in forestry and tree growing more interesting to farmers, communities and private enterprises by more liberal and longer-term leasing and user-right arrangements, timber concessions, public-private partnerships (PPP), etc. However, with a few exceptions, full private and legally acknowledged ownership of land and forest/tree resources, including inheritance rights between generations, rights of selling and buying land and forests, and ability to take loans with land and forest as collateral, is still far off in most countries.

Laws and regulations

The other is related to laws and regulations which need to be adapted to, and enforced in ways that support efforts by farmers, communities and private companies to gain from SFM, prevent illegal activities, and create an enabling environment for production, commerce and trade in tree-based products. As part of this, domestic, intra-African and international trade in forest products must be stimulated, but at the same time regulated. The FLEGT (Forest Law Enforcement, Governance and Trade) process could be applied as an analytical tool to identify needs and opportunities for improvement in legislation and law enforcement.

Likewise, the capacity to certify forest- and tree-derived products and forest operations should be built up within Africa. *Forest certification* involves assessing the quality of forest management in relation to a set of predetermined principles, criteria as well as indicators and their means of verification. It is a *soft policy instrument* that seeks to use assessments of forest management, the verification of legality, chains of custody, eco-labelling and trademarks to promote the sustainable management, conservation and development of forest resources in a holistic manner without compromising the rights, resources or requirements of present and future generations. It does not only give consumers credible guarantee but also aims to encourage ethical trade and commerce and improve market access through the *economically viable, environmentally appropriate and socially beneficial* management of trees, forests and related renewable resources, in order to guarantee law abidance and socially and environmentally acceptable standards (Barklund & Teketay 2004; Teketay 2015).

International processes

Finally, it is important to be aware of the many international conventions and processes directly or indirectly influencing national forest policies which are going on today, many following the UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, and its follow-ups, e.g. the World Summit on Sustainable Development (WSSD, Rio+10) in 2002 (in Johannesburg), and the Conference on Sustainable Development (UNCSD, Rio+20) in 2012. These include the conventions on climate change (UNFCCC), desertification (UNCCD) and biological diversity (CBD), as well as the discussions and negotiations going on within the United Nations Forum on Forests (UNFF). The latter meets bi-annually, while the three established conventions meets annually within their respective Conferences of the Parties (COPs). At all these meetings, various mechanisms, rules, concepts, policies, etc. are discussed, sometimes resulting in agreements with implications for national policies. Of direct importance to forestry and forests are, for example, Reducing Emissions from Deforestation and Forest Degradation, and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon (**REDD+**), Land use, land use change and forestry

(**LULUCF**), Non Legally Binding Instrument on All Types of Forests (**NLBI**), and on International Arrangement on Forests (**IAF**) (Blaser *et al.* 2014), which was endorsed by the UNFF11 meeting earlier this year (2015).

Taking active and informed part in all these processes and negotiations is an enormously resource and knowledge demanding task for African national governments and other stakeholders, both as individual countries and as a region, often having to act within the frame of the very disparate UN-defined negotiating group G77+China. This group includes very dominant players - apart from China, also Brazil, India, Indonesia and Iran - countries which often have different agendas and priorities related to forests than most African countries have. Still, outcomes, recommendations and binding agreements coming out of these processes may have far-reaching implications on national forest policies and legislation, opportunities for external funding and restrictions on options for using forest and tree resources. It is, therefore, essential to strengthen Africa in these processes on forestry and related areas, in order to ensure that African priorities and opportunities are met (Ruhombe *et al.* 2004; Kamugisha-Ruhombe 2009).

4.2 Institutional developments

Key elements in all successful development of the potential of forests and trees to contribute to national development are well functioning, effective, strong, dedicated, technically competent and non-corrupt institutions at all levels and with clearly defined and relevant mandates. How such cost-effective and relevant institutions are set up or, where they already exist, strengthened to cater for the management, advisory, capacity building, supporting, knowledge generating and monitoring needs of the forest sector must be given highest priority by governments, private operators and regional bodies. Resources spent on such institutions should be related to the perceived economic, food security, environmental and societal benefits of natural and planted forests as well as of trees outside forests, and will, thus, vary from country to country. Below are some comments on different types of institutions, their roles and needs.

Forest administrations

Traditionally, most African countries have public forest administrations of some kind, the size and powers of which are normally, but not always, related to the importance of the forest sector. They range from full Ministries, via separate Forest Departments under other Ministries (normally Agriculture, Natural Resources and/or Environment) to small sections under wider Departments (often parallel to Water and other resource sections, as in many West African countries). The roles and mandates obviously vary, but often they are related to protection and management of Government forests (including issuing of timber and logging concessions), law enforcement and, increasingly but still less common, advisory services to the public. Common to most of them is that they are rather weak, understaffed and lacking resources, which means that important tasks, including regular inventories of forest and tree resources, cannot be performed effectively. In some cases, particularly related to issuing and supervision of logging, trading and other permits, corruption has been, and remains, a problem. Another problem has been the well-meant but *ad hoc* and non-consistent foreign financial and technical support provided for particular efforts by forest administrations, e.g. in connection with the previously mentioned planning efforts (TFAP and NFP) or, in the 1970s-1990s period, support to build up of Government plantations and secondary wood industry based on such plantations. Often, when such external support ended, Governments did not provide continued resources for maintaining the activities initiated.

As pointed out above, there is today a clear trend for reforms of forest administrations and their tasks and mandate. These aim at decentralisation, devolution of powers and separation of tasks, e.g.

into separate entities responsible for management and protection of Government forests, extension support to private and community forest actors, and law enforcement and monitoring. The intentions of such reforms are normally good. The main problem is often that reforms, which very often require increased staff, financial resources and technical know-how to be effective, are not accompanied with determined efforts to provide and build up such resources.

Thus, a key requirement for realising the potential of forests and trees is to ensure that the roles of Government - be they management, extension, or law and policy enforcement – are performed by institutions that have enough and competent staff, sufficient resources, and clear mandates and goals. It is also essential that such institutions develop functioning mechanisms to collaborate and interact both with non-government forest-related actors and with government institutions responsible for other sectors.

