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Potential Impacts of Agriculture Development on the Forest Cover in the Congo Basin

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Briefing Note

The Congo Basin is sparsely populated in the rural areas - an estimated 12 million people - with a low population density of 6.5 inhabitants/km^2. But there are a lot of urban centres and even large cities situated in the Congo Basin which brings total population to 24 million people, most of whom rely on forests for their livelihoods. Net deforestation is calculated at 0.16% per year, and net forest degradation at 0.09%. These are low figures by any standard, but that could change rapidly as population growth in the region is one of the highest in the world, estimated at 2,87% per year, meaning a doubling of the population every 25 to 30 years. The demographic transition in the Congo Basin is the slowest in the world, particularly in the DRC and the CAR, which are also among the poorest countries in the world. Deforestation and forest degradation through shifting cultivation, fuelwood and charcoal production, illegal smallscale logging and commercial logging (in that order of importance) are particularly high in the DRC and Cameroon, and particularly low in the other countries (no figures available for Equatorial Guinea).

The Congo Basin countries are a very diverse group, with middle income countries such as Equatorial Guinea and Gabon, lower middle income countries such as the Republic of Congo and Cameroon, and very poor countries such as the DRC and the CAR. All of the countries, except the CAR, suffer from the oil (and mineral) syndrome and Dutch disease type problems. They all have human development and social indicators which are typical of poor developing countries. They all neglect their agricultural sector, have large and growing food imports (except the CAR), facilitated by a (overvalued) currency linked to the EURO (FCFA countries) or the US dollar (DRC). They all have rural to urban migration of especially young people making the large cities grow at least double the population growth rate. Governance is a problem in all of the countries.

Agriculture in these countries has a dualistic character, with on the one hand in the forest traditional smallholder agriculture based on shifting cultivation, with almost no use of external inputs and low productivity, where root crops (cassava, yams, cocoyam) and banana and plantains dominate, and on the other hand, large commercial state-of-the-art perennial crops plantations of oil palm and rubber (except for the Republic of Congo, Equatorial Guinea and the CAR). Livestock production in the humid dense rainforest is limited to small ruminants, poultry and pigs and is very limited for cattle because of the presence of tsé-tsé flies which transmit trypanosomiasis and other animal diseases. Rural infrastructure in the countries is poorly developed and maintained, constraining access to urban markets.

The Congo Basin countries strongly argue that there will be a huge development of industrial and plantation agriculture and agribusiness in the near future. Our analysis does not support this argument, on the contrary. We rather see a declining and neglected smallholder agricultural sector, rapidly increasing food imports, and existing plantations trying to maintain only their productive capacity with replanting, and in the case of Cameroon (only), a small expansion. The investment climate and business conditions do not attract newcomers entering the sector. The lack of public support for the agricultural sector, the lack of adequate infrastructure and support services and Dutch disease type problems result in a lack of international competitiveness compared to similar forest areas in particularly South East Asia. And domestic smallholder food production cannot keep up with increasing food demand from population growth and rising purchasing power induced from natural resource based exports.

Two scenarios are developed for agriculture/livestock development over the next 10-15 years. The first one is "continuation" or business as usual, whereby food imports from the world market increase each year, including animal products, particularly rice, wheat, sugar and palm oil. Agricultural production will increase every year but only at about half the rate of population growth. As soil fertility is declining because of soil mining, cassava will even more replace cereals and grain legumes in the farming system. Rural and urban migration of young people will continue unabated, depriving rural areas of their main workforce, and joining the slums in the cities. Poverty will remain largely a rural phenomenon, as also rural land and labour productivities remain very low. Existing commercial plantations will continue replanting very old oil palm and rubber trees, but no new plantation development will occur because of the adverse plantation investment climate, except maybe some extension of existing plantations in Cameroon.

Under the "Maputo scenario", a gradual transition will occur from shifting cultivation to permanent agriculture, relying on agroforestry practices and integrated soil fertility management, with tree crops such as cocoa, coffee, rubber, oil palm, and fruit trees as important cash crops. Farmers will gradually become agro-entrepreneurs, using purchased inputs such as improved seeds and planting materials, fertilizers, etc. This will require a drastic reorientation of government policies towards agriculture and rural areas, tripling at least present budgets for agricultural development, investing in rural infrastructure and services, including rural electrification, water supply, extension services, nurseries, schools, etc. Food imports will be made more difficult and food self-reliance will become an important theme. The CAADP compact will be signed and implemented, meaning vastly increased public investments in agriculture. All this will reduce deforestation and forest degradation because of shifting cultivation. Also intensive animal production, particularly poultry, pigs and aquaculture, will develop, particularly close to urban centres. Under this scenario, rural to urban migration will basically stop and may even be reversed. Rural poverty will gradually disappear and rural areas will become attractive for life and work.

The choice between both scenarios is very much a political choice, and repeated food crises, which maybe will be happening in the future, may influence this choice. Also REDD+ funds and PES from the international community may induce the "Maputo scenario" to become a reality. The present PRSPs and PNSAs all point to the rural areas and particularly farmers as the main focus for action. The biggest constraint may be the oil syndrome and the easy money that comes with oil, mineral and natural resources (including timber) exports. This money does not provide incentives for farmers nor for rural development and a better food security and more productive and sustainable agriculture.

Résumé Exécutif

Le Bassin du Congo est très peu peuplé en milieu rural - une population totale de 12 million de personnes - avec une densité de population de 6.5 par km^2. Mais il y a beaucoup de centres urbains et même des grandes villes dans le Bassin du Congo qui donnent une population totale de 24 million de personnes, dont la plupart dépendent des forêts pour leur subsistance. La déforestation nette est calculée à 0.16% par an, et la dégradation nette à 0.09%. Ces données sont basses à tout point de vue, mais cela pourrait changer rapidement car l'accroissement de la population dans la région est parmi les plus élevés au monde, estimé à 2,87% par an, signifiant un doublement de la population tous les 25-30ans. La transition démographique dans le Basin du Congo semble être le plus lent de la planète, particulièrement en RDC et RCA, qui sont également parmi les pays les plus pauvres au monde. La déforestation et la dégradation à cause de l'agriculture itinérante, la production de bois de feu et de charbon de bois, la coupe illégale informelle de bois et l'exploitation commerciale forestière (dans cet ordre d'importance) sont particulièrement élevées en RDC et au Cameroun, et particulièrement bas dans les autres pays (pas de données disponibles pour la Guinée Equatoriale).

Les pays du Bassin du Congo sont un groupe très diversifié, avec des pays à revenu moyen comme la Guinée Equatoriale et le Gabon, des pays à revenu moyen inférieur, comme la République du Congo et le Cameroun, et des pays très pauvres comme la RDC et la RCA. Tous ces pays à l'exception de la RCA souffrent du syndrome de pétrole (et des minerais) et des problèmes de la maladie Hollandaise. Ils on tous des indicateurs de développement humain et social bas qui sont typiques pour les pays en développement pauvre. Ils négligent tous leur secteur agricole, ont des importations alimentaires élevées et croissantes (sauf la RCA), facilitées par une monnaie (surévaluée) liée à l'Euro (pays à F.CFA) ou au dollar USA (RDC). Ils ont tous des migrations importantes du milieu rural vers les villes, surtout des jeunes, favorisant un accroissement des grandes villes d'au moins le double de l'accroissement général de la population. La gouvernance est un problème majeur dans tous les pays.

L'agriculture dans ces pays est caractérisée par un caractère dualistique, avec d'un côté dans la forêt une agriculture traditionnelle basée sur l'agriculture itinérante, pratiquement sans recours à d'intrants extérieurs, et une productivité très basse et dans laquelle les tubercules et racines (manioc, igname, taro) et les bananes et plantains jouent un rôle dominant, et de l'autre côté, des grandes plantations commerciales de cultures pérennes de palmier à huile et d'hévéa à la pointe du progrès (sauf en République du Congo, Guinée Equatoriale et la RCA). La production animale dans la zone dense humide de la forêt équatoriale se limite aux petits ruminants, la volaille et le porc, principalement pour l'autoconsommation. L'élevage de gros bovins est très limité à cause de la présence de mouches tsé-tsé qui transmettent la trypanosomiase et d'autres maladies animales. L'infrastructure rurale dans les pays est pauvrement développée et maintenue, limitant l'accès aux marchés des villes.

Les pays du Bassin du Congo affirment fermement qu'il y aura un développement énorme de l'agriculture industrielle, des plantations et de l'agri business dans un avenir proche. Notre analyse ne soutient pas cette thèse, au contraire. Nous voyons plutôt une agriculture familiale en déclin et négligée, des importations alimentaires croissantes, et seulement les plantations existantes essayant de maintenir leur capacité productive par la replantation, et dans le cas du

Cameroun uniquement, une expansion modérée. Le climat général d'investissement et d'affaires n'attire pas de nouveaux venants dans le secteur. Le manque de soutien public à l'agriculture, le manque d'infrastructures, de logistique et de services de support et les problèmes causés par la maladie hollandaise aboutissent à un manque de compétitivité internationale vis-à-vis des aires forestières similaires, notamment en Asie du Sud Est. Et la production agricole familiale locale ne peut pas suivre la demande alimentaire croissante due à la croissance de la population et des pouvoirs d'achat induits par les exportations de ressources naturelles.

Deux scénarios sont développés pour l'agriculture/élevage dans le 10-15 années à venir. Le premier scénario est celui de la "continuation" dans lequel les importations alimentaires à partir du marché mondial continuent à augmenter chaque année, y compris les produits animaux, et particulièrement le riz, le blé et la farine de blé, le sucre et l'huile de palme . La production agricole augmentera chaque année, mais seulement au rythme d'à peu près la moitié de celui de l'accroissement de la population. Comme la fertilité des sols décline chaque année, le manioc deviendra encore plus important et remplacera les céréales et les légumineuses à grains dans le système agricole. La migration du milieu rural vers les villes de jeunes continuera inexorablement, privant ainsi le milieu rural de ses forces vives, qui vont rejoindre les taudis des villes. La pauvreté restera essentiellement un phénomène rural, car la productivité des terres et du travail resteront à un niveau très bas. Les plantations commerciales de cultures pérennes continueront la replantation de vieux arbres de palmier et d'hévéa, mais il n'y aura pas de nouvelles plantations établies à cause du climat d'investissement assez négatif, sauf quelques extensions de plantations existantes au Cameroun.

Sous le scénario "Maputo", il y aura une transition graduelle de l'agriculture itinérante vers une agriculture permanente et intensifiée, sans jachère, en faisant recours à des pratiques agro forestières et de gestion intégrée de la fertilité des sols, avec des cultures pérennes comme le cacao, le café, l'hévéa, le palmier à huile et des arbres fruitiers comme cultures de rente. Les paysans vont graduellement devenir des agro-entrepreneurs, faisant recours à des intrants modernes achetés, comme les semences, les engrais, les plants améliorés etc. Ceci requiert un changement radical des politiques gouvernementales envers l'agriculture, l'alimentation et le milieu rural. Au moins un triplement des budgets actuels pour le développement agricole est nécessaire, en investissant dans les infrastructures rurales et des services, y compris l'électrification rurale, les adductions d'eau, les services de vulgarisation agricole, les pépinières, les écoles rurales, etc. Les importations alimentaires deviendront plus difficiles et on devrait compter beaucoup plus sur ses propres efforts ("self-reliance"); cela devrait devenir un thème important. Le compact du CAADP du NEPAD sera signé et mis en exécution, signifiant une augmentation spectaculaire des investissements publics dans l'agriculture. Tout ceci réduira la déforestation et la dégradation des forêts à cause de l'agriculture itinérante. Egalement une production animale intensive se développera, particulièrement l'élevage des poules et des porcs et l'aquaculture à proximité des villes. Sous ce scénario, l'exode rural ver les villes diminuera et peut même se renverser. La pauvreté rurale disparaîtra graduellement et le milieu rural deviendra attractif pour la vie et le travail.

Le choix entre ces scénarios est essentiellement un choix politique de type de société qu'on désire avoir. Il est envisagé que de nouvelles crises alimentaires (répétées) comme on a connu en 2007/2008, et qui sont probables, peuvent influencer ce choix. Egalement des fonds publics venant de la communauté internationale pour REDD+ et pour le paiement de services environnementaux liés à la lutte contre le réchauffement de la terre peuvent induire ou au

moins encourager le choix pour "Maputo". Les documents DSRP et PNASA pointent toujours vers le milieu rural, et particulièrement les paysans, comme groupe cible pour entamer des actions. La plus grande contrainte à cet égard peut être le syndrome de pétrole avec l'argent facile venant des exportations de pétrole, minerais et bois qui remplit les coffres de l'Etat. Cet argent n'incite pas à responsabiliser les paysans et le milieu rural pour une sécurité alimentaire renforcée et pour une agriculture productive et durable, respectueuse de l'environnement.

ACRONYMS

AfDB: African Development Bank
ASB : Alternatives to Slash and Burn Consortium of the CGIAR
CAADP: Comprehensive African Agricultural Development Program of NEPAD
CABDA : Community Area Based Development Approach
CAR: Central African Republic
CARG : Conseil Agricole et Rural de Gestion
CDC : Cameroon Development Corporation
CEEAC: Communauté Economique des Etats d'Afrique Centrale
CEMAC : Economic and Monetary Community of Central Africa
CGIAR : Consultative Group on International Agricultural Research
CICC: Conseil Interprofessionnel du Café et du Cacao (Cameroun)
CIFOR : Center for International Forestry Research
COMESA: Common Market for Eastern and Southern Africa
COMIFAC : The Central African Forest Commission
CPI: Corruption Perceptions Index
DRC : Democratic Republic of Congo
EBA: Everything But Arms of the EC
EC: European Commission
EDF: European Development Fund
EU : European Union
ECCAS : Economic Community of Central African States
ECOFAC: Conservation et Utilisation Rationnelle des Ecosystèmes Forestiers d'Afrique Centrale
FAO: Food and Agriculture Organization of the United Nations
FC: Franc Congolais
FCFA: currency of the CEMAC countries
FLEGT : Forest Law Enforcement, Governance and Trade
GAP: Groupe Agro-Pastoral (DRC)
GDP: Gross Domestic Product
GIS: Geographical information System
GHI: Global Hunger Index
GOPDC: Ghana Oil Palm Development Company
HDI: Human Development Index (UNDP)
HIPIC: Highly Indebted Poor Countries
HIV: AIDS disease
ICRAF : World Agroforestry Centre
IDA : International Development Association at the World Bank
IITA : International Institute for Tropical Agriculture
IFPRI: International Food Policy Research Institute
ILRI : International Livestock Research Institute
IRAD : Institut de Recherche Agricole pour le Développement (Cameroon)
MDGs : Millennium Development Goals
MT: Metric Tons
NARS : National Agricultural Research System
NEPAD : New Partnership for African Development
NGOs : Non-Governmental Organizations
NTFP : Non-Timber Forest Product
OFAO: Observatoire des Forêts d'Afrique Centrale

OZI : Opération Zonale Intégrée
PES : Payment for Environmental Services
PFBC : Partenariat pour les Forêts du Bassin du Congo
PHC : Plantations et Huileries du Congo (DRC)
PNASA : Programme National d'Appui à la Sécurité Alimentaire
PPS: Purchasing Power Standard
REAFOR: Project for the Relaunching of Agricultural and Forestry Research in the DRC
RED : Reduced Emissions from Deforestation
REDD : Reduced Emissions from Deforestation and Degradation
SADC : Southern African Development Community
SECID : South East Consortium for International Development
SIAT : Société Internationale Agricole Tropicale
SODECAO : Société de Développement du Cacao au Cameroun
SSA: Sub Sahara Africa
STABEX : Stabilization (Fund) for Export Earnings (EC)
UE: Union Européenne
UK : United Kingdom
UN : United Nations
UNFCCC: United Nations Framework Convention on Climate Change
USAID: United States Agency for International Development
VPA: Voluntary Partnership Agreement

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1. Introduction

The objective of this study is to specifically assess potential agriculture/livestock developments, both subsistence and commercial agriculture, and their likely impacts on the forest cover in the Congo Basin region. The proposed study will specifically consist in:

- An overview of the agriculture/livestock sector in the six Congo Basin countries covered by the study (i.e. Cameroon, CAR, DRC, Equatorial Guinea, Gabon, and Republic of Congo).

- An analysis of potential sector developments in the Congo Basin over a 10/15 years time frame, leading to credible scenarios taking population expansion predictions, productivity gains, infrastructure and market developments into account.

- A presentation of the articulation between these agriculture/livestock development scenarios and their possible impact on forest cover.

- Some conclusions and recommendations.

For the methodology, the work mainly consisted of literature compilation and analysis. No field mission was undertaken. The author has visited all the countries of the Congo Basin several times, except for Equatorial Guinea. He also interviewed several plantation owners in Central Africa (Cameroon, Gabon, DRC) in Brussels.