Education and training

Improved and expanded facilities for education and training to provide competent staff for the forest sector is another key requirement in Africa. Today, there are not more than between five and ten institutions (Faculties, Schools, Departments) on the continent that provide under- and post-graduate academic training in forest-related subjects at an acceptable standard. They include Sokoine in Tanzania, Stellenbosch in South Africa, Makerere in Uganda, Wondo Genet in Ethiopia, Ibadan in Nigeria, Kumasi in Ghana and a few others. Many of these institutions were built up in the 1960s to 1990s with financial and technical support from external sources and often in various forms of “twinning” arrangements with forest faculties in the North. Some are still successful in attracting external resources for research and post-graduate training, while others have deteriorated after external funding ceased. And some are trying to adapt their curricula to more current priorities, e.g. to serve the needs of community forestry, agro-forestry, integrated land use, climate change, etc., while others maintain a rather traditional forestry perspective, often borrowed from the situation and priorities in the North many decades ago.

What is required is not necessarily the establishment of more forest faculties and academic education institutions, but rather strengthening existing ones and, most importantly, adapt curricula to current needs and opportunities. Thus, basic undergraduate training ought to address the public and private sectors’ staff needs to develop the potential of forests and trees for economic management, for food security improvement, and for environmental enhancement. Likewise, there should be a good mix of technical management, social and economic, and biological/environmental subjects, as well as inter-sectoral aspects. At post-graduate levels, specialisation in any combinations of these needs and subjects would be desirable.

Higher education institutions are eminently suitable to serve the needs of larger regions of countries sharing similar agro-ecological, social and economic conditions, opportunities and challenges. Some already attract students from other countries, but such regional mandates should be strengthened and acknowledged through ratification by the already existing regional bodies such as EAC, SADC, ECOWAS, CILSS, etc. Likewise, strengthened collaboration and networking within the continent, both with similar institutions and with the private and NGO sectors, and with education and research institutions outside Africa should be aimed for. The role of higher education institutions to provide training to up-date already active forest graduates in current and emerging aspects in their fields also ought to be strengthened.



Figure 14. *The need for training of trainers, in the form of medium level forest extension personnel is enormous in Africa today.*

The major staff problem for the forest sector today, however, is not at the academic level but at the field technical level. The very poor and deteriorating situation in training of people at Technician, Certificate and Diploma levels was pointed out already a decade ago by ANAFE (Temu 2006; Temu et al. 2006). For a variety of reasons, Forest Schools ceased to exist or experienced increasing problems in attracting students and resources. This has created a situation today of very serious shortages of staff at middle management and field operation levels, i.e. staff responsible for forest management operations (logging, planting, silviculture, transport, etc.), nurseries, small-scale forest industries, extension services, day-to day supervision and protection of forest resources, law enforcement in the field, etc. For most African countries with an ambition to make forests and trees outside forests contribute to economic development and food security, this is by far the most urgent problem to address. Again, regional training centres are an interesting option. It is also essential to make the training more attractive to students, e.g. by introducing components in curricula focussing on entrepreneurial and business skills to make graduates from Forestry Schools more attractive to the private sector and more able to take up forest-related business themselves, rather than focussing solely, as has been the case to date, on creating junior and middle level civil servants.

Finally, there is an obvious massive training need of tree farmers, community forest managers and small-scale forest entrepreneurs on how to plant and manage forests and planted trees, as well as in primary wood processing and value addition. Currently, very few countries have adequate facilities and resources for this level of training. What little occurs is often done in the context of externally supported programmes, and there is an urgent requirement for government extension services, in collaboration with community forestry and tree planting umbrella organisations, and, in applicable situations, with private sector buyers and users of wood produced.

Forest research

The situation with respect to forest research institutions is somewhat more favourable. Apart from research programmes at educational institutions, normally linked to post-graduate work, there are, in many countries, also Government forest research institutes, with responsibilities to conduct applied research for the benefit of the sector. Although many such research institutes are underfunded, with resources barely enough to cover personal staff emoluments, some of these are strong and well accomplished, e.g. KEFRI in Kenya, FORIG in Ghana and FABI in South Africa. Many forest research institutes, as well as research programmes at Universities, have been successful in attracting external

funding for their work, including small (e.g. through IFS and various NGOs) and larger (e.g. IDRC and some bi- and multilateral agencies) research grants, partnership arrangements, and opportunities for Ph.D. studies abroad.



Figure 15. *Forest research needs to be strengthened and, particularly, focus on problems and potentials of real relevance to Africa.*

Another positive feature is the presence in Africa of strong international research institutes in the field of forestry (CIFOR), agroforestry (ICRAF) and tree seed genetic resources (Bioversity). Through collaborative arrangements with these, several national research institutes can benefit from high quality research partnerships and from inflow of resources, both contributing to capacity building at the national institutions. Basically, this external support and international collaboration is very beneficial, but it has one major potential, and in some cases real, draw-back, viz. that research priorities and agendas are increasingly defined by international concerns rather than national and local needs and priorities. An example today is the substantial resources going into research on climate change and the role of forests and trees to mitigate this and to adapt to it. Important as this undoubtedly is, it has certainly also diverted resources away from essential research needed on economic and technical aspects of forest and tree management, not least opportunities and challenges facing small scale tree growers and communities.

Research institutions must be strengthened and focussed on addressing real biological, economic, technical, social and environmental bottlenecks and opportunities to achieving SFM - by farmers, local communities and consumers as well as by the private sector and governments. In view of costs and the fact that researchable opportunities and problems are often applicable to many countries, e.g. by being agro-ecological zone specific or related to species/products used in many countries, it will be rational to explore regional approaches to research programmes and priorities. The case of the former East African Agriculture and Forestry Research Organisation (EAAFRO) stand out as an excellent example of what regional collaboration can achieve.

Farmer and community organisations

In the last, say, 20 years, there has been a high level of activity and interest in how to initiate and organise local farmers and communities around tree growing and forest management activities. In many countries in Africa, often with the support of local and international NGOs, all kinds of Tree Growers' Associations, Farm Forestry Groups, Forest Producers' Cooperatives, Community Forest Associations, Associations of Forest Users, Forest and Wood Industry Associations, Outgrower Groups, Associations for promoting forestry and tree planting, etc., have sprung up. Some have been successful and grown; others have succumbed, normally after withdrawal of external support (Odera 2009; Johansson et al. 2013).