The terms of reference of the study are in annex 1. Annex 2 gives the country briefs, which form an integral part of the study. Annex 3 presents some important maps about the Congo Basin. More maps are available on a CD-Rom.

2. General characteristics of the Congo Basin countries

Some general characteristics of the six Congo Basin countries can be defined, as follows:

- all of the countries, except CAR, are oil exporters, some more than others, or natural resource exporters, including minerals and forest products. As resource rich developing countries, they tend to have highly skewed income distribution and are conspicuous in failing to redistribute their natural resource windfalls. The richer of the countries suffer from the oil syndrome, Dutch disease type problems and generally a gross neglect of their agricultural sector. This is also the case of the DRC, despite being very low income. The richer they are, the more of their food they import.
- historically, they all have low historical growth rates in per capita income
- moreover, their economic growth is highly volatile, depending on the prices of primary commodities (oil, minerals, timber)
- they are prone to political instability and civil conflict, what Paul Collier (2007) calls the resource curse problem

- the infrastructure is poorly developed, with very poor intra-regional linkages
- limited strides in poverty reduction, particularly relative poverty remains high, even after that extreme poverty has been addressed
- they are not populous: CEMAC (which includes Chad but not the DRC) has only 32 million inhabitants
- there is a conflict of interest between the richer, coastal parts of the countries and the more landlocked, interior parts
- almost all of the countries, except CAR and to some extent Cameroon, import more than half of their food needs
- although oil palm is native to the Congo Basin, and grows there very well, none of the countries is self-sufficient in vegetable oil, not even Cameroon and the DRC. All import vegetable oil (palm oil) from Asia
- only the Republic of Congo is a net exporter of sugar and has sizeable commercial timber plantations for wood chips for export
- coffee and cocoa in smallholder plantations are only really important in Cameroon
- all of the countries have an investment climate for foreign direct investment that is unfavourable as indicated by the World Bank's "Doing Business" index and rank poorly in the Corruption Perceptions index, except Gabon
- in CEMAC, Cameroon constitutes 50% of its GDP and Gabon 25%. The GDP of Cameroon, the largest economy of the Congo Basin, is 30-50% larger than that of the DRC (2008 figures). This makes abstract of the economy of Guinea Equatorial which has a GDP 7-10 times larger than the DRC
- the ratio of population per ha of crops is 2.02 for the six countries of the Congo Basin, and 0.9 for Gabon
- Cameroon is the only country with prospects for the expansion of plantation agriculture -oil palm and rubber, and cocoa and coffee (smallholders) if the business environment can be improved, and corruption reduced. The DRC has potentially by far the largest potential, but political risk, a very negative business environment, including corruption, and logistical constraints prevent such a potential from being realized.

Hereafter follow some tables with general information about the Congo Basin countries, their economy, agriculture, road infrastructure and social conditions, also in a historical perspective. It is to be noted from the tables below that the road infrastructure is poor, and that the socio-economic situation of the population is not really improving since the 1990's, and even seriously degrading in the case of the DRC. More specific information about each country can be found in the country briefs in annex 2.

Table 1: General information about the Congo Basin Countries

	Population 2006	Population density	GDP/ capita 2006	GDP 2006	Dense forests 2008
		2006	US $	billion US$	million ha
Cameroon	18.2	3.9	980	17.7	16.9
CAR	4.3	6.9	370	1.6	4.6
DRC	60.6	26	130	8.1	98.9
Eq. Guinea	0.5	18.4	8,510	94.9	2.0
Gabon	1.3	5	5,360	7.5	21.1
Rep. of Congo	3.7	10.8	1,370	6	18.5

Source: Etat des Forêts, 2008.

Table 2: General information about forests and cropland in the Congo Basin

	Area under crop 2008	Contribution of forests to GDP	Contribution to fiscal revenue	Production of logs, m^3	Proportion protected
	million ha	%	%	2007	%
Cameroon	4.87	6	62.1	2,296,254	22
CAR	0.92	6.3	-	537,998	28
DRC	0.83	1	1.7	310,000	11
Eq. Guinea	0.003	0.22	13.8	524,799	21
Gabon	0.033	4.3	31.3	3,350,670	9
Rep. of Congo	0.216	5.6	10.0	1,330,980	10

Source: Etat des Forêts, 2008.

Table 3: GDP per capita (US$ constant 2000 prices), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	572	636	678	684	692
CAR	247	255	223	227	233
DRC	117	86	90	92	95
Eq. Guinea	675	2.750	6.874	6.783	8.019
Gabon	4.596	4.167	4.034	4.003	4.148
Rep. of Congo	1.029	1.048	1.163	1.212	1.170

Source : FAOSTAT, FAO Statistical Yearbook 2009, table G.1.

Table 4: Agricultural GDP per capita of the agricultural population (US$ constant 2000 prices), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	181	245	293	303	316
CAR	147	176	176	181	186
DRC	80	69	61	61	62
Eq. Guinea	-	-	358	364	395
Gabon	587	672	757	789	949
Rep. of Congo	-	-	-	-	-

Source : FAOSTAT, FAO Statistical Yearbook 2009, table G.1.

Table 5: Share (%) of agricultural GDP in total GDP, 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	18.6	20.4	20.4	20.3	20.4
CAR	45.5	50.3	53.8	53.3	52.9
DRC	44.7	50.0	40.5	39.3	38.1
Eq. Guinea	-	7.7	3.5	3.6	3.3
Gabon	5.7	6.1	5.9	6.0	6.0
Rep. of Congo	-	5.3	-	-	-

Source : FAOSTAT, FAO Statistical Yearbook 2009, table G.2.

Table 6: Agricultural production characteristics of the Congo Basin

	Rural population as % of total population 2003-05	Ag.value added annual % growth 1990-2005	Meat production kg/cap 2003-05	Average annual growth % meat prod. 1990-2005	Total food prod./cap annual growth 1990-2004
Cameroon	46.3	5.1	14	1.8	0.7
CAR	62.1	3.9	32	4.0	1.6
DRC	68.4	-0.1	4	0.2	-4.5
Eq. Guinea	-	-	-	-	-
Gabon	-	-	-	-	-
Rep. of Congo	40.2	-	8	2.8	-0.7

-: no data available

Source: World Development Report, 2008, p. 320 and 326.

Table 7: Road transport quality indices and road density, Congo Basin

	Road transport quality index	Road density (km of roads/100 km^2 land) 2004
Cameroon	18.4	11
CAR	4.4	4
DRC	3.8	7
Eq. Guinea	6.5	-
Gabon	19.2	4
Rep. of Congo	13.6	5

Note: road transport quality: South Africa = 100

Source : for road transport quality index: Buys Piet, Uwe Deichmann and David Wheeler, Road Network Upgrading and Overland Trade Expansion in Sub-Saharan Africa, World Bank Policy Research Working Paper 4097, December 2006; for road density: World Development Indicators, The World Bank, 2007, pp. 170-172.

Table 8: Proportion (%) of undernourished in total population in the Congo Basin, 1990-1992 to 2003-2005

	1990-1992	1995-1997	2003-2005
Cameroon	34	35	23
CAR	47	50	43
DRC	29	57	76
Eq. Guinea	-	-	-
Gabon	5	<5	<5
Rep. of Congo	40	43	22

Source : FAOSTAT, FAO Statistical Yearbook 2009, table G.3.

Table 9: Human Development Index (HDI) (%), 1995 to 2007, Congo Basin

	1995	2000	2005	2006	2007
Cameroon	46	51	52	52	52
CAR	35	38	36	37	37
DRC	-	35	37	37	39
Eq. Guinea	-	66	72	71	72
Gabon	75	74	75	75	76
Rep. of Congo	58	54	60	60	60

Source : FAOSTAT, FAO Statistical Yearbook 2009, table G.4.

Table 10: Life expectancy at birth (years), 1994-1996 to 2007, Congo Basin

	1990	1995	2000	2005	2007
Cameroon	55	54	52	51	51
CAR	49	48	46	46	47
DRC	48	46	46	48	48
Eq. Guinea	47	48	49	49	50
Gabon	61	61	60	60	60
Rep. of Congo	59	56	54	53	54

Source : FAOSTAT, FAO Statistical Yearbook 2009, table G.5.

Table 11: Child mortality rate (per 1.000 live births), 1994-1996 to 2007, Congo Basin

	1990	1995	2000	2005	2007
Cameroon	139	151	151	149	148
CAR	171	193	186	176	172
DRC	200	192	179	166	161
Eq. Guinea	170	187	200	205	206
Gabon	92	91	91	91	91
Rep. of Congo	104	110	116	123	125

Source : FAOSTAT, FAO Statistical Yearbook 2009, table G.5.

3. Charcoal production leads to Forest Degradation and Deforestation

Especially around cities and urban centres, charcoal production ("makala" in Lingala in the DRC) occurs at a large scale and leads to massive forest degradation and deforestation. And for good makala production, hardwoods, i.e. the most valuable, slow growing species, are preferred. Especially where other sources of energy are absent, or unreliable, particularly electricity, fuelwood and charcoal ensure the energy requirements for cooking. In a country like the DRC, with its large cities, large portions of the city, or even entire large cities (Gemena, Bumba, Lisala, Mbandaka, Kananga, Mbuyi-Mayi, etc.) are without electricity from the national grid. A city like Lubumbashi, with more than one million inhabitants, uses an estimated one million sacks of charcoal per year. In the table below, the relative importance of fuelwood and charcoal for the DRC are shown.

Table 12: Wood production in the DRC by use and type

	Annual volume m^3	Economic value mio US $	%
Formal wood production	500.000	40	4
Informal wood production	5.000.000	50	5
Fuelwood and charcoal	50.000.000	1.000	91

Source: Van de Ven and Debroux, in "Etat des Forêts, 2008, p. 219.

Most fuelwood and charcoal production does not lead to complete deforestation, rather forest degradation, particularly in peri-urban forests and in a circle of 100-200 km from large cities.

On average, 90% of timber harvesting in the Congo Basin forests is for fuelwood and charcoal, which supply together 80% of energy needs (Etat des Forêts, 2008). But few studies have been done on this.

Presently, CIFOR conducts a major study on makala for the cities of Kinshasa and Kisangani. In the DRC, only 5% of the population has access to electricity. Fuelwood and charcoal represent 85% of energy use and is the most transported product in volume. Kinshasa alone, with 8-10 million inhabitants, uses 5 million m^3 of fuelwood or equivalent per year. Kinshasa itself is located on eolian Kalahari sand in the middle of the plateau des Batéké, which is essentially savannah with trees only in the river valleys. Most fuelwood comes from the forest galleries along rivers, up to 200 km from Kinshasa. It is estimated that thus 60,000 ha per year are cleared for fuelwood.

Libreville in Gabon is a good example where fuelwood and charcoal use are minimal, because of an extensive electricity network and subsidized gas for cooking. In Pointe Noire, planted eucalyptus represents 53% of the supply of fuelwood. In cities in the Congo Basin, fuelwood consumption is on average 1 m^3/person/year (almost double that of West Africa), and with 100 m^3/ha harvested, for a city of one million inhabitants, 100,000 ha of forests are needed. It can be concluded that fuelwood and charcoal production are major drivers of forest degradation. If alternative forms of energy (electricity, gas) are not readily available at affordable cost, people have to rely on fuelwood and charcoal.

Box 1: Deforestation and Forest Degradation in the Congo Basin, 90% of CO_2 emissions

Fossil fuel combustion is the primary source of CO_2 emissions globally, but deforestation and forest degradation constitute the largest source of CO_2 emission in Central Africa, accounting for about 90% of the annual release from the region. The Congo Basin forests contain an estimated 25-30 billion tons of carbon, or roughly 4 years of current global anthropogenic CO_2 emissions. The Congo Basin region is currently not a large global source of carbon emissions when compared with countries like Brazil and Indonesia, however the potential for increases in carbon emissions from deforestation in the Basin is huge. Current estimates of carbon emissions from deforestation for Central Africa range from 20 to 60 million tons per year.

Estimates of future deforestation in Central Africa indicate that by 2050, forest clearance in de Democratic Republic of Congo will release over 30 billion tons of CO_2, approximately equivalent to the CO_2 emissions from the UK over the last 60 years. Protecting an additional 1% of forests in Central Africa would preserve about 230 million tons of carbon, or about one-third of the UK's annual greenhouse gas emissions. This is worth more than $ 500 million in today's carbon market. This money can assist the Congo Basin forest countries to implement climate change adaptation projects that will contribute to poverty reduction and sustainable development.

Despite their immense natural resource wealth, many countries of the Congo Basin are classified among the poorest in the world, and this poverty is often the leading factor for the degradation of the natural resources.

Source: AfDB and Climate Change Support Program to Preserve the Congo Basin Eco-systems, 2009.

4. **The tropical forest, deforestation, reforestation and forest degradation in the Congo Basin**

According to Duveiller et al. (2008), Central Africa contains the second largest area of contiguous moist tropical forest of the world, covering about 2 million km^2 (Mayaux et al., 2006). The Congo Basin in particular includes vast and still uninterrupted tracts of rainforests from the Gulf of Guinea to the Albertine Rift. Salient features are the presence of the world's largest area of tropical swamp forests in the central part of the Congo Basin, and of two mountainous regions in Cameroon and in Eastern Democratic Republic of Congo. Central African humid forests are inhabited by a rural population of approximately 12 million people sparsely distributed in low density communities (6.5 inhabitants per km^2) and in some urban settlements. Around 80% of the rural population are slash-and-burn cultivators, while hunter-gatherers and fishermen represent about 20% of the population (Joiris, 1997). For the Central African countries, timber production represents a significant part of export incomes. The main ecological gradients that determine the patterns of biological diversity are oriented according to four main drivers (Vande weghe, 2004): latitude (from the evergreen forests at the equator to semi deciduous at the fringes of the Basin), proximity of the ocean (with cloudy and per humid coastal areas to the more insolated and drier eastern part), elevation (with mountains in Cameroon and Eastern Democratic Republic of Congo surrounding large depressions) and soil (from low drainage hydromorphic soils in the Cuvette to Kalahari sands).

In this study, when we refer to the Congo Basin, it applies strictly to the Central Africa humid dense tropical forest (rainforest, "forêt dense humide"), including tropical swamp forests, but not the moist savannahs with some trees (e.g. in the North of Ubangi in the DRC) nor what is called the transition zone between rainforest and savannah, which is much more densely populated than the rainforest.

According to Duveiller et al. (2008), the annual gross deforestation rate for Central Africa's tropical forest is estimated at 0.21% per year (±0.05%), with an additional gross degradation of 0.15% per year (±0.03%). On the positive side, 0.05% (±0.01%) of the study area goes annually from non-forest to forest, and 0.06% (±0.02%) of the area are regenerated from

Table 13: Basin wide and national figures for annual gross deforestation, gross reforestation and net deforestation rates between 1990 and 2000

Country	*n*	Gross deforestation	Gross reforestation	Net deforestation
Cameroon	32	0.20%±0.26%	0.06%±0.06%	0.14%
C. A. Republic	14	0.12%±0.10%	0.06%±0.08%	0.06%
D. R. Congo	267	0.25%±0.06%	0.05%±0.01%	0.20%
Eq. Guinea	2	0.31%±0.41%	0.69%±0.91%	–
Gabon	21	0.12%±0.11%	0.03%±0.03%	0.09%
Rep. of Congo	54	0.07%±0.04%	0.05%±0.06%	0.02%
Central Africa	390	0.21%±0.05%	0.05%±0.01%	0.16%

The number of processed samples (*n*), the change rates and their confidence interval are mentioned for every country. The national figures which are less reliable due to missing data (country name in italics) are mentioned for information only.

Source: Duveiller et al., 2007.

degraded to dense forests. The Democratic Republic of Congo shows the most active deforestation process in the region, followed by Cameroon and Equatorial Guinea. However, the estimates for these two latter countries have a low accuracy, due to the high number of missing data. The forest dynamics is much lower in Congo-Brazzaville, Central African Republic and Gabon but the same reservation about missing data is still applied (especially for Gabon).

Table 14: Basin wide and national figures for annual gross degradation, gross reforestation and net forest degradation rates between 1990 and 2000

Country	*n*	Gross forest degradation	Gross forest recovery	Net forest degradation
Cameroon	32	0.07%±0.06%	0.06%±0.05%	0.01%
C. A. Republic	14	0.06%±0.05%	0.04%±0.04%	0.02%
D. R. Congo	267	0.19%±0.04%	0.07%±0.03%	0.12%
Eq. Guinea	2	0.00%±0.00%	0.32%±0.62%	–
Gabon	12	0.09%±0.10%	0.01%±0.02%	0.08%
Rep. of Congo	54	0.04%±0.03%	0.04%±0.03%	0.00%
Central Africa	390	0.15%±0.03%	0.06%±0.02%	0.09%

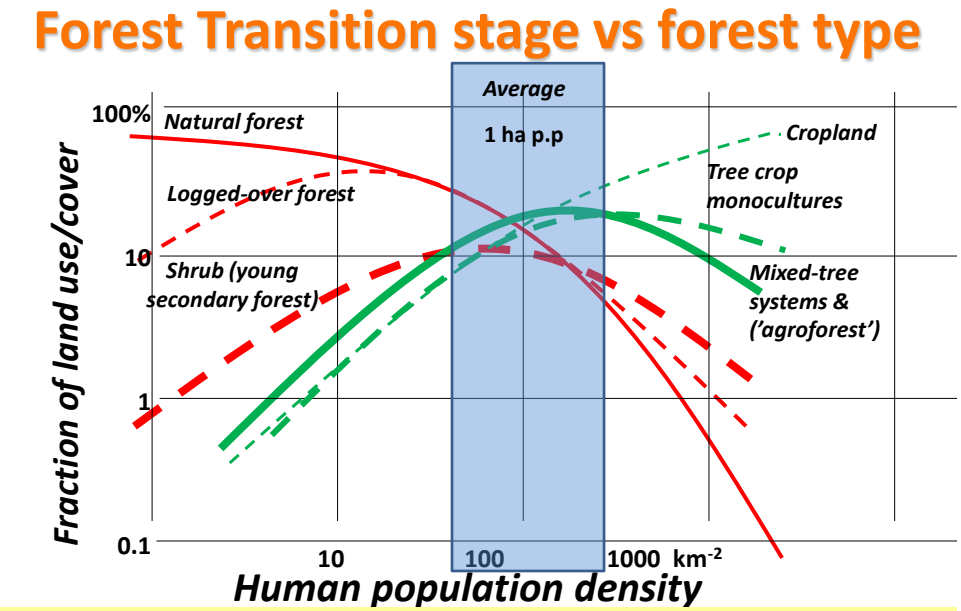
The number of processed samples (*n*), the change rates and their confidence interval are mentioned for every country. The national figures which are less reliable due to missing data (country name in italics) are mentioned for information only.

Source: Duveiller et al., 2008.

It is currently believed that, with the exception of localized clearings, the central region of the Congo basin has low deforestation rates (Mayaux et al., 2003). This situation can be explained by the absence of a significant local market for wood products and a poor transportation infrastructure. However, coastal Central Africa has experienced more intensive forest exploitation. Here, population growth, agricultural expansion, as well as emerging marketing opportunities, have exerted a strong pressure on forest resources.

The first estimate of deforestation for the period 2000-2005 reported in Etat des Forêts (2008) (p. 204) gives a net annual deforestation rate of 0.15 % per year, very close to the figure estimated for the period 1990-2000 of 0.16 %. Thus, no change seems to be occurring. The same publication also gives the carbon stock in the Congo Basin (pp. 205-209) as 46,016 million t of C, distributed as follows: DRC 56.3 %; CAR 11.9 %; Cameroon 11.0 %; Gabon 9.5 %; Rep. of Congo 9.2 %; Equatorial Guinea 0.97 %. The relatively high % for the CAR comes from deciduous dense forests, almost as high as the DRC and almost four times as high as Cameroon, and the deciduous forest savannah, again almost as high as the DRC and almost 2.5 times as high as Cameroon. Dense humid rainforest C stock in the CAR is only 5 % of that of the DRC and 28 % of that in Cameroon.

Dewi et al., forthcoming analysis for Indonesia



Population density accounts for about 70% of variance in total and type of tree cover, terrain + climate + markets + policy+ error influences the residual 30%...

Figure 1

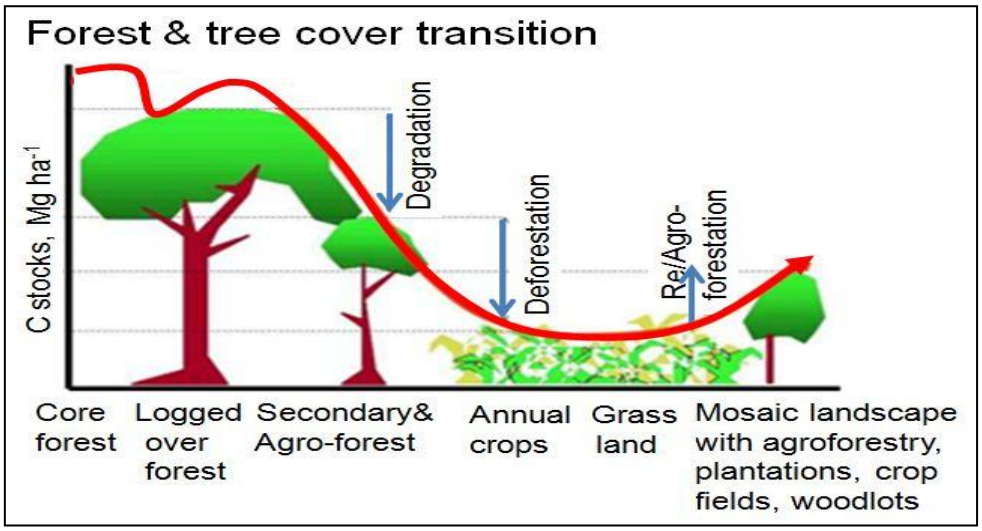


Figure 2

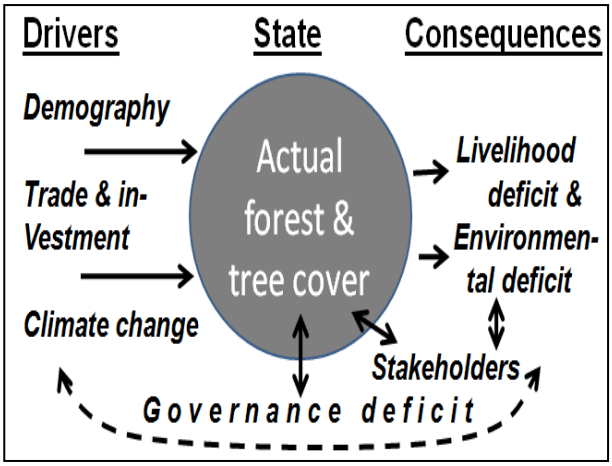
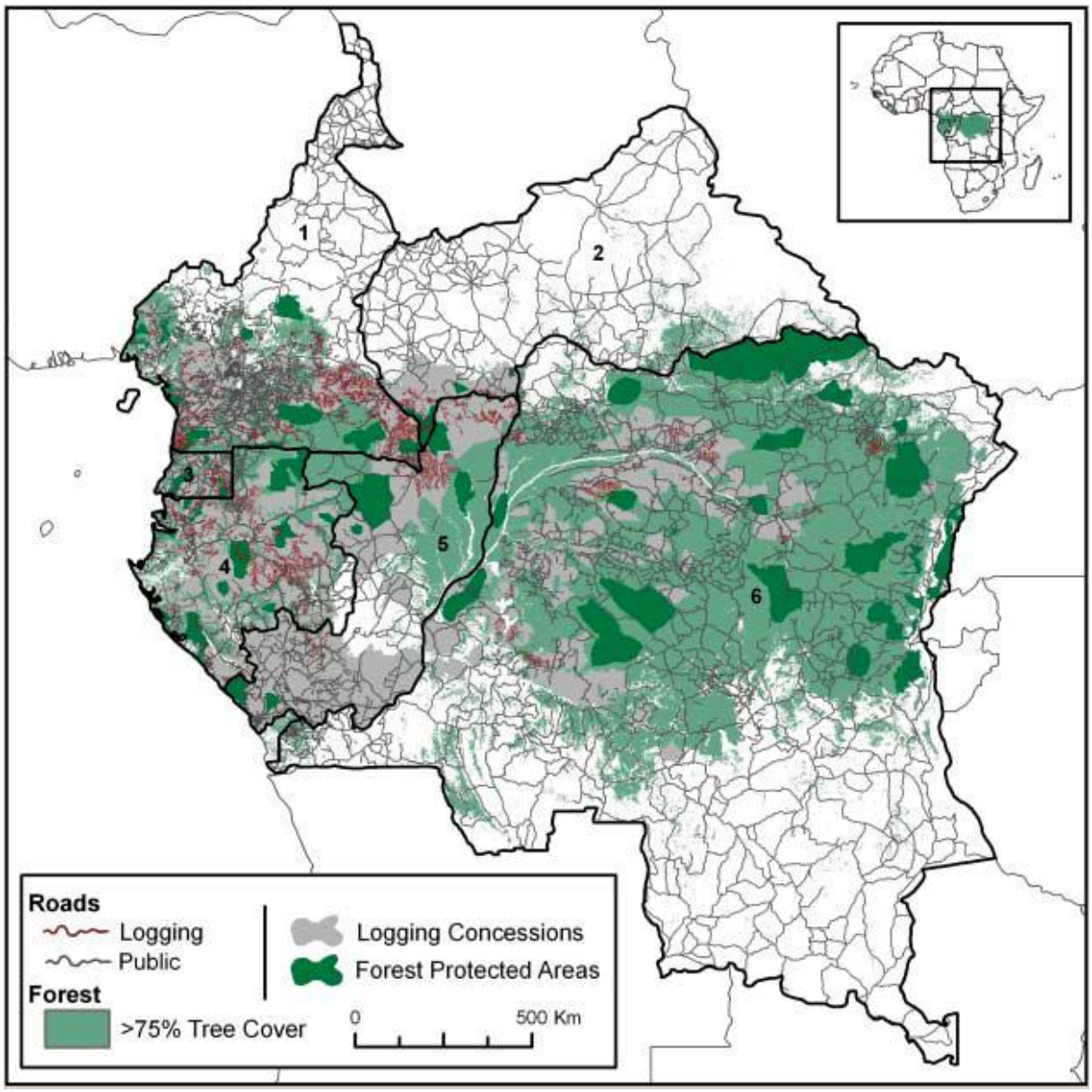


Figure 3

Figure 4: Logging concessions and road distribution in Central Africa



1=Cameroon ; 2= CAR ; 3=Equatorial Guinea ; 4=Gabon; 5=Republic of Congo ; 6=DRC

Source : Laporte Nadine T., Jared A. Stabach, Robert Grosh, Tiffany S. Lin and Scott J. Goetz, Expansion of Industrial logging in Central Africa, Science, Vol. 316, 8 June 2007, p. 1451.

5. Informal illegal logging more important than the export market

CIFOR has started studying illegal logging in Cameroon, Gabon and the DRC. This is part of the international FLEGT (Forest Law Enforcement, Governance and Trade) process. Illegal logging is in fact informal, smallscale timber logging and sawing timber planks with chain-saws, mainly for the local market, although some of the quality timber is also exported.

This informal logging activity is very labour intensive and dangerous work. But it is very common in the Cameroon rainforest zone, either by loggers living in the villages or even coming from outside the rainforest. The forest law of 1994 in Cameroon only regulates the cutting of trees for export, not for the domestic market. CIFOR's research has already shown that logging for the domestic market is about 120% of the export market. In the DRC, it is estimated that informal logging for the domestic market, about 1-2 million cubic meters, is many times (5 to 8 times) the timber export, which is estimated at about 350,000 cubic meters. Thus, the domestic timber trade is generally more important than the export timber trade, but is usually overlooked in the negotiations on the Voluntary Partnership Agreements (VPA's).

Regarding the DRC in particular, informal logging for timber for local use, charcoal production and land clearing by shifting cultivators are presently the main drivers of deforestation, not logging for export, plantation establishment or cattle ranching.

Box 2: Field Visit to Smallscale (informal) Loggers in Cameroon (24.11.2009)

The system works as follows. Informal loggers, who usually own a chainsaw, receive an order for planks, either for the local market or for export, or work for their own account. They identify a suitable tree for logging, not far from the road, because the planks have to be carried to the roadside. This tree is often just behind the cocoa grove. They then buy the tree from the owner of the land. They never obtain a formal permit for logging, and are situated in zones not reserved for logging. In this sense it is illegal. In principle, they also have to pay a sort of logging tax ("impôt libératoire") of 40.000 F.CFA (61.01 €) to the commune where the tree is located, but sometimes get away with no payment. If they get caught, the planks they have ready are seized by the authorities. They also have to pay a chainsaw tax of 20.000 F.CFA (30.5 €) per year. They fell the tree, and saw planks of a particular size from the fallen tree. They then hire people that will transport the planks on their head to the roadside, but out of sight of the road, from 100 to 1.000 F.CFA per plank depending on the weight of the plank and the transport distance. Once enough planks have been amassed, a truck is hired to transport them to the market or the buyer. In addition, for a 12 ton truck, a transport tax of 100.000 F.CFA (152.7 €) needs to be paid to the commune. Again, often transporters try to escape paying the tax via bribing officials in the commune or during road blocks which are on all main roads. This informal logging activity is very labor intensive and dangerous work. But it is very common in the Cameroon rainforest zone, either by loggers living in the villages or even coming from outside the rainforest. In one village, we could find at least 4 piles of planks waiting for transport. The forest law of 1994 only regulates the cutting of trees for export, not for the domestic market.

Source: visit of the author

6. Population density and expected population growth in the Congo Basin

Overall expected population growth until 2050 is as shown in the tables below. What is particularly to be noted is the very high population growth in the two Congo's, 1997/99-2015, 3.0 and 3.3% p.a., or a doubling in population in 24 years or even less in the case of the DRC (21 years). Even for the period 2015-30, the estimate for the DRC is above 3%.

Table 15 : Population in the Congo Basin, 1950-2010, million people

	1950	1980	1995	2001	2006	2008	2010(1)
Cameroon	4.466	9	13	15.2	17	19	20
CAR	1.314	2	3	3.8	4	4	4.2
DRC	12.184	27	44	52.5	59	64	68
Eq. Guinea	0.226	-	-	0.5	-	0.659	1
Gabon	0.469	1	1	1.2	1.3	1.448	1.5
Rep. of Congo	0.808	2	3	3.1	3.6	4	4

(1) estimate

Source : World Development Indicators, The World bank, various years and for 1950, Carl Haub, World Population Dynamics 2002, Institute for World Population and Global Development, Berlin.

Table 16: Annual growth rate of population 1997/99-2050

	1997/99-2015	**2015-30**	**2030-50**
Cameroon	2.1	1.6	1.1
CAR	1.8	1.8	1.2
DRC	3.3	3.1	2.2
Eq. Guinea	-	-	-
Gabon	2.4	2.1	1.4
Rep. of Congo	3.0	2.8	2.0

Source: World Agriculture towards 2015/2030, an FAO perspective, Jelle BRUINSMA, ed., FAO/Earthscan, 2003, p. 384.

Table 17: Urban growth rate (%) 2005-2010 and population per square km, 2009

	Urban growth rate (%)	Population per square km 2009
Cameroon	3.8	40
CAR	2.4	7
DRC	4.7	29
Eq. Guinea	3.0	24
Gabon	2.4	6
Rep. of Congo	2.6	11

Source: UNFPA, State of World Population 2009 and 2009 World Population Data Sheet, Population Reference Bureau, Washington D.C.

Table 18: Rural population as % of total population, 1994-1996to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	55	50	46	45	44
CAR	63	62	62	62	62
DRC	72	70	68	67	67
Eq. Guinea	61	61	61	61	61
Gabon	25	20	16	16	15
Rep. of Congo	44	42	40	39	39

Note : rural population is residual population after subtracting urban population from total population. Urban population is population residing in urban areas, defined according to national census definitions. The rural population relies on agriculture directly or indirectly.
Source : FAOSTAT, FAO Statistical Yearbook 2009, table A.2.

Table 19: Population projections in the Congo Basin, 2015-2050

	2015	**2030**	**2050**
Cameroon	20.2	25.8	32.3
CAR	4.9	6.4	8.2
DRC	84.0	132.6	203.5
Eq. Guinea	1.0	-	1.4
Gabon	1.8	2.4	3.2
Rep. of Congo	4.7	7.2	10.7

Source: World Agriculture towards 2015/2030, an FAO perspective, Jelle BRUINSMA, ed., FAO/Earthscan, 2003, p. 384.

Table 20: Population of Kinshasa, DRC, since 1960 (2020 and 2025 estimated)

1960:	400.000
1969:	1.000.000
1980:	2.000.000
1993:	4.000.000
2000:	5.500.000
2010:	9.000.000
2020:	14.000.000
2025:	17.000.000

Source: Défis Sud, Nr. 92, décembre 2009-janvier 2010, p. 17.

It appears that the demographic transition in the two Congo's is delayed because of the widespread poverty and lack of strong economic development, particularly in the DRC and the CAR. But the Congo Basin itself is only sparsely populated - an estimated 12 million rural people and 12 million urban (Kinshasa, Mbandaka, Gemena, Bumba, Kisangani, Franceville, Libreville, Douala, Ebolowa, Sangmélima, Bangui, etc.), a total of 24 million. In rural areas, there is a low population density of 6.5 inhabitants/km^2 (Duveiller et al., 2008). Despite a high population growth rate (about 3%), most young people prefer to migrate to the cities such that the population density will remain very low. From personal experience[1], deep

[1] The author lived for four years in Yangambi, 100 km west of Kisangani, in the middle of the rainforest.

in the rainforest in remote villages, you meet only a lot of young children and older people as young boys and girls are with relatives in urban centres and tend to stay there.