The rationales behind these local institutions vary from improved incomes and livelihoods, enhanced environment, strengthening agroforestry systems, more secure rights to resources, better access to markets, or any combinations of these. Often the way of operation and goals reflect the social, economic and/or environmental agendas of the NGOs involved in supporting the setting up of the associations. Sometimes, the focus is on a single product or service (timber, charcoal, soil fertility enhancement, gums and resins etc.), others have a wider range of goals. Often, there are strong components of capacity building and empowerment (political and economic) involved. Some are very successful in quantitative terms, e.g. number of people involved or numbers of trees planted or areas brought under management, and some have become rather influential in local politics and economic development. It is not easy to draw any generally valid conclusions on what approaches and goals are successful, or which ones are not.

It is clear, however, that farmers and communities must be encouraged and supported to organise themselves, first in primary production activities, later in all parts of the wood and NWFPs value/market chains. The rapid developments of local, national, regional and international markets for all kinds of forest/tree-derived products are creating opportunities for significant economic gains for rural people. What institutional forms are best to benefit from these opportunities may vary, but it is desirable for Governments and partners from the private sector to support the efforts by creating enabling economic, legal and policy environments for these associations. This ought to include effective extension and advisory services, provision of high quality planting material, facilitation of public-private partnerships, lifting trade restrictions, ensuring that farmer and community organisations have a voice in policy processes, etc. It is also desirable that mechanisms are put in place for agreeing how to measure quantities and quality of wood for pricing purposes. Successful producer associations will increasingly get involved further down the value chains, e.g. in secondary wood industry, transport and retailing, which also will require support.

Private sector

The private sector involved in primary and secondary wood and NWFP production, and in value adding and trade in forest-based products, is organised in different ways in different countries and regions. The strongest national forest association on the continent is *Forestry South Africa* that organises over 90% of all commercial and corporate timber growers, with associated secondary industry, including plantation and industry giants such as Mondi, Sappi and SAFCOL. There are a number of national timber, sawmilling, forest industries and similar organisations in many other countries, but few are strong and influential in expressing the interest of and supporting their members. At the regional level, there is the Inter-African Forest Industries Association (IFIA), which organises African timber producers (mainly operating logging concessions and sawmills in the rain forest zone of Central and West Africa) and European companies importing timber and wood from those producers (mainly in France, Belgium and Germany). Another regional body is the recently formed SADC Timber Association (STA).

As the economic potential of forests become more obvious, the private sector will no doubt form stronger institutions on their own initiatives. The purposes of such associations are many, e.g. providing market information and analysis, promotion of the sector and its actors, information and public relation work, lobbying and influencing policy and legislation, compiling production statistics, representing the sector and its members at national, regional and international meetings and processes (including FLEGT), etc. They are often also working on increasing and up-dating skills and competences of member companies.

Professional associations

One type of institution that is often overlooked is professional foresters' associations. A recently conducted survey and analysis commissioned by AFF on a sub-regional basis in Southern and Eastern Africa (see *Kojwang 2011; Kamugisha 2011*) show that, with a few exceptions, such associations are very weak. They need strengthening to fulfil their important roles as promoters of professional standards and ethics, information to members, contributing to policy and other discussions and processes related to forests, work in the interest of the profession, and establish and maintain links with sister associations in other countries as well as with associations of other and related professions.

Regional organisations

Finally, there are a number of regional and sub-regional organisations with forest-related mandates of different kinds. The oldest one is the *African Timber Organisation (ATO)*, which is an intergovernmental organisation created in 1976 for cooperation on forestry issues, particularly timber production and trade, relating to its 14 member countries, which between them account for over 75% of the tropical natural forests on the African continent. Its main priority since 1994 has been to “promote the implementation of sustainable forest management in ATO member countries”. It is today a rather weak organisation, and its main strength is as a regional partner to the more influential International Tropical Timber Organisation (ITTO).

Another sub-regional intergovernmental organisation with partly overlapping membership (10 countries) is the *Commission des Forêts d'Afrique Centrale (COMIFAC)* which was created through the so called Yaoundé Declaration in 1999. This declaration recognised the protection of the Congo basin ecosystems as an integral component of the development process and reaffirms the member countries' commitment to work together to promote the sustainable use of the Congo basin forest ecosystems. This is done through the COMIFAC Convergence Plan adopted in 2005. The Commission is also one of the creators, together with a large number (in all 70) of donor countries, international and UN organisations, scientific institutions, private sector companies and NGOs, of the *Congo Basin Forest Partnership (CBFP)*, which was launched at the 2002 World Summit on Sustainable Development in Johannesburg, South Africa. CBFP works to support the implementation of the COMIFAC Convergence Plan by taking actions to protect regional biodiversity, promote good forest governance and improve standards of living in the region. A major regional status review with a very comprehensive analysis of the current forest and forest industry situation in the Congo Basin was recently published by the *Central Africa Forest Observatory (CAFO)* with the support of CBFP (*de Wasseige et al. 2014*).

Also in West Africa, the Economic Commission for West African States (ECOWAS), together with FAO, has launched a regional plan for the sustainable use and management of forests in that region (*ECOWAS/FAO 2013*).

The *African Forest Forum (AFF)* was established in 2007 with the aim of providing independent analysis and advice to national, regional and international institutions and actors on how economic, food security and environmental issues can be addressed through the sustainable management of forests and trees. It is an association of individuals with a commitment to the sustainable management, wise use and conservation of Africa's forest and tree resources. Today, there are more than 1000 members, foresters and others, from all over the continent and beyond, drawn from government services, research and education institutions, the private sector, international and UN bodies, NGOs, etc.. It has a Secretariat based at ICRAF's HQ in Nairobi, Kenya, currently with eight professional staff. Through a large number of commissioned studies and analyses of special topics, organising workshops and establishing special task forces, publishing reports, providing information to members and others, supporting African delegations to international negotiations, networking and agreements

of collaboration with most relevant international, regional and sub-regional bodies, participation in and contribution to the work of other institutions, etc., it has rapidly established itself as a major platform for promotion of good management, use and conservation of Africa's forest and tree resources. AFF certainly has the potential to act as a catalyst for strengthening the forest and tree sector on the continent.

4.3 Management and technical know-how

Apart from enabling policies and legislation, strong and relevant institutions at all levels, and sufficient numbers of trained and dedicated people, there is also a need to address challenges and problems of a technical and management nature in order to fully realise the outlined roles and potentials of forests and trees to contribute to economic development, increased food security and enhanced environment. Some of these challenges require research and development efforts, others are known but need to be more efficiently communicated to forest and tree users. They include plant material, management, products, inventory and monitoring, environmental interactions and integrated management, each of which are discussed below.