Quanfa Zhang et al. (2002) have estimated the impacts of simulated shifting cultivation on deforestation and the carbon stocks of the forests of Central Africa. Their model was based on projected rural population growth in the northern DRC.

Box 3: Rural to urban migration in Cameroon and the DRC

…Until recently, rural-urban migration was overwhelmingly male. However the levels of female migration, particularly autonomous female migration have been rising with often negative socio-economic consequences for these women themselves and the families they leave behind in the villages. This phenomenon constitutes important changes in gender roles in both rural and urban areas which often culminate in the breakdown of the traditional extended family. This has led, for example, to massive migration of youths from rural areas to cities in Cameroon such as Douala and Yaoundé. It has also resulted in problems such as homeless youths in these cities and very high crime wave as these youths are usually unskilled and unemployed…

Source: Stella Nana-Fabu, An Analysis of the Economic Status of Women in Cameroon, Journal of International Women's Studies, Vol. 8 #1, November 2006.

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… Cameroon's rural-urban migration rate was about 44.5% in 1994. Today, migration is on such an enormous scale that there is not only a physical exodus from rural areas but also a massive brain drain. Cameroon's rural-urban migration rate is now estimated at 48% (Ministry of Urbanization, 2000). The cities of Yaounde and Douala and other towns such as Limbe and Kumba in the South West Province, Bamenda in the North West Province and Bafoussam in the West Province, have all witnessed large population increases in recent years. For example in 1995 Douala's population was 1,037,894. It is was estimated at 1,214,930 in 2000 (in 2010, it is estimated at 1,494,700). Similarly Yaounde's population was estimated at 926,586 in 1995. In 2000, it was 1,085,714 (Ministry of Urbanization 2000) (today in June 2010, it is estimated at 1,565,393). This has mainly been due to the fact that many people are unable to make a living in rural areas as a result of the population pressure on the land (subsistence farming being their main mode of obtaining a livelihood), and suffer under discriminatory policies based on gender and age in both traditional beliefs and modem practices of land use in rural areas. As a result people drift to towns and cities in Cameroon to look for employment, mainly as unskilled workers. Often, the people mainly men5 who have left their villages for the cities - are paid only minimum wages and are housed in work camps while those without work live in shanty towns such as Briquetterie in Yaounde and New Bell in Douala. Thus they make up the unskilled labour force in large cities. They are constantly in search of work and often move from one low paid job to another…

Source: Nana-Fabu, High fertility and Development in Cameroon, Journal of Social Development in Africa, Vol. 16, N° 1, January 2001, 35-36.

***

… the rapidity of urban growth (7 to 8 %), the concentration of 28 % of the urban population in Kinshasa and the accelerated rhythm of the rural exodus…

Source: DRC, Ministry of Human Rights, 8th, 9th and 10th periodic report to the African Commission on Human and Peoples Rights, period July 2003 to July 2007, Kinshasa, June 2007.

The parameters used in the simulation for the period 1950-2050 appear reasonable:
- shifting cultivation with a cultivation period of 2 years and fallow per period of 15 years
- an average of 0.25 ha of land area per head per year
- annual population growth rate of 1%, starting in 1800 and run for 200 years to initialize the forest age - class structure in 1800. Then another 250 years simulation for the land demands 1800-2050 using the rural population growth rate of 1% before 1950.

However, their simulation deviates from reality when after 1950 they somehow use actual and projected population growth rates found in UN reports for the period 1950-2030. They use the following rural population growth rates and densities:

Table 21 : actual and projected population growth rates based on UN reports

	rate (annual %)	density (persons/km^2
1950	1.82	4.2
1960	1.71	5.0
1970	2.97	6.0
1980	3.41	8.2
1990	3.68	11.5
2030	1.11	25.8
2050	0.73	26.3

Source: Quanfa Zhang et al. (2002).

As population density increases, fallows per period will decrease as already seen in the humid forest zone of southern Nigeria around Benin city where fallows have already completely disappeared. Also, as land in shifting cultivation becomes more scarce, especially young people will out-migrate to cities. Population growth rates above 3% in rural areas, no outmigration, shifting cultivation with 15 years fallows and population densities in the order of 1 person per 4 ha (25/km^2) are totally unrealistic. It is thus not surprising that they find annual rates of deforestation 2000-2050 of 0.78%, almost four times those found between 1990 and 2000 by Duveiller et al. (2008). They arrive at a rate of annual deforestation of 1.2% in 2030. It is interesting to note that they conclude that the Central African region can theoretically support 20-28 people/km^2 based on the cultivation of carbohydrate staples (cassava, yams, cocoyam, plantain), but then 94% of the primary forest will have been converted into cropland, fallow and secondary forest. They completely miss the fact that as population density increases, fallow periods are reduced and eventually disappear altogether. And as soils degrade and crop yields decline, especially young people will out-migrate to the cities.

In conclusion, population growth in rural areas, ceteris paribus, will lead to a reduction of fallow periods from a certain threshold on, say 10-15 persons/km^2 when long traditional 10-15 year fallows are no longer possible. A reduction in fallow period then reduces new clearings of primary forests, but curtails regrowth of forests on fallow land, and results in less fertile soils being cultivated, thus lowering yields. In the end, this is not sustainable and leads to a food security crisis situation.

7. An overview of the agricultural sector in the Congo Basin countries

7.1. General characteristics

In all the Congo Basin countries, the agricultural sector has a dualistic character, except in CAR and Equatorial Guinea. This dualistic character means on the one side a large group of smallholder family farms, cultivating a maximum of 2-3 ha, with hand tools (hoe, machete, axe), with a small home garden (compound farm) around the house, and on the other, larger commercial plantations usually owned by multinational plantation companies, or as in the Republic of Congo, abandoned large farming estates dating from the collective communist past following independence. Particularly in Cameroon, Gabon and the DRC, large oil palm and rubber plantations, and also banana plantations in the case of Cameroon, employ salaried labour and have a central processing factory. The palm oil is for local consumption, while the rubber is mainly exported, as are the bananas in Cameroon.

7.2. Smallholder family agriculture in the rainforest

Essentially annual foodcrops are grown by the smallholders, particularly cassava, plantains, taro, yams, banana, maize and groundnuts for own use, with a surplus sold in the market. In some parts, upland rice is grown as a cash crop. Some other crops like beans, gourds and vegetables are also grown for their own use, particularly in the home garden together with fruit trees. Some chickens and goats and sometimes sheep or some pigs are also kept, but in small number, essentially for their own use. The dominant type of agriculture is slash-and-burn shifting cultivation (sometimes called swidden farming) of the type cut-burn-plant.

Box 4: Forest-based system

(11 percent land area, 7 percent agriculture population in Sub-Saharan Africa)

This farming system occurs in the humid forest zone. It is found in the Congo Democratic Republic, the Congo Republic, Equatorial Guinea, Southeast Cameroon, and Gabon. Farmers practice shifting cultivation, clearing a new field from the forest every year, cropping it for 2 years (first cereals or groundnuts, then cassava) and then abandoning it to bush fallow for 7-10 years. Cassava is the staple, complemented by maize, sorghum, beans and cocoyam. Cattle populations are low. Population density is also low and physical isolation plus lack of roads and markets are serious problems. Forest products and wild game are the main source of cash, but cash is in short supply because few households have cash crops and market outlets are distant.

Agricultural growth potential is moderate thanks to the existence of large uncultivated areas and high rainfall, but yield increases in the near future are expected to be modest. Root crop (cassava, yam, cocoyam) yields have grown modestly in this farming system. Development entails environmental risks, including soil fragility and loss of wildlife habitats.

Source: InterAcademy Council Report, African agriculture production systems and productivity in perspective, 2004, Amsterdam, p. 30.

But shifting cultivation can be extremely complex and varied in the Congo Basin, as described by Marvin Miracle in his 1966 book on Agriculture in the Congo Basin. Jurion and Henry (1969) also describe at length what they call itinerant agriculture or primitive farming. In such a system, a fallow period of several years (10 to 15) is necessary to restore soil

fertility after 2-3 years of cultivation, and in order to control weeds. Basically, two types of shifting cultivation exist: either rotating the land whilst staying in permanent villages, which is now common, or moving villages after a couple of years of cultivation of the land. During the colonial period, people were obliged to live in permanent villages along the road such that moving villages around in the forest became in fact illegal.

On a cleared field in the forest, after burning, the more demanding crops are usually planted first, such as yams or taro, maize with groundnuts, followed by cassava and some plantains. Typically, crops are grown in mixed associations, which reduce the risk of crop failure. Loss of soil fertility is by no means the main reason for abandoning a field after 2-3 years of cultivation. Rather, because of shortage of labour and the hard work with hand tools, the control of weeds, especially hardy weeds such as *Imperata cylindrica* (spear grass) is often the determining factor in abandoning a field. The big advantage of clearing a field by burning is that it destroys the vegetation, easing planting, giving a flash fertility effect because of the fertile ash on top of the soil (potash), and thus ensuring a reasonable harvest.

Box 5: Field clearance by burning

Clearance and burning may be carried out at any time of the year, except in the wettest months, there being no very clear idea of a farming year. In dense forest the undergrowth is first cut away with machetes and then men attack the larger trees. These are felled with a primitive axe, or else the trunk is burnt through, either by heaping logs around it, or by placing pointed firebrands on a platform round it and gradually driving them further and further into the stem until it is burnt right through at the desired level.

All the trees are felled except the hardwoods, fetish trees, those harbouring edible caterpillars, or, in the Mayumbe area of Bas Congo, *Terminalia superba* (limba), which casts little shade. After the brushwood has dried out and been broken down a little, a fairly fierce running fire gets rid of the leaves, twigs and smaller branches. By the time the ground is ready for its first planting it looks like a battlefield: the earth itself, the skeletons of felled trees, the stumps rising some four or five feet from the ground, the base of the trees still standing, are all blackened. The monotony is broken only by a few heaps of white ashes or a patch of burnt earth. Where an old fallow is being cleared the regrown trees and bushes are felled level with the ground; the operation is altogether simpler and incineration more complete.

Source: Jurion and Henry, 1969, p. 37-38.

The unsustainability of shifting cultivation in the forest zone basically comes from population growth. As population density increases above 10-15 persons per square km, the length of fallow period needs to be shortened and as fallows shorten, the soil fertility of cleared land declines, resulting in reduced harvests, distress because of food insecurity, conflicts and often outmigration to other areas or urban centres. The literature shows that the critical threshold of complete breakdown of the shifting cultivation system is reached from 20-30 persons/km^2, i.e. 3 to 5 ha per person. In a system of 2 years of cultivation and 10 years of fallow, 2/12 or 17% of the available land is in cultivation and with 3 ha per person, this means only 16,6 ares under crops per person; with 5 ha per person, 29,4 ares per person or less than 1/3 ha crops per person. Such small parcels of land are barely adequate to feed a person, taking into account that yields are very low in traditional agriculture. On the poorest, most degraded soils, only cassava still produces an acceptable low yield. The most densely populated areas in the rainforest of Cameroon and the DRC (e.g. Lisala and Bumba territoire) have already reached

a population density of 30 persons/km^2. In that case, young people either migrate to urban centres, grow cash crops such as rice or tobacco, engage in handicrafts, trade or other remunerative activities.

On the better alluvial soils, fallows can be shortened to 3-5 years without much yield loss if some organic manure or crop residue is worked into the soil. But on the typically acid, leached, red ferralitic soils of the rainforest, short fallows do not restore soil fertility completely and only cassava can still be grown, although with low yields. Families living there are basically chronically food insecure, with malnutrition rampant with the children.

Hunting and particularly fishing are still an important activity in the rainforest, as rivers are everywhere. Closer to urban centres, charcoal production becomes a very important lucrative activity, contributing to rapid deforestation.

In the rainforest, access to markets is generally poor as feeder roads are difficult to maintain under wet conditions and with low traffic. In any case, the road density in the rainforest is low, much lower than in the savannahs. In the cuvette area of the DRC, a lot of transport is by boat – dugout canoes. Another important activity is traditional palm oil production from wild palm trees, palmwine production, and harvesting of wild honey. Another activity that is still gaining in importance is smallscale illegal logging of valuable trees (see section 5). This is very common in Cameroon and the DRC.

Traditional food crop production in the Congo Basin, either cassava based production systems, or plantain based, or yam based (West province of Cameroon), uses very little external inputs. Almost no fertilizers[2] or pesticides are used and usually traditional planting material is relied on. Regarding specifically fertilizer use, all of the countries of the Congo Basin are reported to be using about 6 kg or less of fertilizers per ha (2002), as shown in the table below.

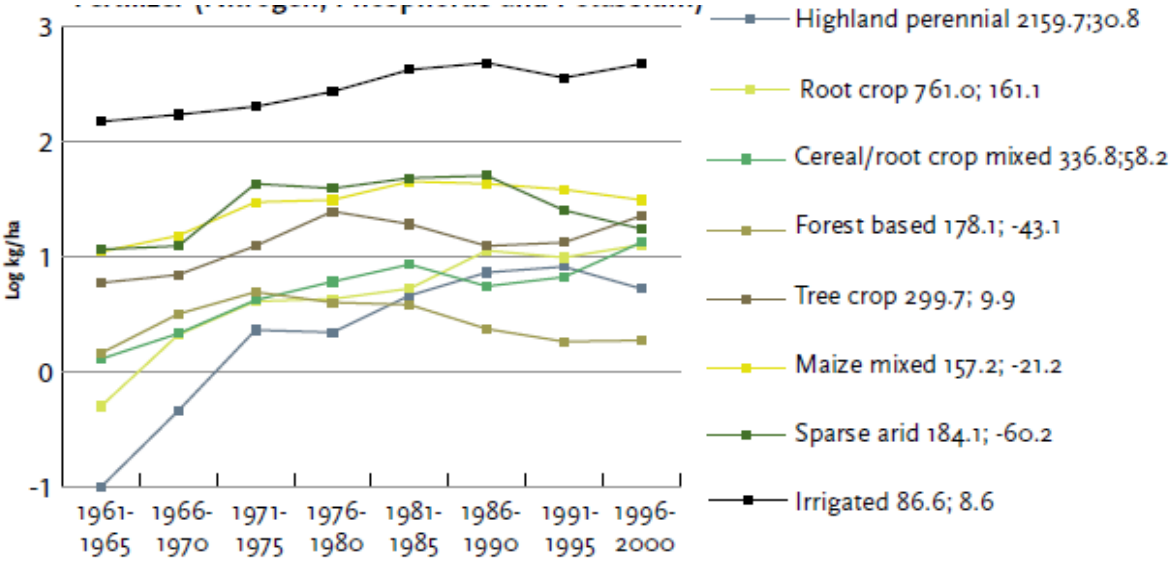
Table 22: Fertilizer use intensity, kg/ha, 2002, and compound annual growth rates in fertiliser consumption (%), 1970-2002, Congo Basin

Country	kg/ha	%
Cameroon	5.86	1.40
CAR	0.31	- 4.27
DRC	1.57	2.42
Eq. Guinea	-	-
Gabon	0.92	-
Republic of Congo	1.24	-11.16

Source: Overview of the Fertilizer Situation in Africa, background paper Africa Fertilizer Summit, Abuja, Nigeria, 9-13 June 2006.

[2] FERTISTAT, the FAO fertilizer data base, only has figures for Cameroon: 53,800 t of nutrients imported in 2006, and Gabon: 2,700 t of nutrients. Imports of fertilizers in Cameroon are essentially for SODECOTON in the North of the country, plantations and vegetable production. The DRC imports less than 10,000 t of fertilizers. CAR imports fertilizers for cotton production, and the Republic of Congo for its large sugar estate near Dolisie.

Figure 5: Trends in the use of fertilizers in farming systems in Africa



Source: IAC report, Amsterdam, 2004, p. 48, based on FAO (2003).

This figure shows that fertilizer use in the Forest based farming system is the lowest of any farming system in Africa and is strongly declining, i.e. – 43.1 % over the period 1981/85-1996/2000.

The table below shows that agricultural productivity expressed as agricultural value added per worker in US$ has been increasing in Cameroon and the CAR, but declined seriously in the DRC.

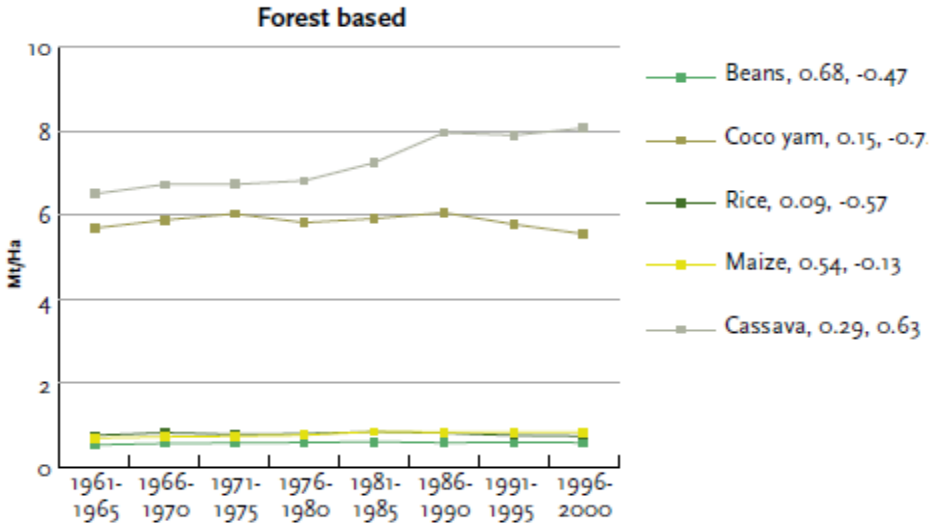
Table 23: Agricultural productivity - agricultural value added per worker in US$[1)] in the Congo Basin

	1990-92	2001-03
Cameroon	389	596
CAR	290	407
DRC	186	154
Eq. Guinea	-	-
Gabon	-	-
Rep. of Congo	-	-

[1)] ratio of agricultural value added, measured in constant 1995 US $, to the number of workers in agriculture; - no data available

Source: World Development Report 2008, p. 340.

Figure 6: Land productivity trends of the major commodities in the Forest based farming system of SSA



Average percentage of annual yield increase in the period 1961-1980 and 1981-2000, respectively: cassava 0.29 :0.63 ; cocoyam 0.15 :-0.7; rice 0.09 :-0.57; beans 0.68:-0.47; maize 0.54:-0.13, based on FAOSTAT (2003).

Source : IAC report, Realizing the promise and potential of African agriculture, African agricultural production systems and productivity in perspective, 2004, p. 36.

Some improved varieties of cassava have been introduced, but their diffusion is very slow, as 1 ha of cassava only produces planting material (cassava cuttings) for 10-12 ha. Such slow multiplication rate, typical in vegetative propagation (also for yams and bananas and plantains), is a major constraint on productivity improvements. In the DRC, where cassava mosaic disease - Uganda type - is a major constraint, cassava improvement with the production and distribution of improved cassava cutting is on-going since 2002 in collaboration with IITA, FAO, USAID, SECID and others. More than 50 million US $ have been spent on cassava improvement. According to the REAFOR project (with IITA and FAO), only about 15% of all cassava is now under improved varieties. In the meantime, new constraints have appeared such as cassava root scale and brown streak disease such that average yields remain very low, about 7-10 t of fresh cassava roots/ha after 1-2 years of cultivation.

Generally, crop yields in the Congo Basin have been stagnating or declining, mainly because of pest pressure and declining soil fertility because of shortening fallows.

Trying to determine total agricultural R&D public sector spending in the Congo Basin countries based on the ASTI IFPRI database was unsuccessful because most of the Congo Basin countries do not report data, in contrast to West or East Africa where all countries have data. Only data for Gabon (2001) and the Republic of Congo (2001) are reported, in million 2005 PPS US $, respectively 3.8 and 4.7, which are amongst the lowest in SSA. We also know that the CAR, DRC and Equatorial Guinea spend very little on agricultural research. Only Cameroon in Central Africa has a performing national agricultural research institute, IRAD, with about 200 researchers in 10 research stations, with however minimal operating funds.

The result is that agricultural research in the Congo Basin is not a major driver of productivity improvements. Only spillovers from the international agricultural research system, particularly the CGIAR, reach these countries, particularly for cassava, maize, bananas and plantains from IITA, agroforestry from ICRAF, livestock from ILRI, rice from AfricaRice. Most of the technology from these centres is yield stabilizing resistance against pests and diseases, not yield enhancing. Thus, productivity improvements in the future are not expected to be significant, especially if soil fertility is declining.

7.3. Smallholder cocoa and coffee plantations

Throughout the rainforest of the Congo Basin, and particularly in Cameroon, there are smallholder coffee (Robusta, Arabica in the highlands of Cameroon) and cocoa plantations, overwhelmingly held by smallholders, 0,5 to 3 ha in size. There are very few commercial coffee or cocoa plantations as estates. There were such estates in the DRC but almost all have been abandoned following first the Zairianisation (expropriation) in 1973-1974 and the pillages of 1991 and 1993. Only in Cameroon (see tables below) are there many smallholders with a small coffee and/or cocoa plantation in the rainforest, and this development is encouraged by the Government. It is quite common in the South West province of Cameroon (around Kumba), and requires artificial drying of the cocoa beans by fuelwood, which encourages deforestation. More efficient drying ovens (Samoa type) have been introduced and promoted using STABEX funding from the EC. Only in Cameroon is smallholder cocoa plantation development on the rise, promoted by SODECAO, a parastatal specifically for cocoa development, and the Ministry of Agriculture, financed from a small levy on all cocoa exports. Nevertheless, coffee production is now in decline, Robusta and Arabica, following depressed world market prices for this commodity. Productivity on cocoa-coffee plantations is still very low, with yields of 300-500 kg/ha. Usually, no fertilizers are used but spraying with fungicides (Ridomil +) is necessary after each major rain against black pod disease on cocoa, which is a major constraint, particularly in the wetter areas such as South-West and Littoral provinces.

Why is cocoa and coffee smallholder cultivation so important in the case of Cameroon and not in the other Congo Basin countries? Cameroon has an estimated 900,000 cocoa and coffee farmers, at least 600,000 cocoa farmers (Source: CICC, Douala). First of all, Cameroon has the highest rural population density, the best rural infrastructure (see table 7), the best investment climate (see the Doing Business index in section 11.1.) and by far the most supportive government (see the Maputo engagement in section 8). It is also the politically most stable country in the Congo Basin with a long tradition of growing cocoa and coffee as cash and export crops, dating back to the colonial period.

Table 24: Production of cocoa beans (1.000 tons), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	122.242	120.233	178.500	164.553	179.239
CAR	50	50	50	50	50
DRC	7.558	6.461	5.630	5.590	5.590
Eq. Guinea	3.927	4.800	3.000	3.000	3.000
Gabon	838	600	300	200	100
Rep. of Congo	2.263	1.304	1.000	1.000	1.000

Source : FAOSTAT, FAO Statistical Yearbook 2009, table B.7.

Table 25: Production of coffee (1.000 tons), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	83.955	84.900	48.256	62.300	38.240
CAR	13.833	12.153	3.300	1.500	2.400
DRC	82.345	43.365	31.990	31.960	31.930
Eq. Guinea	4.833	4.500	4.000	4.500	4.500
Gabon	212	128	120	120	125
Rep. of Congo	1.586	1.551	2.000	2.000	2.000

Source : FAOSTAT, FAO Statistical Yearbook 2009, table B.8.

7.4. Large commercial plantations

These are described in more detail in section 9. What is remarkable is that they are enclaves of the modern sector within the traditional sector, with very little if any relations between them. Only in Gabon is there some nucleus estate development (also called outgrower schemes), based on what was formerly called OZI's ("Opérations Zonales Intégrées"). SIAT Gabon operates such a nucleus estate for rubber, but encounters many difficulties: lack of interest of smallholders, poor feeder roads, poor quality production, etc. We are not aware of any important successful nucleus estate type developments in Cameroon or the DRC. It is important to emphasize that large commercial plantations (Cameroon, Gabon, DRC) have the obligation to provide full social services to their workers, i.e. housing, schools, hospitals and dispensaries, water and electricity, transport, etc. This in fact about doubles the cost of employing salaried labour, but it is the only way of attracting sufficient labour and moreover a legal obligation.

Table 26: Production of palm oil (1.000 tons), 1994-1996 to 2007, Congo Basin

	1995	2000	2005	2006	2007	2008
Cameroon	125.000	136.277	154.000	160.000	172.000	182.100
CAR	6.730	2.183	1.700	1.800	1.800	1.900
DRC	195.630	167.640	175.000	175.000	180.000	182.000
Eq. Guinea	4.500	4.500	4.500	4.500	4.500	4.500
Gabon	7.405	6.400	6.400	6.400	6.700	6.700
Rep. of Congo	16.100	16.700	19.000	24.500	25.000	25.000

Note: most of the palm oil produced in the DRC, CAR, Equatorial Guinea and the Republic of Congo is artisanal production. For the DRC, in 2005 agro-industrial palm oil production was estimated at only 25.000 tonnes and artisanal production at 150.000 tonnes (Be.Ce.Co, 2006).

Source : FAOSTAT, FAO Statistical Yearbook 2009, table B.3.

Table 27: Production of rubber (1.000 tons), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	53.194	56.427	48.000	48.000	48.000
CAR	1.000	1.000	1.000	1.000	1.000
DRC	6.492	4.638	3.500	3.500	3.600
Eq. Guinea	-	-	-	-	-
Gabon	5.375	10.933	11.000	11.000	12.000
Rep. of Congo	1.433	1.200	1.350	1.350	1.350

Source : FAOSTAT, FAO Statistical Yearbook 2009, table B.3.

It is important to point out that once the workers are settled on plantations, illegal logging and harvesting of fuelwood and the production of charcoal, hunting, etc., is much reduced and the forest surrounding the plantation is much better conserved. This is often overlooked. Thus, plantation development, especially large scale plantations which provide full amenities (electricity, water, gas, schools, dispensaries) to their workers, are not necessarily negative for forest conservation.

As examined in section 9, only Cameroon is really attractive for the expansion of plantations. This is already happening, induced by the attractive prices of palm oil and rubber. In the DRC, abandoned plantations are being rehabilitated, with a lot of difficulties as squatters live on these plantations, harvesting at will. In the Republic of Congo, there are only abandoned plantations.

7.5. Agricultural supply/demand balances - reliance on imports for food supply

As explained in detail in the country briefs (annex 2), all countries except the CAR are large net-importers of food, even Cameroon (rice, wheat, sugar). This poses no balance of payments problems in the CEMAC zone as they also export oil, minerals and timber. As explained in section 8, they neglect agriculture and are far from meeting their Maputo engagement. It also means that their poverty reduction efforts in rural areas, as specified in the various PRSPs, cannot succeed as long as agriculture is not seen as the cornerstone of broad based, equitable economic development and poverty alleviation.

Hereafter follow tables with for each country the most important food staples, production and imports in a historical perspective. Specific tables on the imports of wheat and wheat flour, milled rice and palm oil are in section 11.1.4. What is particularly striking are the large and rapidly increasing imports of rice, wheat, sugar, poultry, fish and palm oil. Rice is the fastest growing food commodity as a convenience food in urban areas, growing about 7% per year or double population growth, as in West Africa. Wheat and wheat flour imports are large and growing because of the bread based culture in the cities. Surprisingly sugar imports are large. Only the Republic of Congo normally exports sugar. The large poultry imports, especially in Gabon and the Republic of Congo, reflect the shortage of maize and soybeans for animal feed in these countries (see section 10 on livestock production). Fish imports are very large, surprising for coastal based countries. Offals imports are particularly large in the DRC, but also in Gabon and the Republic of Congo, basically for access to animal proteins for the poorest part of the population. The DRC and the Republic of Congo are large egg importers, especially from India. The high cost of local animal feed for poultry production makes imports competitive with local production, despite an import protection (35% in the DRC). All the countries are also large net-importers of vegetable oil, especially refined palm oil from

Asia. Some of these rapidly increasing imports reflect urban-based shifts in consumption profiles towards more cereals (wheat and rice) and less roots, tubers and coarse grains, more animal protein and more ready to prepare convenience foods.

It is to be noted from table 34 on per capita agricultural productivity that the index is declining in all countries since 1999-2001, except for the Republic of Congo, and the decline is the most pronounced in the DRC followed by Equatorial Guinea.

The picture that emerges is that these countries are net-importers of food, and looking at more recent statistics, these imports are rapidly increasing. During the food crisis 2007-2008, all the CEMAC countries reduced their import tariffs on food, even suspended them temporarily (but not the DRC). There were even food riots in Cameroon. The potential for more local production is high, but the investment climate, Dutch disease type problems in Gabon, the Republic of Congo and Equatorial Guinea, the high cost of local inputs (animal feed, chemical fertilizers), the extensive character of local food staple production, lack of access to markets in the cities because of poor feeder roads, economies of scale in importing from ports, etc., all make importing from the world market more attractive from local production and marketing.

It would be good to have information on prices of locally produced foods compared to imports and price trends. An attempt was made to do this but the unit price information available in the FAOSTAT database is simply not adequate for comparison purposes. Several prices in the database appear completely unreliable for a study of local competitiveness against imports, possibly because the prices reflect different stages in the marketing chain (wholesale versus retail; producer or retail prices versus wholesale import prices; quality differentials), possibly because of unreliable value declarations at import[3].

Table 28: Most important food crops ranked according to their importance, production in tons, 2007, Congo Basin

Rank	1	2	3	4	5
Cameroon	cassava	plantains	taro	bananas	maize
CAR	cassava	yams	maize	groundnuts	plantains
DRC	cassava	plantains	maize	groundnuts	rice
Eq. Guinea	cassava	sweet potato	plantains	bananas	taro
Gabon	plantains	cassava	yams	taro	groundnuts
Rep.of Congo	cassava	bananas	plantains	groundnuts	yams

Source: FAOSTAT website, agricultural production domain.

[3] Usually, import prices are calculated by dividing the declared import value by the declared import quantity.

Table 29: Production of food staples, 2007, tons, Congo Basin

	Rice	Maize	Sugar	Palm oil
Cameroon	35.000	900.000	72.500	172.000
CAR	50.000	141.100	12.000	2.000
DRC (2006)	315.830	1,155.440	85.459	101.912
Eq. Guinea	-	-	-	3.000
Gabon	3.000	220.000	2.800	33.000
Rep. of Congo	1.000	8.200	27.000	25.000

Source: FAOSTAT, website food balance sheets.

Table 30: Production of animal products, 2007, tons, Congo Basin

	Beef	Poultry	Fish	Milk	Eggs	Offals
Cameroon	94.000	30.000	143.000	135.000	13.000	23.000
CAR	75.000	14.000	15.000	65.000	1.000	11.000
DRC (2006)	12.402	10.668	276.936	16.345	9.400	-
Eq. Guinea	-	-	-	-	-	190
Gabon	1.000	4.000	44.000	1.600	2.000	1.000
Rep. of Congo	2.000	6.000	58.000	1.000	1.000	1.000

Source: FAOSTAT, website food balance sheets.

Table 31: Production of cereals (1.000 tons), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	1.146	1.272	1.660	1.412	1.535
CAR	113	170	230	212	227
DRC	1.564	1.570	1.523	1.524	1.525
Eq. Guinea	-	-	-	-	-
Gabon	30	27	32	32	34
Rep. of Congo	11	12	21	21	21

Source : FAOSTAT, FAO Statistical Yearbook 2009, table B.1.

Table 32: Production of pulses (1.000 tons), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	148	255	310	306	306
CAR	26	31	31	30	30
DRC	199	192	191	194	194
Eq. Guinea	-	-	-	-	-
Gabon	0	0	0	0	0
Rep. of Congo	7	8	9	9	9

Source : FAOSTAT, FAO Statistical Yearbook 2009, table B.3.

Table 33: Production of oil crops[4] (1.000 tons), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	236	259	308	290	300
CAR	56	67	73	77	80
DRC	377	328	330	330	260
Eq. Guinea	7	6	6	6	6
Gabon	13	13	12	12	13
Rep. of Congo	27	27	29	35	36

Source : FAOSTAT, FAO Statistical Yearbook 2009, table B.5.

Table 34: Per capita agricultural production index (1999-2001=100), 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2003	2004	2005	2006	2007
Cameroon	98	100	100	98	101	96	93
CAR	95	100	98	99	98	96	89
DRC	128	100	89	86	84	86	78
Eq. Guinea	107	100	89	85	83	83	81
Gabon	100	100	95	93	91	91	91
Rep. of Congo	102	100	99	102	103	104	104

Source : FAOSTAT, FAO Statistical Yearbook 2009, table B.13.

Table 35: Imports of cereals and sugar, 2005, tons, Congo Basin

	Rice	Maize	Wheat	Sugar
Cameroon	470.947	1.622	217.907	73.749
CAR	2.000	6.000	35.000	17.000
DRC (2006)	519.645	22.567	618.055	91.905
Eq. Guinea	-	-	-	-
Gabon	60.000	5.000	83.000	9.000
Rep. of Congo	40.000	8	209.000	70.000[1)]

[1)] Exports of 51,000 t

Source: FAOSTAT, website food balance sheets.

[4] Oil crops comprises groundnuts, soybeans, sesame, oil palm.