Plant material

Plant material with known and appropriate properties for whatever purpose trees and other woody perennials are grown - be it for timber for different end uses, charcoal, building or transmission poles, NWFPs, soil fertility enhancement, etc. - must be produced by and/or made available to farmers and communities in sufficient quantities, at the right time and at a reasonable price. Today, improved seed of commercial tree species, mainly for timber, is often imported and prohibitively expensive. Larger private enterprises in the forest sector normally know what to plant and how to acquire appropriate seed and plant material. However, it is a very common mistake, often with devastating results when well-meaning and enthusiastic, but ignorant, NGOs and others are promoting tree planting by farmers and communities as a goal in itself, without any consideration of the quality of trees planted and what they can be used for. The disappointment of having spent time and money on something that five or ten years later turn out to be of poor quality and unsellable is not a good basis for increased popular engagement in the tree growing business.

Improvement of tree genetic characteristics through selection and breeding in order to improve quality, growth, suitability for targeted uses, resistance to pests and diseases, adaptation to changing temperatures and rainfall patterns, etc., is in its infancy in the forest sector compared to what has been done in agriculture and horticulture. Many countries in Africa used to have some rudimentary tree improvement programmes in the past, particularly related to industrial timber species, but today, with the possible exception of work carried out by international institutions (e.g. ICRAF for some agroforestry species, and Bioversity), there are few major efforts in building and strengthening tree seed germplasm capacity in Africa. This needs to be given urgent attention and priority.

Another issue related to what plant material to use is the infected discussion on “indigenous” versus “exotic” species. To exclude the use of economically valuable and ecologically perfectly well adapted species simply because they have evolved biologically during millions of years outside the boundaries of 50-100 year old man-created national or regional boundaries is naïve at the best but rather irresponsible. A very significant number of tree species and genera which today are well integrated in the economic and ecological landscapes of Africa, e.g. pines, eucalypts, teak, cypresses, wattle, *Grevillea*, *Jacaranda*, *Prosopis*, and many more, are originally “exotic” in the sense that they have been brought in from outside the continent. Others (many *Acacia* spp., for example) are “indigenous” to the continent but have moved across national and regional boundaries

for centuries and are, thus, strictly speaking not “indigenous” within the boundaries of current-day countries and sub-regions where they are grown today. *Naturally*, when introducing new species or varieties, or moving them across boundaries, one must take care that they are not potentially harmful (e.g. carriers of pests and disease that can spread to local flora, or being aggressively invasive in the new environment) or that they are not used in the wrong ecological niches (e.g. planting fast-growing eucalypts in hydrologically sensitive areas). Obviously, mistakes have been made, but can be prevented by having phytosanitary rules and institutions to supervise these in place, and by having strict protocols for testing how new plant material perform in new environments. To argue that the forestry and tree sector should completely refrain from using “exotics” is the equivalent of denying African farmers and consumers growing, raising and consuming maize, cassava, wheat, rice, bananas and plantains, tea, cows, sheep, goats, and other “exotic” species, which are today the mainstay of agriculture and food security on the continent.

To avoid misunderstandings, it goes without saying that there are also hundreds of indigenous species of trees, which are in widespread use, or of potential use, and often have a comparative advantage (ecologically adapted to a site and with well-known products in the market) that have a large potential for improvement and also require determined efforts in selection and breeding.

Management

Management of forests and trees, i.e. raising seedlings, planting them in forests, plantations or on farms, silviculture (e.g. thinning, pruning, removing undesirable competing plants, etc.), logging and harvesting (whether of wood or NWFPs), transport to industry and other users, is important in order to get products of the right quality and quantity at the right time. In agroforestry and other integrated land use systems, management also involves how to combine the trees in space and time with other components of the systems. There is, and has been for a long time, quite a lot of relevant R&D work going on in Africa on many of these aspects, particularly related to commercial and larger scale forest operations in plantations and in natural or semi-natural forests, and more recently on managing trees in agroforestry systems. A special management need today, particularly in some countries in Eastern and Southern Africa, is the rehabilitation of tens of thousands of hectares of neglected and mismanaged, but potentially very valuable, public forest plantations (*Chamshama 2011*).



Figure 16. Rational production of wood through plantations has an enormous potential in much of Africa, from small-scale farm woodlots to large scale commercial plantations. There is a need for improved sustainable management techniques as well as for improved plant material to fully exploit the potentials of plantations (photos author).

Protecting forest from fires, particularly in the vast areas with marked dry seasons (Eastern and Southern Africa and the Sahel and Sudano-Sahelian regions), needs urgent improvement. National programmes for detecting and preventing forest fires must be developed and be treated as high priorities, together with strategies and resources for fighting wild and man-made fires when they occur. Another important aspect of managing risks is to have knowledge and institutional readiness to deal with pests and diseases.

Most urgently needed today, however, are robust and feasible management techniques adapted to the needs and resources of small scale tree growers and rural communities with limited access to external inputs (machine power and technical equipment, chemicals, fertilisers, etc.). Such techniques need to be developed in close partnership with farmers and communities, and they must be adapted to local economic, social, market and ecological conditions.

Products

Improvement of tree-based products, whether wood for various uses – from charcoal and building poles to timber for construction, furniture and other utility purposes - or NWFPs of different types (fruits, nuts, medicines, gums and resins, etc.) should be given more attention. Again, there used to be a number of “wood utilisation and technology” research and development institutions in many countries analysing and improving the properties of wood for different uses, and developing wood preservation technologies to withstand rot and termites. Many of these, unfortunately, have ceased operations or failed to adapt to expanding and changing consumer requirements. There are some institutions, projects, networks and other mechanisms working on the properties and improvement of specific products - e.g. gums and resins, medicines, charcoal, incense, etc. - that still do useful and interesting work. However, much more attention must be given to the study and improvement of wood, wood-based products and NWFPs. This should preferably involve partnerships between Government institutions, the commercial sector and consumer interests. Like in the case of other forest research and educational efforts, also product improvement may be done at a regional basis, given the similarity in products and consumer preferences between countries.