Table 36: Imports of animal products, 2005, tons, Congo Basin

	Beef	Poultry	Fish	Offals	Milk[1)]	Eggs
Cameroon	0	7.000	124.000	2.000	61.000	0
CAR	0	0	2.000	0	5.000	-
DRC (2006)	15.456	37.300	206.391	237.530	23.979	2.464
Eq. Guinea	-	-	-	-	-	-
Gabon	10.000	33.000	14.000	8.000	47.000	0
Rep. of Congo	4.000	33.000	14.000	12.000	74.000	3.000

[1)] Fresh equivalent

Source: FAOSTAT, website food balance sheets.

Table 37: Value of agricultural imports, US$ million, 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	136	248	455	501	510
CAR	48	26	33	36	38
DRC	250	207	406	484	542
Eq. Guinea	10	16	57	69	84
Gabon	143	170	269	276	318
Rep. of Congo	106	147	296	285	376

Source : FAOSTAT, FAO Statistical Yearbook 2009, table C.1.

Table 38: Value of agricultural exports, US$ million, 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	523	418	604	599	802
CAR	44	27	16	27	43
DRC	112	37	34	39	42
Eq. Guinea	5	8	3	3	4
Gabon	9	12	43	56	57
Rep. of Congo	8	20	54	49	65

Source : FAOSTAT, FAO Statistical Yearbook 2009, table C.1.

Table 39: Share (%) of agricultural imports in total imports, 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	12.3	16.7	15.7	15.9	13.9
CAR	27.6	21.6	19.1	17.0	15.4
DRC	63.0	32.7	18.1	17.1	15.4
Eq. Guinea	10.9	2.7	2.7	3.5	3.0
Gabon	15.4	20.0	19.6	18.1	14.1
Rep. of Congo	22.1	24.2	20.9	12.1	13.2

Source : FAOSTAT, FAO Statistical Yearbook 2009, table C.2.

Table 40: Share (%) of agricultural exports in total exports, 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	31.0	23.5	20.2	16.7	22.3
CAR	27.2	18.1	12.5	22.1	24.0
DRC	25.6	7.2	1.7	1.7	1.6
Eq. Guinea	4.4	0.7	0	0	0
Gabon	0.3	0.4	0.8	0.8	0.9
Rep. of Congo	0.7	1.0	1.1	0.7	1.1

Source : FAOSTAT, FAO Statistical Yearbook 2009, table C.2.

Table 41: Net agricultural trade value (exports-imports), US$ million, 1994-1996 to 2007, Congo Basin

	1994-1996	1999-2001	2005	2006	2007
Cameroon	387	170	148	98	292
CAR	-4	1	-17	-9	4
DRC	-138	-170	-372	-445	-500
Eq. Guinea	-5	-8	-54	-66	-79
Gabon	-134	-158	-226	-220	-261
Rep. of Congo	-98	-127	-242	-236	-311

Source : FAOSTAT, FAO Statistical Yearbook 2009, table C.3.

Table 42: Net food trade, 2006, % of GDP, Congo Basin

	%
Cameroon	-0.7
CAR	-0.5
DRC	-4.9
Eq. Guinea	-
Gabon	-2.3
Rep. of Congo	-2.6

Source: The State of Food Insecurity in the World, FAO, 5Rome, 2009, table 2, p. 52.

From these tables, it can be seen that the value of agricultural imports are increasing rapidly, except for the CAR, but even agricultural imports are increasing less than total imports. That total imports are increasing rapidly as is to be expected from oil and mineral exporting countries. The share of agricultural imports in total imports is more or less stable in Cameroon and Gabon, declining in the DRC, Equatorial Guinea (since 1994-1996) and the Republic of Congo. Agricultural exports are rather stagnating, except for the DRC where they have declined a lot, and increasing for Gabon and the Republic of Congo, but still at a low level.

The share of agricultural exports in total exports has declined everywhere since the mid-1990s, except for Gabon and the Republic of Congo where they are only about 1 % of total exports. Net agricultural trade is negative for all the countries, except for Cameroon. Cameroon is the only Congo Basin country with a very positive agricultural trade balance,

undoubtedly because of the importance of smallholder cocoa and coffee and sizeable plantations of oil palm, rubber and export bananas. Nevertheless, also for Cameroon, net food trade as a % of GDP is negative at - 0.7 %. It is strongly negative at - 5 % in the DRC, about minus 2-3 % in Gabon and the Republic of Congo, and less than minus 1 % in the CAR.

8. The neglect of agriculture in the Congo Basin

The Congo Basin countries grossly neglect their agricultural sector. In terms of their agricultural expenditures in national budgets, they spend less than 5%, despite their commitment made in 2003 at Maputo, renewed in 2005 at NEPAD (CAADP), to invest 10% of national budgets in agriculture by 2010. As shown in the table below, they spend less than 5%. Equatorial Guinea and the Republic of Congo did not report any data, but it is well known that they spend very little on agriculture.

Table 43: Agricultural expenditures in national budgets by country in the Congo Basin compared to CAADP target (Maputo engagement) of 10%

	%	year reported
Cameroon	3.8	2005
CAR	3.0	2005
DRC	1.7	2005
Eq. Guinea	- (1)	-
Gabon	0.8	2004
Rep. of Congo	- (1)	-

(1) no data reported to NEPAD secretariat
Source: NEPAD secretariat.

Undoubtedly, the resource curse problem (Collier, 2007) affects these countries. Because they are rich in natural resources, including oil and minerals, they neglect agriculture and import their food needs. None of these countries signed the CAADP compacts. Only in the DRC, and recently in the CAR, is the CAADP implementation now officially launched (see figure next page). The Congo Basin countries are the only group of countries that have not signed the CAADP Compact in terms of which they have agreed to increase public investment in agriculture by a minimum of 10% of their national budgets. Already eighteen countries have signed the CAADP Compact. The only interpretation can be that these countries don't believe that agriculture is the cornerstone of their economy and critical to efforts to eliminate hunger, food insecurity and poverty. This also means that agriculture will not be a major driver of deforestation in the Congo Basin, as extensive slash and burn agriculture - cut, burn, plant - will continue, with medium to long fallow periods, made possible by sparsely distributed low population density - on average 6.5 inhabitants per km^2 (Duveiller et al., 2007, p. 2) (Mirade, 1967).

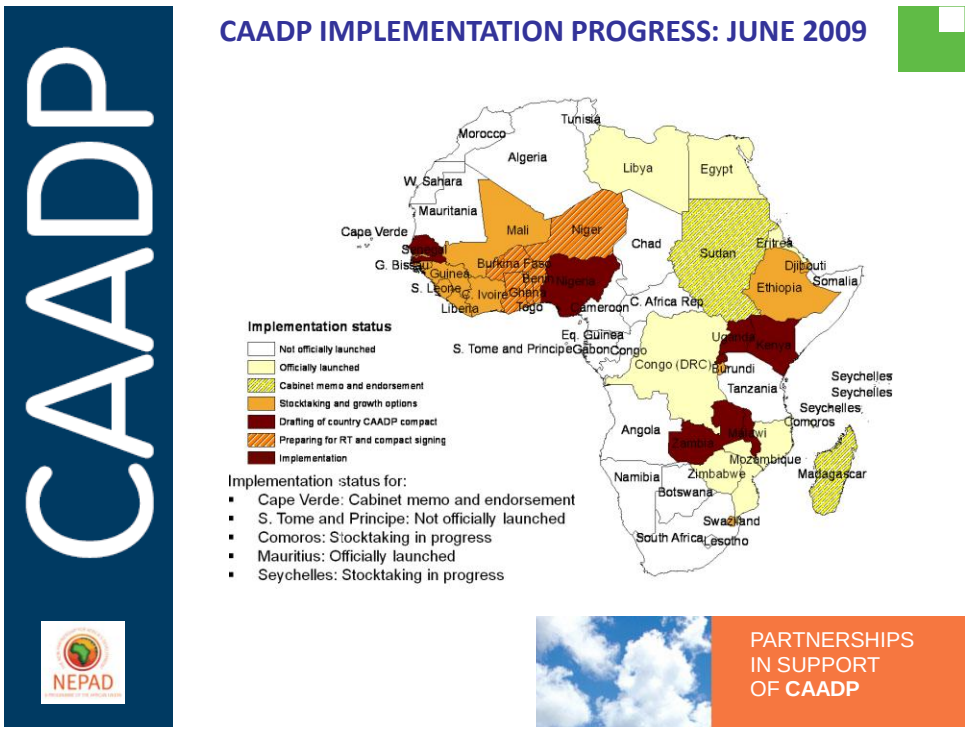
Regarding the National Food Security Strategies (PNSA in French) which the countries in the CEEAC area are developing or implementing with the support of FAO, the Republic of Congo is implementing one developed in 2006, to be revised shortly, Cameroon developed one in 2007, a document was elaborated in Gabon in 2009, and in the DRC, a strategy is being developed. The other two remaining countries (CAR, Equatorial Guinea) do not yet have a document. These PNSA as they are called build on and are aligned with the PRSPs available in each country as part of the poverty reduction strategy.

Box 6: Agriculture and CAADP

CAADP (Comprehensive Africa Agriculture Development Programme) was established as part of the New Partnership for Africa's Development (NEPAD) and endorsed by the African Union assembly in July 2003. NEPAD is a radically new intervention, made in Africa and spearheaded by African leaders, to address the main challenges facing the continent. CAADP is considered one of NEPAD's most important sub-activities because Africa is largely agrarian. Through CAADP, African governments are committed to raising agricultural productivity by at least six per cent per year. This is the minimum required if Africa is to achieve agriculture-led socio-economic growth. To achieve this, these governments have agreed to increase public investment in agriculture by a minimum of 10 per cent of their national budgets – substantially more than the four to five per cent average they commit today. Thus far, only a few countries currently meet or surpass the 10 per cent goal: Mali, Madagascar, Namibia, Niger, Chad and Ethiopia. However, a number of governments, including Zambia, Malawi, Kenya and Rwanda, have either already boosted their agricultural budgets significantly, or are going to do so soon. Recently, nine countries achieved or exceeded the CAADP goal of six per cent annual growth: Angola, Burkina Faso, Republic of Congo, Eritrea, Ethiopia, Gambia, Guinea-Bissau, Nigeria and Senegal. Other countries are close: Rwanda, Benin, Ghana and Uganda. But current improvements just aren't enough as they will not put Africa on the path to achieving the United Nation's Millenium Development Goals (MDGs) of halving poverty and the number of malnourished people by 2015; rather it will be within 10 years.

Source: www.nepad.org/2005/files/caadp.php

Figure 7



9. Expansion of plantation agriculture (oil palm, rubber) in the Congo Basin

Only oil palm and rubber are cultivated in large plantations operated by multinational companies in the Congo Basin, as coffee and cocoa are predominantly smallholders' production. In Cameroon and Gabon, all oil palm and rubber plantations presently in operation were created in the 1960-1980s by the State as parastatal companies, supported by international donors. These were all privatised as part of the structural adjustment process in the 1990s and early 2000.

In Gabon, AgroGabon was privatised to the Belgian plantation company SIAT S.A., which has also plantations in Ghana, Côte d'Ivoire and Nigeria. It comprises a 100,000 ha cattle ranch with 6,000 animals, situated in a savannah valley, surrounded by rainforest, surprisingly without tsé-tsé flies such that they now can convert to Zebu breeds (SENEPOL). They plan to expand to 25,000 animals. They also run an 8,500 ha oil palm plantation, all for the local market, including soap production, and 10,000 ha rubber in nucleus estate (ex-OZI) with 2,000 ha with smallholders. They intend to expand on the existing concession, replanting old plantations, using their own generated cash flow. Their main constraint is access to labour, which is mostly from Cameroonian or Sahelian origin. No new plantations are planned and no other foreign investments in plantation agriculture or livestock ranching are expected in Gabon, although there is plenty of land available, but it is impossible to find labour.

In Cameroon, all parastatal plantations were privatised except some of CDC's (Cameroon Development Corporation) which are still in the process of privatisation (for over 10 years now). Existing plantations are doing quite well, are replanting and expanding where possible. Main problems encountered are land ownership - land can only be leased for 99 years ("bail emphyotique") - and fiscal harassment by the State, including corruption. As far as known, none of the present plantation owners plan new plantations and no new plantation development is planned or underway. Rubber plantations are presently more profitable than oil palm, and all rubber produced is for export. All palm oil produced is for the local market and export to neighbouring countries, including Chad and Gabon.

In the DRC, there were never state-owned oil palm or rubber plantations. Two small cocoa plantations were established in the 1980s with EDF financing. Already in 1912, Lever Brothers established its first oil palm plantation in the Congo. Rubber plantations followed soon after that and were quite important during World War II when they were the only source of rubber for the allied forces in Europe. Most of the plantations were owned by the conglomerate Société Générale de Belgique, which sold off all its plantations in the 1980's, when Suez took over, to the Blattner Group (Agricom, SCAM, Busira-Lomami, Société de Cultures au Congo (Binga), GAP, etc.). The other main plantation company was Lever Brothers, with PHC (Plantations et Huileries du Congo), which sold its interests to a group of Canadian investors (Feronia) (Lokutu, Yaligimba, Yatolema plantations).

Together, Blattner and PHC have 32,000 ha of oil palm, but 40% of it is abandoned, following the pillages of 1991 and 1993 when squatters took over. Total industrial production is estimated presently at 25,000 t palm oil and 2,000 t palm kernel oil. Regarding rubber, production is actually less than 10,000 t. Recent figures indicate 5,000 t, of which about 2,000 t is used locally for tire production (Cobra brand, owned by Blattner group).

Presently the DRC imports palm oil from Asia, now about 80,000 -100,000 t per year and growing.

In the oil palm-rubber sector, some newcomers are coming in in the DRC, recuperating abandoned plantations, and replanting old plantations. This is the case for SOCFIN-INTERCULTURES which acquired the large Brabanta plantation near Ilebo, and the planned Chinese investment in oil palm plantations by ZTE (see elsewhere under DRC country brief - land grabbing in the DRC).

There are no large active oil palm-rubber plantations in the CAR, Equatorial Guinea and the Republic of Congo. In the Republic of Congo, the Ouesso Sangopalm plantation is abandoned.

In conclusion, the present strategy of plantation owners in Cameroon, Gabon and the DRC is to rehabilitate the existing plantations which they have in order to maintain production capacity, replanting of old trees, and some expansion of their land concession where possible. No new forest clearing for plantation establishment in new ventures is planned, except for the planned Chinese investment in oil palm in the DRC for 100,000 ha, which is still at the planning stage following the food crisis. Moreover, as there is a moratorium on new forestry concessions in the DRC, some expect the Chinese to clear 100,000 ha of pristine rainforest, export the logs to China, and fail to invest in the oil palm plantation. There are such cases reported in Indonesia.

Some Asian based multinational companies, operating out of Singapore, such as OLAM/WILMAR, which are already very active in Côte d'Ivoire, have shown interest in new plantation development in Cameroon and the DRC. OLAMCAM is already the second largest coffee and cocoa exporter in Cameroon. But no new investment has yet been announced. Feronia, the Canadian company which acquired the PHC plantations in the DRC, is basically a private equity investment firm, with no track record in oil palm plantation management.

10. Livestock production in the humid forest of the Congo Basin

In the humid rainforest of Central Africa, it is nearly impossible to raise cattle economically because of the presence everywhere of tsé-tsé flies, which transmit trypanosomiasis, the deadly sleeping disease of cattle. Although some trypanotolerant cattle breeds exist, such as N'Dama JVL, Dahomey breed, etc., their productivity and growth rates are low compared to breeds held in the savannahs, such as Zebu type, such that their profitability is low. Although they are tolerant to trypanosomiasis, they still need expensive treatment from time to time and mortality is an ever present threat. Only some missions and private companies in the rainforest keep such breeds for their own use. Thus, the only livestock encountered in the humid rainforest are sheep and goats, particularly goats, and sometimes some pigs. Goats are the preferred livestock in the rainforest because of their rusticity and adaptability. All large livestock ranches in Central Africa are outside the rainforest, either in the transition zone or in the savannah, like on the Adamaoua plateau in Cameroon, or in the North of Ubangi region in the DRC (Mpaka ranch) or in the North or West of CAR. In the savannahs, with few trees, the tsé-tsé fly pression is much less and cattle ranching becomes profitable.

Table 44: Production of meat, milk and eggs, 1995-2007, Congo Basin, thousand tons

	Meat		Milk		Eggs	
	1995	2007	1995	2007	1995	2007
Cameroon	180	221	183	189	13	13
CAR	89	118	50	65	1	1.2
DRC	212	157	7	5	9	6
Eq. Guinea	-	-	-	-	-	-
Gabon	28	32	1	2	2	2
Rep. of Congo	22	31	1	1	1	1

Source: The State of Food and Agriculture 2009, FAO, Rome, table A1, pp. 128-129.

Table 45: Production of pigs, poultry, cattle and sheep, 1995-2007, Congo Basin, thousand tons

	Pigs		Poultry		Cattle		Sheep	
	1995	2007	1995	2007	1995	2007	1995	2007
Cameroon	12	16	21	30	73	92	28	32
CAR	10	13	3	4	48	74	8	13
DRC	28	24	13	11	16	13	23	21
Eq. Guinea	-	-	-	-	-	-	-	-
Gabon	2	3	3	4	1	1	1	1
Rep. of Congo	2	2	6	5	1	2	1	1

Source: The State of Food and Agriculture 2009, FAO, Rome, table A2, pp. 133-134.

Table 46:Consumption (kg/person/year) of meat, milk and eggs, Congo Basin, 1995-2005

	Meat		Milk		Eggs	
	1995	2005	1995	2005	1995	2005
Cameroon	12.9	13.5	14.4	13.7	0.7	0.5
CAR	25.8	31.0	14.2	13.7	0.7	0.5
DRC	5.4	4.6	0.9	1.3	0.1	0.1
Eq. Guinea	-	-	-	-	-	-
Gabon	57.0	64.4	26.1	37.5	1.3	1.2
Rep. of Congo	18.3	21.0	10.1	20.9	0.3	0.8

Source: The State of Food and Agriculture 2009, FAO, Rome, table A1, pp. 128-129.

In the mouth of the Congo river, downstream from Matadi, there is a large 20.000 head cattle ranch (Société des Grands Elevages du Bas-Congo, owned by Blattner group) on the island of Mateba, in fact in the rainforest, but there are no tsé-tsé flies on the island. They were never able to cross the river from the mainland. The same happens with SIAT Gabon in Gabon which took over the large cattle ranch from AgroGabon situated in a deep savannah valley (ranch Nyanga) without tsé-tsé flies, although surrounded by rainforest. They now raise Zebu type cattle (SENEPOL), which is known to be very sensitive to trypanosomiasis.

Availability of animal feed is also a problem. No animal feed is imported in the Congo Basin; only mineral and vitamin concentrates and sometimes soybeans are imported for mixing with local feedstuffs (cereals, flour of root and tubers, soybeans and protein cakes). Except for Cameroon where there are several feedmills[5] competing in the market and producing concentrated feeds for mainly poultry and pigs (and small amounts for cattle), in the other countries there are no feedmills or only one (as in the DRC) or two, usually acting in collusion, and only present in the capital city. Often, the feedmills are subsidiaries of the wheat milling company, using by products from wheat milling, such as wheat bran, as raw material. But often these companies prefer to export their wheat bran to the EC as it can be imported duty free in the EC under ACP regulations (the case for the MIDEMA feedmill in Matadi, DRC). Livestock keepers always complain that purchased concentrated feed is too expensive, and often of variable quality. Thus, especially poultry and pig farmers often mix their feed themselves with rudimentary mixers (small concrete mixers), using locally procured maize, oilseed cakes, and other ingredients. Access to soybeans or soybean cake for poultry feed is usually a problem. Often, the feed made is of low quality, resulting in substandard livestock performance, thus affecting negatively local competitiveness against imports.

The conclusion is that deforestation for cattle ranching in the Congo Basin is not a threat. Livestock development in the Congo Basin will be limited to small ruminants and poultry as long as tsé-tsé flies cannot be controlled adequately[6]. ILRI based in Nairobi does research on tsé-tsé flies and trypanosomiasis for over thirty years and has not yet found an adequate, economical control strategy. Thus, livestock development in the Congo Basin is bound to be

[5] The largest is a Belgian-Cameroonian joint venture – Société des Provenderies du Cameroun (SPC) – based in Bafoussam in West province.

[6] Baboons (and humans) are totally resistant to animal trypanosomiasis. This depends on a single gene. That gene has been spliced into a mouse, which is found to be totally resistant to the disease. The next step is to transfer the gene to cattle, thus creating transgenic resistant animals. This is now happening, with funding from the Gates foundation. But it poses tremendous problems in terms of regulation and societal acceptability (Source: Dr. Carlos Séré, director general of ILRI).

quite different from that in the Amazon Basin or in Asia where tsé-tsé pressure is much less or absent. Trypanosomosis, but also other tropical diseases such as dermartophilosis, anthrax, rift valley fever, East Coast fever, etc. which however can be controlled at a cost, make cattle raising in the rainforest ecology not an attractive option.

Box 7: Lethal animal diseases constrain cattle production in SSA

Animal production is almost impossible in the hot and wetter parts of Africa due to diseases such as trypanosomiasis (tsé-tsé fly) and the pressures of parasites (ticks, worms, etc.). A focus on disease resistance has met with little success. Nomads and transhumants have learnt to use these infested areas for only a small period of the year to feed and water their herds.

In Africa, 37 percent of the continent (11 million square-kilometres and about 40 countries) is infested by tsé-tsé flies. Control of the disease they carry, trypanosomiasis, could release about 65 percent of this area (7 million square-kilometres) for livestock or diversified farming without stress to the environment. The potential benefits from trypanosomiasis control in terms of meat and milk surplus (added to benefits such as lower mortality and higher fertility) amount to US $ 700 million per year.

Source: IAC report, 2004, p. 81.

11. Potential scenarios for agriculture/livestock development within the next 10 to 15 years and their likely incidence on afforestation/deforestation

First, the sector policies and strategies are described for the different countries, and then potential scenarios will be outlined for agriculture/livestock development in the Congo Basin for the next 10 to 15 years. The articulation between such development and the afforestation/deforestation processes will then be analyzed based on the dynamics of the scenarios outlined for agriculture/livestock development, and their impact on forest cover.

11.1. Analysis of potential sector developments

1. Sector policies and strategies

In section 8, the neglect of agriculture in the Congo Basin is shown. This may however change as a result of the recent food crisis, the CAADP process linked to the Maputo engagement, and actions by CEEAC to define a common agricultural policy and national projects for food security (PNSA) (ten in total). This itself is linked to the PRSPs in each country. Right now, only in the DRC and the CAR is the CAADP implementation officially launched.

Despite that the Congo Basin countries are natural resource rich, the food security situation in most of the countries is a matter of concern. Only Gabon does relatively well. Hereafter follows IFPRI's Global Hunger Index 2009 for the Congo Basin countries.

Table 47: Global Hunger Index 2009 (GHI) [1)]

	Rank	GHI	Qualification
Cameroon	44	17.90	serious
CAR	75	28.10	alarming
DRC	84	39.10	extremely alarming
Eq. Guinea	no data		
Gabon	13	6.90	moderate
Republic of Congo	41	15.40	serious

Source: ASTI IFPRI website

[1)] The 2009 Global Hunger Index (GHI) ranks 84 developing countries using three equally-weighted indicators and combines them into one score. The three indicators are:1). The proportion of people who are calorie deficient, or undernourished, which is a key indicator of hunger; 2). The prevalence of underweight in children under the age of five, which is a measure of childhood malnutrition - children being the most vulnerable to hunger; 3). The under-five mortality rate, which measures the proportion of child deaths that are mainly caused by malnutrition and disease.

In the 2009 report, the GHI is calculated for 1990 and for the most recent period for which data are available to measure progress over time. Countries are ranked on a 100-point scale, with 0 and 100 being the best and worst possible scores, respectively. The GHI offers a picture of the past, not the present, using data from 2002 until 2007 - the most recent available for specific indicators. The 2009 Index therefore could only very partially reflect increases in food and energy prices and does not account for the negative household effects of the global financial crisis. However, it does reference the likely impact of the crisis on hunger.

Particularly, the situation in the DRC is dramatic, ranked last of all countries. Given that there is such heterogeneity between the countries of the Congo Basin, it is difficult to treat them as one group. But as long as Dutch disease and the resource curse affect these countries, with basically no foreign exchange constraints and weak institutions supporting the agricultural sector, agricultural growth will be below population growth, while 6% is needed in the CAADP process. A drastic change is needed in their public support for the agricultural sector, in the investment climate ("doing business") (see table below) and in the attractiveness of agriculture to employ young people as farmers. In the Doing Business index and in the Corruption Perceptions index, all the countries score poorly. Gabon and Cameroon score the best in both indexes, at rank 158, respectively 171 (for 2010) and the DRC and the CAR at the next last and last ranking for the Doing Business index. For the CPI (2009), Gabon at 106 and Cameroon at 146, and the DRC at 162 and CAR at 158. No wonder that Cameroon and Gabon are still the most attractive for plantation investment, although far below South East Asia (Malaysia, Indonesia, Papua).

Table 48: Ease of doing business index[7] (ranking: lowest rank is 183) and Corruption Perceptions Index (CPI) in the Congo Basin, 2008, 2009 and 2010

	Ease of doing business index		CPI (out of 180)	
	2009	2010	2008	2009
Cameroon	167	171	141	146
CAR	183	183	151	158
DRC	182	182	171	162
Eq. Guinea	169	170	171	168
Gabon	151	158	96	106
Rep. of Congo	179	179	158	162

Note: 2004 to 2008 data not available on the the World Bank website.
Source : Ease of doing business, Doing business 2010 report, The World Bank, website, and Transparency International website.

One important factor is that the fixed FCFA-EURO link in the CEMAC countries in fact squeezes agriculture and indirectly heavily taxes it. Thus, agricultural exports are penalized by the "overvalued" exchange rate while imports are in fact subsidized (see World Bank, World Development report 2008, 2007, (p. 35, Box 1.5 is relevant)). The same is true for the DRC between 2003 and 2007 when the local currency (FC) was pegged to the US $ around 500 FC = 1 US $. This is in fact a Dutch disease type problem that discourages investments in agriculture. After 2007, with the financial crisis and the mining sector in decline, the DRC let the local currency decline against the US $ and the exchange rate is now close to 1,000 FC = 1 US $.

2. Rural population density

Rural population density in the Congo Basin constituted of humid, dense rainforest is very low. The Congo Basin hydrological area is quite large, comprising 10 countries, including Zambia, Angola, Rwanda and Burundi, an area of 4,048,470 km^2 with a population of 77 million. The humid dense rainforest is estimated at 1,619,879 km^2 (Etat des Forêts, 2008)

[7] The Doing Business index of the World Bank provides objective measures of business regulations and their enforcement across 183 countries. It comprises scores for starting a business, dealing with construction permits, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts and closing a business.

with a rural population of about 12 million resulting in a rural population density of 6.50/ km^2, or 0.065 persons per ha, i.e. 15.38 ha per person. The central question is whether this relatively low population density will continue over the next 10-15 years.

There are already rural areas in the rainforest that are much more densely populated, e.g. the Lisala and Bumba territories in the DRC, and territories close to large urban centres such as Gemena, Binga, Lisala, Bumba, Kindu and Kisangani in the DRC, Libreville, Franceville in Gabon, Douala, Yaounde and Abong Mbang in Cameroon, and Bangui and Bangassou in CAR (see the map Figure 9.6 on p. 158 of Etat des Forêts (2008); the areas in yellow have had more than 5% loss in forest cover between 1990 and 2000). All these urban centres now have a population of at least 100,000 inhabitants, and all these cities have important peri-urban intensive agriculture. Geographers talk of a new phenomena induced by poverty in the cities: "rurbanisation" or rural areas with the city. This means an expanding peri-urban agriculture with especially leafy vegetables, tomatoes (market gardening), small livestock production, etc. This is a major factor for deforestation, including fuelwood and charcoal production around urban centres which create large deforested halos around cities, well visible on aerial maps.

Undoubtedly, this urbanisation and rural to urban migration will continue, attracting in particular young people, devoiding rural areas of their most productive workforce. If present trends continue, we do not believe that rural population density will increase much because of rural to urban migration. But urban centres will expand rapidly and large rural villages will become urban centres.

3. Prospects for productivity gains

As discussed in previous sections, the prospects for productivity gains in agriculture in the Congo Basin are minimal. The trend over the last years is even declining in terms of land productivity, mainly due to reducing fallow periods, no use of fertilisers, and pest and disease problems. The main food staple crops in the forest zone are roots and tubers and bananas and plantains, for which yield increases through breeding - and also because of their slow vegetative propagation - are much less than for cereals. Fallow periods are declining not only because of shortage of land - particularly the long distances to walk to remote fields in the forest - but also because taking back a young fallow into production is much less labour intensive as trees and shrubs are then much smaller to cut. Labour productivity could increase through mechanization, including the very labour intensive post-harvest operations for women. But there are no indications that increased mechanization is happening, except the proliferation of cheap chainsaws manufactured (or coming from) Nigeria (contraband fake Stilh brand, probably coming from China), at one third the normal price (no data could be found on chainsaw imports in the Congo Basin).

Regarding plantation agriculture, productivity gains are certainly realized through the use of improved planting material, use of fertilizers and mechanization. Techniques in use in South East Asia for oil palm and rubber are rapidly transferred to Africa, as the same multinational plantation companies operate on both continents. An example of a recent improved production technology now being used is rubber production stimulation with the "RRIM FLOW" method, imported from Malaysia. This stimulation with a growth hormone occurs with a special gas instead of a liquid, and is more efficient.

Regarding livestock development, so far no effective tsé-tsé control strategies have been found. Infected animals can be treated with medication, but that is expensive, and animals get reinfected quickly with trypanosomiasis. Chickens for eggs, broilers and pigs are mainly kept in large units around urban centres, using purchased animal feed. Such animal feed is usually expensive as maize and soybeans, the essential ingredients, are difficult and expensive to source, and particularly the soybeans are often imported. Local competitiveness against imports is a major issue, shown by the large growing imports of poultry and eggs in the countries. This is not expected to change, especially since demand for animal protein is increasing rapidly in the cities.

4. Agricultural market developments

Urban centres in the Congo Basin are growing rapidly at 3-5% per year and even more (5-8 %) for the already large cities such as Kinshasa and Kisangani, Brazzaville and Pointe Noire, Libreville, Franceville and Port Gentil, Douala and Yaounde, Bata (see table on urban growth rate and rural population as % of total population in section 6 on population density and expected population growth). This means that the demand for staple foods and convenience foods such as bread, rice, eggs, chicken, fish and palm oil is growing at least at this pace. There is evidence that starchy staples such as cassava, yams, cocoyams, plantains are being replaced with cereals, particularly bread and rice, from imports. In fact, as the tables below indicate, the imports of wheat, rice and palm oil are increasing very rapidly. The cost of expensive fuelwood and charcoal is a factor in the substitution, as rice is cooked much more quickly than starchy staples. Expensive transport on poor feeder roads is a factor in favouring imports, which can be imported benefiting from economies of scale.

Box 8: Products with Competitive Potential in African Agriculture

In the framework of CAADP…in Central Africa, potentially competitive country-specific crops include: cocoa (Cameroon, Equatorial Guinea and Saõ Tomé and Principé); coffee (Cameroon, CAR and Equatorial Guinea); oil–palm fruit (Equatorial Guinea, Saõ Tomé and Principé and CAR); sugar cane (Republic of Congo and Gabon); and sesame (CAR).

Source: Dorina Minoiu, Agricultural Policy Coordinating Service, Policy Assistance Division, FAO, Rome, 2003.

But a landlocked country as the CAR imports very little food. But local food production cannot keep pace with population growth, resulting in increasing chronic food insecurity. Nevertheless, per capita annual growth 1990-2004 in total food production in the CAR at 1.6% is the highest of the Congo Basin countries, followed by 0.7% for Cameroon and negative growth rates for the DRC (-4.5%), Republic of Congo (-0.7%) and probably also for Equatorial Guinea and Gabon, which import more than two-thirds of their food needs (see table below). Thus, in the Congo Basin countries, total food production growth is half or less than half population growth. The agricultural market is there, but increasingly supplied from imports.

For plantation crops, the domestic market is very buoyant for local crude palm oil production and for the export of rubber. In the long term, the prospects are the best for rubber (see FAO Commodity Outlook) as the Indian and Chinese markets for cars are booming, but also the outlook for palm oil is very positive, supported by the demand from the same countries as the cheapest vegetable oil, and by the emerging biofuels market. Plantation development is

especially important in Cameroon, but so far concerns mainly replanting of existing plantations and attempts to enlarge these. There is no new plantation development so far. The same is happening in Gabon, albeit on a much smaller scale, and in the DRC, where recuperation and regeneration of old abandoned plantations is the challenge.

Table 49: Imports of wheat and wheat flour (wheat equivalent), tons, 1960-2007, Congo Basin

	1961	1970	1980	1990	2000	2007
Cameroon	23.885	53.444	116.874	284.030	223.000	318.174
CAR	4.636	9.604	11.315	35.883	39.241	41.380
DRC	46.862	115.980	176.633	231.168	217.371	395.795
Eq. Guinea	-	-	-	4 ;382	12.779	16.214
Gabon	5.337	9.881	21.928	30.991	72.425	80.595
Rep. of Congo	12.127	23.205	85.027	64.150	165.203	163.542

Source : FAOSTAT, import quantity, website.