Inventory and monitoring

One of the most serious shortcomings in many African countries today is the lack of reliable systems for tree- and forest resources inventory and monitoring. There has been forest inventories carried out in the last 5-10 years, with the support of external sources (e.g. FAO), in some countries, e.g. in Tanzania 2009-2013 (*MNRT/FAO 2014*) and Mozambique (*RoM 2008*), and an ongoing one in Botswana funded by JICA of Japan. However, they are normally not followed up by continued and statistically reliable monitoring to track changes in forest areas, types, tree densities on farm, quality of forest resources, etc., over time. A lot of valuable information has been compiled in connection with the previously mentioned national forest plans (assisted by the NFP Facility) in c. 20 countries, and by the work of the Congo Basin Forest Partnership in support of the COMIFAC Convergence Plan. There are also recent international programmes for inventory and partly systematic monitoring of changes in forest areas by satellite imagery which also collect information from Africa (*Schepaschenko et al. 2015*).

There is an urgent need for many countries to have better information on the dynamics and values of their forest and tree resources in order to better plan their economic utilisation, environmental benefits, climate change mitigation effects (e.g. biomass and, thereby, CO₂ stored in, released from and built up in trees), and assess land use options.

Likewise, lack of reliable monitoring of production and trade in wood products (charcoal, timber, building poles, etc.) and some important NWFPs, as well as key forest/tree services (soil fertility

enhancement, hydrological conditions) must be addressed if the real economic, environmental and food security values of forests and trees shall be appreciated. Today, a very significant part of such products and services fall outside the radar of official overview and statistics and, thereby, are not captured in GNP figures, for taxation, or for support commensurate to their value through public extension and advisory services.

Environmental interactions

A particular set of aspects of forests that require increased technical knowledge and capacity to understand and manage is environmental interactions. Many of these are mentioned under other sections above, since they also require policy, research, legislation and other inputs, but there is also a hard core of basic technology required. In recent decades, a multitude of international, regional and national organisations – many NGOs, but also government and university departments – have been engaged in research, development, fact finding, advocacy, policy formulation and promotion of the climate, biodiversity, water and other environmental aspects of forests. As a result, much knowledge and insights have been gained on what needs to be done in order to understand and act upon such relations. Still, more need to be known on aspects such as the ability of forests and individual trees to mitigate CO₂ emissions and adapt to weather induced extremes caused by a warmer climate, how big areas and what kind of habitats different species of plant or animal, or ecosystem, require to ensure their survival, or what the quantitative relations are between river flow and various scenarios of forest area, quality and their use in watersheds. In some countries, e.g. South Africa, restrictions on tree planting have already been introduced where such are perceived to negatively interfere with water availability for domestic and agricultural purposes.

Integrated management

Still, the most urgent need is to understand how environmental and economic aspects of forests, agriculture and other land uses, and other natural resources interact and can be managed in integrated ways. It is unrealistic to assume that large enough tracts of forest can be set aside for single purposes to fully satisfy every individual need. Integration, optimisation, and compromises of different kinds must be guiding principles, and this will require much more knowledge, research, new policies and appropriate legislation. It will not be possible to achieve such perfect compromises between environmental and economic goals at individual land management unit levels but we must rather look at larger scales, at “landscapes” and regional land units. Much work and thought are currently devoted (see, for example, *Chavez-Tafur & Zagt 2014; Sayer et al. 2013; Minang et al. 2015*) to how to manage multipurpose and integrated landscapes, particularly by international environment and forestry institutions (e.g. WWF, IUCN, IIED, WRI, CIFOR, ICRAF and others). In 2014, a conference was held in Nairobi that resulted in an “African Landscape Action Plan” (ALAP 2014).

The fact remains, though, that today most institutions, including research institutions, national government ministries, or regional bodies, are not set up to address complex issues like the ones discussed above which require integrated and cross-disciplinary, and often cross-boundary, approaches. The answer probably does not lie in creating new mega-institutions since disciplinary and sector-specific knowledge, legislation, research, etc., will still be the natural basis for institutions, but rather to create mechanisms for collaboration and partnerships between institutions mandated to work on integrated and cross-disciplinary issues. Like with many other aspects touched upon earlier, it is likely that international, regional and sub-regional bodies can have a catalytic role to play in initiating such mechanisms.

4.4 Economic issues, value chains and infrastructure

It was earlier pointed out that only when forests and trees acquire an acknowledged and real economic value within legal and recognised frames, will they significantly contribute to economic development. Apart from an enabling policy and legal environment, which put emphases on incentives for sustainable forest and tree management, rather than on logging bans, prohibiting charcoal trade, or surrounding tree planting with out-dated restrictions, this will require a much better understanding of how economic markets and value chains of wood- and non-wood forest products function, and how these can be improved and supported. There is an unfortunate and lingering tendency among international as well as national civil servants, bi- and multi-lateral cooperation agencies, many NGOs, and at universities, of regarding private and commercial actors and a market economy with suspicion. Although in a few cases no doubt justified, this attitude often leads to unnecessary restrictions and lack of appreciation of the role of effective markets and functioning value chains with multiple actors (cooperatives, associations of private growers, commercial businesses, and also public companies and parastatals). Another set of constraints to well-functioning forest and wood value chains is the lack of good infrastructure for transport and marketing. Some comments related to what need to be addressed in this regard are discussed under economic factors, value chains and infrastructure below.

Economic factors

Among economic factors that need to be addressed is that of access to credit for investments, particularly by individual small farmers and rural communities that want to engage in tree growing and forest management activities. Because of the time frames involved between initial investment and income, and the lack of security in the form of land, commercial banks are normally hesitant to provide such loans, and if they do they charge prohibitive interests. With time, as tree growing and forest management have resulted in a build-up of value in growing wood and NWFPs, the situation may improve as the growing stock can be used as collateral. In some countries, cooperative and public credit facilities are established that better serve the needs of farmers and communities. Associated with the access to credit is obviously also the willingness to take risks, which is partly a matter of changing the mind-set of often conservative and risk-unwilling farmers and rural people. Some interesting approaches and case studies, in part also applicable to Africa, can be found in *Asen et al. 2012*.

Another factor of importance for well-functioning markets is reliable and timely information on prices paid for various products, and where. For producers in forestry and tree growing, this means prices paid for logs, charcoal, building poles and other primary products sold on local markets or by those buying directly from farmers and communities (and from private commercial tree growers, of course). It is also important to have mechanisms for as reliable as possible predictions of demand and prices in the foreseeable future, not least important in forestry and tree growing with its time lag between planting and selling. Naturally, such information and prediction instruments are of equal importance to secondary and tertiary producers, as well as for traders and retailers in forest-derived products.

It also goes without saying that the way Governments impose taxes, levies, fees, tolls and other charges need to be designed in such ways that they do not reduce or completely take away the willingness of farmers, communities or private business to engage in wood and NWFP production and trade, while still generating fair public incomes.

Value chains

In recent years, the awareness of the importance of working with entire value chains of different products, and understanding the supply-demand situation along the chains - from primary production, via secondary and tertiary production and value adding, transport, trade (including export, if applicable) and retailing, to the end consumers – has gained momentum. Positive as this is, there remain obvious gaps in the minds of governments, NGOs, R&D institutions and others, of a full appreciation of the many steps involved, how they are linked to each other and, not least, what costs are associated with different steps in the value chains.

A common cause for heated arguments and indignation is to compare the price paid to a farmer or community for a particular volume of wood or NWFP and the final retail price paid by a consumer in, say, a supermarket in a city for the end product, be it furniture, treated construction timber, writing paper or hygiene products, originating from the same volume of primary product. The fact that this difference is normally very significant is often taken as proof that unreasonable profits are made by “middlemen” at the expense of the original growers, rather than trying to understand the role and magnitude of investments in transport, value adding, trade and retailing that other actors make along the value chain.

Taking examples from Sweden, a country that hardly can be accused of permitting rampant exploitation of its farmers or forest owners, the normal case is that, out of the price in the consumer end of the chain, only 5-10% is made up of the primary raw material cost, i.e. the original price paid to the farmer/grower. The rest, 90-95%, is to cover costs for transport vehicles, secondary industry, energy, storage, sales promotion, taxes and, not least, labour costs along the different steps. And, yes, there is also a surplus or profit component, but the normal profit margin for actors along the value chains in forestry is normally less than 10%. Similar figures and relations apply to much of the agricultural sector.

Understanding such relations, e.g. by conducting systematic studies of the functioning and economic flows in value chains of different products, may also lead to an appreciation of the fact that the potential role of an expanded forest and tree commercial sector to national economies - employment, export earnings, public incomes, etc. - lies more in the gains of the further steps in the value chains, rather than in primary production alone, but also that this all depend on expanded and efficient tree growing and forest management.

Related to understanding the value chain is the need for a full appreciation of the supply-demand mechanisms and how to adapt tree growing, forestry, wood and NWFP production to realities related to these. Tree growing often become an aim in itself, and it is, for example, still quite rare that forest managers and tree growers systematically try to identify final consumer preferences as an input into the design of their production. If, say, the growing urban middle classes, which make up a dynamic and expanding component of consumers of forest products in Africa today, prefer charcoal made of particular species or furniture made from wood of special types, then it makes sense to plant such species. Or, if construction firms, electricity companies or furniture makers have specifications on durability and density of the timber they use, then this limits the number of attractive species to grow for those markets. It is not realistic to assume that such market intelligence and understanding can be built up by individual growers, but associations of tree grower cooperatives or community producer groups ought to build up such competences.

One aspect of the importance for the supply side driven by the demand side is that of the increased use of and pressure for *forest certification* (see also under section “Laws and regulations” on p. 24 above) by which products derived from forests are guaranteed to come from sustainably and socially and environmentally responsibly managed forests (*Barklund & Teketay 2004*). Although still in its infancy in Africa, the areas of certified forest, mainly through the Forest Stewardship Council (FSC), is increasing as a result of demands of consumers, mostly in Europe and North America, but increasingly

also in Asia and by urban populations in Africa itself. Virtually all commercial plantations in South Africa are today certified and there is a rapidly growing area of certified forest operations also in the rain forest concessions in Central and West Africa. The main constraint to certify forest operations by small farmers and rural communities are the prohibitive costs associated with it. It is important to build up an internal African capacity to carry out certification, particularly if the export market potentials for forest products shall be fully exploited. For the local domestic markets in general, there is not yet any pressure for certified wood.

Infrastructure

Finally, a functioning forest and tree products market require infrastructure that can facilitate its smooth operations. This obviously includes ITC and transport infrastructure in the form of roads, railways and, for export, harbours, but also a physical infrastructure for storage and marketing of products, as well as a functioning telecommunications infrastructure. Some of this, particularly at the “finer” ends of the producer chain, i.e. at farm and rural community levels, will require support from both local administrations and from the producers themselves. National transport and telecommunication systems are obviously the main responsibility of Governments, but innovative ways of exploring potentials for private initiatives and public-private partnerships (PPP) also in infrastructure developments are worth looking into, not least for the forest sector often requiring heavy and space-demanding transport and storage facilities and infrastructure.

5. The way forward

The potentials, opportunities, problems and needs in the wide forest sector touched upon above must primarily be understood and addressed by Africa's own institutions, governments and civil societies, both at local, national and regional levels, and not, as has often been the case in the past, be "pushed" by external agencies and NGOs. The recognition and ownership of the African Union of a Comprehensive Africa Agriculture Development Programme (CAADP) also including forestry as a prominent component would obviously be desirable. Still, it is also essential to accept that developing the full potentials of forestry and tree growing are not things that can be centrally commanded following some pre-determined "grand plan". It will instead take place, as it already does in some places, as thousands of farmers, communities and private enterprise see the potentials in their particular geographic and market situations. Successful initiatives of profitable forest management, community forestry undertakings, tree growers' cooperatives, forest-based ecotourism or small- or large-scale secondary wood and NWFP industries, will be copied and spread. Likewise, when individual governments and sub-regional bodies recognise the roles of forests and trees in economic development, food security and environmental enhancement, and adapt their policies, priorities and development strategies to support these, it will lead to more resources allocated to research, education, extension and other public undertakings in support of the forest sectors.

Thus, although challenges and opportunities will be addressed at many levels and as *ad hoc* initiatives, there are things that can be done at higher levels – national, sub-regional and continent-wise – to facilitate the development of the various roles of trees and forests. Thus, some initiatives that need to be taken and areas to be addressed are:

5.1 Assess current status

A good starting point is obviously to carry out inventories of current knowledge of the forest and tree resources, their economic value, environmental importance and their roles in food security. Such work would include identifying, in broad terms, what gaps there are in such knowledge and also potentials worth exploring. In many countries there is quite a lot of information, of course, through government statistics (on forest areas, trade and commerce, employment in different sectors, etc.), experiences and results from forest/tree-related development projects and programmes carried out by various actors, research results from universities and public research institutes, and from many other sources.

However, it is also true for most countries that statistics is not always reliable: much of what is done in the broad field of forest and tree use falls outside the formal sector of economies; there are much illegal activities (which, by definition are rarely quantified); activities and influences, both economic and environmental, related to trees and forests fall in many different and un-coordinated sectors (agriculture, environment, energy, industry and trade, etc.). Countries that have benefitted from more recent "forest planning" exercises - e.g. the ones promoted by the NFP Facility, which often used a broader participatory approach than the narrow conventional single sector approaches - are in a better position. Analyses of this broad nature should preferably be carried out jointly by concerned parties, i.e. Government, private sector, community- and farmer-based organisations, and consumer organisations.

5.2 Promote the inclusion of forests, trees and forestry in the mandates of regional bodies

Many of the opportunities and challenges related to the roles of forests and trees outside forests are regional in nature or would, for economic and environmental reasons, be relevant to deal with through regional collaboration and partnerships. These include conservation and ecosystems services aspects, such as hydrology in river basins and biodiversity conservation, economic factors, such as cross-border trade and establishing common standards for wood products and NWFPs, and opportunities for joint research and education programmes. Some of the sub-regional economic bodies, e.g. SADC and ECOWAS, as well as special regional commissions such as COMIFAC, are already having many forest issues on their agenda, but it could be further strengthened. Some issues are obviously of interest for smaller or larger groups of countries than those currently members of such organisations. Ultimately, the goal should be that the roles of forests and trees are featuring prominently at the continental level, equivalent to the way agriculture is dealt with through the AU/ NEPAD CAADP.

5.3 Explore opportunities to enter into partnerships with actors outside Africa

Many countries in Africa will stand to gain from working with development, technical and financial partners from outside the continent in achieving the full potentials of forests and trees. Many forest and natural resources oriented institutions - national, UN agencies and international organisations - outside Africa already have a long and successful experience of working with national and regional partners in Africa in developing and promoting forest management, use and conservation. This applies to overall sector development, small-scale forest industry, research, resource inventories, education, strengthening stakeholder organisations, conservation efforts, policy development, integrated land use, rural development, climate mitigation and adaptation, and other aspects. Over the years, a very significant number of forest professionals from outside the continent have worked in different parts of Africa, and thousands of African professionals in the wide natural resources field have benefited from gaining work experience, acquiring higher degrees and/or have attended short-term training provided by institutions in Europe and elsewhere.

Such collaboration ought to be strengthened, but it is essential that goals and agendas for such collaboration are set by countries and partners in Africa and follow priorities and plans focusing on economic, environmental and food security relevant to the countries and people in Africa. Likewise, it is important that external inputs are provided by partners with a comparative advantage, e.g. in the form of relevant and successful experience in building their own forest and tree-based sectors in the form of sustainable forest management, policies, industry, institutions, and research, extension and education systems in support of forestry. There has been a tendency that much support of and advice to the forest sector in Africa has been provided by rather academic/ theoretical and/or ideologically oriented organisations without any practical technical and economic experience themselves.

An example of how a systematic approach to identifying potential and mutually beneficial partnerships between the forest sectors in Africa and a country outside the continent, in this case Sweden, is the collaboration between the African Forest Forum (AFF) and the Royal Swedish Academy of Agriculture and Forestry (KSLA). Starting with an analysis of what relevant lessons from Sweden's successful development of its forest sector over the last 150 years are potentially applicable to Africa (*Lundgren 2009*), via an in-depth review of collaboration that actually has taken place between 1960 to 2010 (*Lundgren et al. 2011b*), to identifying key areas suitable for future collaboration (*Lundgren et al. 2011a*). It is a model that could be applied also to other potential partner countries.

5.4 Opportunities related to interest in climate change

The very rapid resurrection of interest in forest matters in recent years triggered by the climate change threat, and the perceived essential role of forests in countering such change, has added potentially very significant funds for forest developments. These include various REDD+ and carbon funds, but also the Global Environment Facility (GEF) has a window for supporting SFM initiatives. The “Green Climate Fund”, currently under development and fund pledges, aims at having 100 billion USD per year (!) available for climate programmes, which specifically also include forest initiatives. Naturally, African countries should utilise the potential in these sources of funding, and some countries already have. The build-up of increased and sustainably managed forest and tree resources is imminently suitable and relevant for attracting “climate funds”. However, it is essential that African countries are able to clearly articulate that the development of their forest resources is mainly a matter of improved economies, food security and environments, and that the climate mitigation effects will be a side-goal, although there may be enormous positive potentials in binding CO₂ in an increased “working biomass”.

5.5 Forests in relation to the UN Sustainable Development Goals (SDGs)

Finally, the roles of forests in the international agenda should be stressed. This year, 2015, the Millennium Development Goals will be superseded by the Sustainable Development Goals. Although “forests” are only explicitly mentioned in one of these goals (No. 15), it is important, in promoting investments in and priority given to the forest sector, to stress the enormous direct and indirect roles of sustainably managed forests and tree resources for virtually all of the SDGs and to a “green economy” in general. In the box below, goals which have a significant potential to be addressed by improved and increased management, use and conservation of forests, trees and NWFPs are listed with indications of what aspects are relevant.

Goal 2. End hunger, achieve **food security** and **improved nutrition** and promote **sustainable agriculture**;

Goal 6. Ensure **availability and sustainable management of water** and sanitation for all.

Goal 7. Ensure access to affordable, reliable, **sustainable** and modern **energy** for all;

Goal 8. Promote sustained inclusive and **sustainable economic growth**, full and productive **employment** and decent work for all;

Goal 13. Take urgent action to **combat climate change** and its impacts;

Goal 15. Protect, restore and promote **sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification**, and **halt and reverse land degradation** and **halt biodiversity loss**.

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Forests and Trees - their roles and opportunities in Africa's economic development, food security and environmental health

Author: Bjorn Lundgren, AFF (email: bjorn.lundgren@ekman.se)

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Abstract:

The purposes of the report are to highlight and promote the great potential roles of forests and trees to contribute to Africa's economic development, food security and environmental health, and to indicate what requirements need to be addressed in order to realise these potentials.

Official statistics on forest and tree resources in Africa are unreliable for many reasons. FAO indicates an area of 675 mill ha of closed forests (23% of the land area), 350 mill ha of "other wooded land", and a considerable and growing volume of wood in "trees outside forests", e.g. in agroforestry systems. The plantation area is indicated as c. 15 mill ha, but this includes formations that strictly speaking are not forest plantations.

Even more unreliable figures are quoted for uses of wood and NWFPs. First, it must be kept in mind that the estimated use of wood for fire-wood and charcoal accounts for more than 80% (615 mill tons) of wood removals. Wood for industrial purposes is estimated at 72 mill m³ annually, which is probably an underestimate in view of widespread illegal felling/trade in timber. In addition, there is a substantial informal secondary wood and NWF products sector. As a result of all this, the official contribution of the forest sector to GNP and employment is modest, but should, according to FAO, be three times larger if also informal and illegal activities were captured in statistics.

Today, many macro-trends and issues influence the forest sector and its potential to contribute to Africa's economy, food security and environment. These include: i) a continued high rate of deforestation and forest degradation; ii) a rapid economic development in much of Africa with urbanisation and growing middle classes and a growing demand for wood and NWF products; iii) an increasing competition for land for production of food, fibre and fuel (the 3F-question); iv) a rapid growth of tree planting and forest/woodland management by farmers, communities and rural people; and, v) the increasing focus on the role of forests and trees in climate change mitigation.

The potential roles of forests and trees in Africa are treated under three separate categories. The first deals with contributions to **economic development** and **poverty alleviation**. The largest wood-based economic sector today is related to production, transport and sale of charcoal, which is estimated to be worth billions of USD and employing millions of people. However, since this almost invariably occurs in the informal, and often illegal, sectors of the economy, figures are uncertain. Demand is rapidly increasing and there is an enormous economic potential provided that charcoal production/sale are legalised, based on sustainably managed forest/tree resources, modernised technology and given advice. The same applies for other products for local and regional markets, such as scaffolding, building and transmission poles, and for locally sawn timber and products like furniture. Due to factors such as increased local demand, export markets and land availability there is also a substantial potential for conventional forest products and commercial level forest and tree management, by private and government enterprises as well as by farmers and communities.

The potential contribution of forests and trees to **food security** is also large, but often overlooked. Already today, the supplementary food and income derived from wood and NWFPs is an essential

part of livelihoods of rural people. The potential of trees in increasing/maintaining fertility of soils and providing fodder to domestic animals, and thereby food crop and livestock productivity and sustainability, have been given much attention in recent decades. The role of forests in hydrology, and thereby water availability for agriculture, and the roles of trees in creating amenable microclimate, e.g. windbreaks and shade also contribute to improved food security. All these various forms of contributions have considerable potentials for improvement.

The third category relates to **environment enhancement** and **climate change mitigation**. Today, with an almost singular focus on climate change, it is important to point out that by far the most important role forest and tree management can play is to vastly increase the “working biomass” of wood in sustainably managed forests, plantations and on trees on farm. This is more important than to just focus on halting deforestation. In addition, increased use of wood in “long-term deposits”, e.g. construction wood, furniture, flooring, etc., will contribute to CO₂ sequestration. To achieve all this, economic incentives are essential. The well-known role of Africa’s forests and woodlands as protectors of flora and fauna biodiversity is as important as ever and under continuing threat. Instead of just relying on complete protection, integrated use of forests is the way forward, with economic incentives playing an important role, e.g. through eco-tourism, careful harvesting of wood and NWFPs, regulated hunting, etc. Finally, the role of forests and woodlands in catchment and river basin hydrology remain crucial to the continent’s water supply.

In order to realise the above potentials of forests and trees, several requirements need to be addressed, with different importance in different countries and in different agro-ecological, political and market situations. They include:

Policies, legislation and regulations need to be revised, modernised and applied effectively, guaranteeing both an enabling environment for investments and engagement in the forest sector by farmers, communities and the private sector, and an effective prevention of destructive and illegal practices. Realistic plans for the sector at appropriate geographic and commodity levels must be developed and implemented. Land and tree tenure must be modernised to ensure long-term willingness to invest in forest management and tree planting. Africa must acquire a stronger voice and influence in international policy processes influencing forests and their use.

Strengthening institutions in support of forest development must be given priority. This includes government forest administrations and extension bodies, education/training/research institutions, farmer and community organisations, the private sector, professional associations, and regional organisations with a mandate to handle forest issues.

Technical know-how must be increased through research, training, partnership, enhanced practical experience, etc. Among technical aspects that need to be given priority are genetically improved plant material, better management of forests and trees (particularly by communities and farmers), improved products matching customer demands, effective and continuing inventory and monitoring of forest and tree resources, better understanding of environment-forest interactions, and an improved ability to assess and implement integrated management of land and natural resources (e.g. through “landscape approaches”).

Economic issues that require attention are partly related to policy issues. Others include better access to credit and reliable information on markets and prices, that taxes and fees are not prohibitive and discouraging to investments, that value adding and value chains of wood and non-wood products are much better understood, that forest certification can be applied when demanded, and that investments in infrastructure (both roads and IT) are increased.

Apart from forcefully, and as appropriate in different situations, addressing the requirements above, ***the way forward*** for countries, organisations, private sector actors and others who want to see an expanded forest and wood sector in Africa should include the following: i) an overall assessment of the current situation with regard to resources, problems and opportunities in the sector; ii) promoting the inclusion of forests, trees and forestry in the mandates of regional bodies, in view of their growing importance on the continent; iii) exploit the potentials related to the enormous funds made available for forest-climate initiative, but ensure that economic aspects are in the fore-ground; iv) explore opportunities for partnerships with actors outside Africa, for increased investments, access to know-how and expanded markets; and, v) for promotional purposes, point at and explain the significant roles forest and trees can and must play in achieving the UN Sustainable Development Goals (SDGs).



African Forest Forum

A platform for stakeholders in African forestry



For more information please contact:

The Executive Secretary
African Forest Forum
c/o World Agroforestry Centre (ICRAF)
United Nations Avenue, Gigiri
P.O.Box 30677-00100, Nairobi, Kenya
Phone: +254 20 722 4000, Fax: +254 20 722 4001
Email: exec.sec@afforum.org; Website: www.afforum.org