Table 50: Imports of milled rice, tons, 1960-2007, Congo Basin

	1960-1970	1971-1980	1981-1990	1991-2000	2001-2005	2006	2007
Cameroon	7.496	21.387	45.600	110.948	310.956	429.866	203.317
CAR	160	140	3.065	2.520	2.014	2.000	-
DRC	24.852	31.847	49.469	60.000	80.000	519.645	-
Eq. Guinea	-	-	-	5.000	5.000	6.613	5.264
Gabon	1.647	4.727	12.322	37.562	29.718	48.678	32.242
Rep. of Congo	1.424	2.660	9.820	25.365	38.212	49.135	55.044

Source :WARDA, Africa Rice Trends, website.

Table 51: Imports of palm oil, tons, 1960-2007, Congo Basin

	1961	1970	1980	1990	2000	2007
Cameroon	556	96	13	0	6.038	27.355
CAR	270	1.628	0	1.222	427	1.352
DRC	0	0	0	0	4.400	47.353
Eq. Guinea	-	-	-	-	-	-
Gabon	0	0	1.457	6.200	5.128	3.089
Rep. of Congo	41	631	1.811	34	6.600	31.559

Note : up to 1955, the DRC was the largest exporter of palm oil in the world.
Source : FAOSTAT, import quantity, website.

5. Potential scenarios for the next 10 to 15 years

Based on the above, the most likely scenario is a continuation of present trends ("continuation") - business as usual. Under this scenario food imports will continue to grow, public expenditure on agriculture will remain < 4% of government budgets, the institutions supporting agriculture (research, extension, credit, rural roads, rural education, rural electrification and water supply) will remain weak, and rural to urban migration of especially

young people will continue[8]. Rural population density will remain around 6-8 persons/km^2, except around urban centres and cities where peri-urban agriculture will continue to grow and expand in circles (von Thunen effect) going 20 to 40 km around cities. Drivers of this peri-urban agricultural development will be fuelwood and charcoal production, vegetable production, pigs, poultry and small ruminant production, bananas and plantains and other perishable local foods such as chikwangue production (cassava paste) and cassava leaves. Farther from the city, slash-and-burn shifting cultivation will continue, with very low productivity, but acceptable yields as long as fallows are not too short (not less than 5 years). As soil fertility declines, cassava will become more important as even in very poor soils, cassava still produces a harvest.

Under the present scenario, there will be no new plantation development, but existing plantations will continue with replanting and in the case of Cameroon, small extensions may occur where land adjacent to existing plantations can be acquired. In Cameroon, banana production in large plantations for export may be expanded, because of the very favourable production conditions on volcanic soils and duty and tax free access to the EU market.

Box 9:From CARPE , USAID: Trees, Mines and Pipelines:
Natural Resource Dependence and Political Instability in the Congo Basin

… the Congo Basin represents an unfortunate combination of weak, poorly governed states with rich endowments of precisely the kinds of resources – oil, gems, strategic minerals, timber – most suited to abusive exploitation. Where such resources are of high value and easily looted (e.g. gems), they can also become key elements of civil unrest, financing arms purchases for armed groups resisting central government authority (e.g. "conflict diamonds"). … Countries with a stronger agricultural sector are less apt to follow the path of rural neglect combined with political unrest and autocracy. Agricultural economies need to maintain effective trading links with the rural areas producing coffee, cacao, palm oil, cotton, etc., which tend to be distributed across larger geographic areas and involve a large share of the rural population in production. Moreover, crops are not readily looted, and have only moderate value as potential sources of financing for armed groups. In this respect, Cameroon's strong agricultural tradition poses a significant contrast to other parts of the Congo Basin. However, as Cameroon's timber has grown more important in recent years and cash crops have lost value, these differences may count for less than in the past. Terms such as "resource curse", "staple trap" and "Dutch disease" are now used to describe this dilemma of state dependence on rents arising from exploitation of natural resources.

Source: Frederick Swartzendruber, Congo Basin Information Series Nr. 26, CARPE, August 2003.

A second possible scenario, called "MAPUTO", is that of a policy and strategy shift that takes the Maputo commitment into account, working towards a common agricultural policy in CEEAC, implementing the PNSA's in each country, which are based on the PRSPs, signing the CAADP compacts and starting its implementation, including large public investments in agriculture. This is the optimistic scenario, breaking with the past, moving away from the oil syndrome and realizing that the resource curse can be overcome. This requires strong leadership and vision. In such a scenario, more food-self-reliance and less dependency on

[8] No hard data could be found on the magnitude of such rural to urban migration. We only have data on urban population growth and the rural population as a % of the total population.

imports stand central. It requires an improved investment climate for agriculture, much more focus on rural areas and its population and probably increased protection against imports. For this to happen a shock is probably necessary and that shock could be a new deep prolonged food crisis. Paradoxically, such a new food crisis could be brought on by a strong economic revival of the world economy, with oil prices above 150 US $/barrel.

The main change that will happen in the forest zone of the Congo Basin under this scenario is that farming system intensification will be pursued, with the use of improved varieties, some chemical fertilizers (probably micro-doses), integrated soil fertility management[9] including agroforestry[10] (fruit trees, fertilizer trees), mulching, fallow management with legumes, planting of cocoa and coffee agroforests, smallholder rubber, integrated pest management etc.

Box 10: Agroforestry

Agroforestry offers the promise of increased agricultural productivity and natural resource protection while increasing diversity and socioeconomic stability. In marginal areas, agroforestry trees can supply farm households with a wide range of products for domestic use or sale, including food, medicine, livestock feed and timber. Trees also bring environmental benefits such as increased soil fertility and moisture conservation, and social services, such as boundary markers. Agroforestry can be of importance when periods in traditional bush-fallow systems become too short to restore soil fertility. There is great potential to improve the productivity of traditional cropping systems, but studies reveal that the system has great diversity and complexity that necessitate specific measures. In part because of this specificity, a farmer centred approach would ensure development, adaptation and adoption of agroforestry practices.

From InterAcademy Council, 2004, p. 84.

Cassava, yams, plantains, bananas and cocoyam will still be grown, but with much higher yields, allowing the farming system to be much more diversified, focusing also on cash crops (including food crops as cash crops) and access to markets. Gradually shifting cultivation will disappear with no more cutting and burning, but rather permanent fields, requiring no new clearings in the forest. Ideally, farmers will receive money from the government for avoided deforestation and forest degradation (REDD+) and for keeping a permanent C stock on their farm (PES: payment for environmental services for smallholder carbon projects). Trees will be everywhere in the landscape, but the trees around the house will all be useful as fruit trees, medicinal trees, fertilizer trees, fodder trees (for the sheep and goats), fuelwood and construction trees. Cocoa and coffee agro-forests will be promoted as well as smallholder rubber and oil palm. However, these last two tree crops need an industrial plant for the processing of rubber and palm bunches, but village level smallscale units exist and could be promoted. Cocoa and coffee do not require local village level industrial processing as all the work can be done by farmers with no needed machinery or external inputs. Young farmers will not outmigrate anymore to the cities but become agro-entrepreneurs, having a viable business, only going to the city to sell produce or buy inputs and implements. Under this scenario, rural areas will be attractive for young people to settle as agro-entrepreneurs or in agribusiness. This could include intensive chicken, pig and aquaculture (tilapia, clarias) operations in rural areas, fully integrated with crop production, using by-products from

[9] See Vanlauwe et al., 2010.
[10] See Hairiah et al., 2000.

agriculture. Biogas could be produced from crop residues and manure, obviating the need for fuelwood and charcoal. The compost left over after biogas production will be recycled as organic manure. Rural electrification could also be promoted, using local biofuels such as palm oil or Jatropha oil. This would further reduce the need for wood based energy. As the landscape will become more complex with different species of plants and animals, even biodiversity could be enhanced, as less land will be cleared for crops.

Such an evolution can already be seen in South East Asia (Malaysia, Indonesia). REDD+ financing and PES could accelerate the evolution towards such a situation. It will also require stepped-up agroforestry research in Central Africa to define which trees in the landscape are most indicated for the multiple uses that are envisaged. In the humid forest zone, only many trees in the landscape which mimic the rainforest will ensure a sustainable agriculture. But these trees can be useful trees such as cocoa, coffee, rubber and fruit trees. Research so far by the ASB (Alternatives to Slash and Burn) systemwide program of the CGIAR is simply not enough for practical application in the Congo Basin.

The millennium villages[11]currently promoted by the Millennium Villages Project of the Earth Institute at Columbia University and overseen by the UN Millennium Project have many of the features outlined in the "Maputo scenario" at the village level. But this project works strictly at the village level while the "Maputo scenario" envisions a rural transformation country-wide. This is also the case with Community Area Based Development Approach (CABDA)[12] Programme initiated 17 years ago by NGOs in Ethiopia, Uganda and Malawi, but again the CABDA projects each cover a population of 50,000 to 100,000 inhabitants, and are never country wide.

Regarding commercial plantation development over the next 10-15 years under the "Maputo" scenario, if the investment climate for agriculture is improved and the "Doing business" conditions vastly enhanced, then new plantation development will occur for oil palm and particularly rubber, with nucleus estate development (as SIAT does in the GOPDC in Ghana), probably from Asian investors and from existing plantation owners. Then, new land concessions need to be granted and the access to rural labour constraint alleviated, by attracting young labour to work in the plantations under improved social conditions. Central Africa is the only part in Africa where there is still considerable space for new plantations. New plantations for oil palm will essentially aim to satisfy the local market, while rubber will be for export. New sugar plantation development is also likely, as only the Republic of Congo is presently a net exporter of sugar. The DRC has presently a sugar deficit of at least 100,000 t and present consumption is only at 3 kg sugar/person/year (it is 25 kg per person in Kenya).

11.2. Articulation between sector developments and the afforestation/deforestation processes

In this section, potential future impacts on forest cover are examined based on past trends and the likely scenarios for the next 10/15 years. Two scenarios are considered as outlined in section 11.1: "continuation" and "Maputo".

[11] See "The Millennium Villages Project - A new approach to ending rural poverty in Africa?" by Lidia Cabral, John Farrington and Eval Ludi, August 2006.

[12] See "Community Area Based Development Approach (CABDA) Programme: An alternative way to address the current African food crisis?", Chris Wardle, November 2008.

"Continuation" is very much the business as usual scenario. Rural population density will remain low but urban expansion will continue with large halos around cities of deforested and degraded lands. Forest degradation because of fuelwood and charcoal production around urban centres will continue and even exacerbate. Deforestation around these centres will also accelerate for vegetable production and production of perishable foods such as cassava leaves, chikwange, and also intensive pig and poultry farms. It is important to realize that new rural to urban migrants - the poorest people - usually settle on the fringes of the town, as squatters in unallotted housing areas by cutting down whatever vegetation there is. Later on, these quarters become part of the city but have no public utilities nor public services. Because they are unemployed they seek self employment in fuelwood and charcoal production, petty trade, transport (by bicycle) and food processing, including the harvest of NTFP (non timber forest products). They may also be engaged as illegal loggers, felling trees and sawing planks not far from roads, to satisfy the demand for construction timber and furniture manufacturing.

Under this scenario, as already now, the DRC shows the most active deforestation process in the region, followed by Cameroon and Equatorial Guinea. Annual gross deforestation will remain at about 0.21% per year, but gross degradation, especially around urban centres, is bound to increase from 0.15% per year (1990-2000) to 0.20% or more. Agriculture with shifting cultivation will continue unabated. As rural population density increases slowly, fallow periods tend to become shorter and reforestation and forest recovery after land clearing will slow down. This process is very much linked to rural population density which is very much determinated by rural to urban migration of young people. Congo-Brazzaville, Gabon and CAR are the least affected by the process. In Congo-Brazzaville and Gabon, most people already live in the cities. The DRC is the most affected, particularly north of the Congo River in Ubangi and Mongala districts which are already almost half deforested. Within the inner Congo river central cuvette, deforestation is minimal, population density is very low (1-3 persons/km^2), rural roads are few and people still basically live as subsistence farmers. Most of this area could be easily converted in a protected area or national park, similar to the Salonga national park.

The "Maputo" scenario will have two opposing effects regarding deforestation. On the one hand, rural to urban migration will be drastically reduced, keeping much more young people in rural areas, thus increasing rural population density, which normally is a main driver of deforestation. On the other, shifting cultivation through cut-burn-plant activities will be gradually phased out, avoiding the clearing of new parcels of land in the forest. As agroforestry will dominate the landscape, some reforestation - forest recovery will occur, depending on the density of planted trees. Cocoa agroforests, and to a lesser extent, coffee agroforests and rubber agroforests will be established as cash crops, but always under shade of large trees. On balance, despite higher rural population densities, the eventual disappearance of shifting cultivation will have a very positive effect on net forest cover (deforestation + degradation - reforestation - recovery = net forest cover loss). The active deforestation process will be reduced, and this will be particularly important in the DRC, Cameroon and Equatorial Guinea. For this last country, because of the immense oil syndrome, and large neglect of agriculture, it is doubtful whether they will adhere to a "Maputo" scenario. But already the DRC and Cameroon have shown the most interest in the CAADP compact and in showing to be leaders in CEEAC for a common agricultural policy.

Under this scenario, food imports will be drastically reduced, requiring increasing protection against imports. In order for this scenario to be REDD+, it is important that rural

electrification be developed, based on the abundant hydropower resources available in the region, and that the production of biogas is promoted as a source of energy for cooking.

It is not clear how long the transition from pervasive slash-and-burn shifting cultivation to intensified agro-forestry based agriculture will take, but it will be at least 5 to 10 years. REDD+ and PES funds should be used to promote and accelerate this transition. In any case, strong government support will be necessary to make this transition possible, with a key role for the agricultural extension service, micro credit, village level tree nurseries, agro-input dealers, etc.

12. Conclusions and recommendations

12.1. Conclusions

The conclusion of this study is that the Congo Basin countries have presently a low deforestation and forest degradation rate, but that this could increase significantly because of population growth (population doubling every 25-30 years) coupled with pervasive shifting cultivation, fuelwood and charcoal production, informal illegal smallscale logging and formal logging for export. Livestock development and large-scale plantation development are presently not seen as main drivers of deforestation. Livestock development is seriously constrained by the presence of tsé-tsé flies (trypanosomiasis) and other tropical diseases. Plantation development is harmed by the negative investment climate and the difficulties of doing business. Presently, only replanting of old trees occurs and in Cameroon only, an effort is underway to extend existing plantations. Cameroon offers the best prospects for agricultural development.

The Congo Basin countries strongly argue that there will be a huge development of industrial and plantation agriculture and agribusiness in the near future. Our analysis does not support this argument, on the contrary. We rather see a declining and neglected smallholder agricultural sector and rapidly increasing food imports, except for Cameroon. But even in the case of Cameroon, the investment climate and business conditions are such that only existing plantation firms are trying to maintain their productive capacity, with no newcomers entering the sector. The public neglect of the agricultural sector, the lack of adequate infrastructure and support services, the poor high risk investment climate, the long delays in returns on investments in plantation agriculture, the difficulty of finding local labour in Gabon, the Republic of Congo and Equatorial Guinea, other Dutch disease type problems and the lack of international competitiveness compared to similar forest areas in South East Asia prevent new investors from coming in. In this respect, the link of the F.CFA (in CEMAC countries) to the Euro and the FC to the US$ (in the DRC) squeeze agriculture and do not stimulate exports. And domestic smallholder food production cannot keep up with increasing food demand from population growth and rising purchasing power induced from natural resource based exports and incomes.

It is argued that a "MAPUTO scenario" be pursued whereby governments more than triple their present public investment in agriculture, attach much more interest to rural development and rural poverty alleviation, adhere to a policy of food self reliance (is not equal to food self sufficiency!), constrain food imports which at present are large and rapidly increasing, create a positive investment climate for agriculture and agribusiness, favour the transition from shifting cultivation to permanent, intensive agriculture, introducing agroforestry practices,

integrated soil fertility management, tree crops such as cocoa, coffee, rubber, palm oil, fruit trees as cash crops, rural electrification and rural water supply, biogas development and diversified intensive agriculture which creates rural jobs and incomes. This will favour a rapid transition out of shifting cultivation, which is destructive for the forest and biodiversity. This evolution should be publicly supported by REDD+ financing and financing for environmental services (PES - smallholder carbon projects), to which the international community should contribute. The most important candidate countries are the ones where deforestation is presently the highest, and which have a large rural population and a great agricultural potential: Cameroon and the DRC. In Cameroon, with a more positive investment climate for agriculture, plantation development could really take off, particularly for oil palm and rubber, for which prospects are bright. Also in Cameroon and the DRC, smallholder cocoa and coffee, and maybe smallholder rubber, have good prospects and could increase rural incomes significantly, reducing the pressure for illegal logging and fuelwood and charcoal production as money earners.

Hereafter, recommendations are made as a follow up on the study and guidance for the future.

12.2. Recommendations

The following actions are recommended:

1. It is recommended for the Congo Basin countries to monitor rural population densities, per district or province, poverty and food insecurity. These are in fact main drivers of deforestation, and only scant information is available (ref. PRSPs and PNSAs). A correct monitoring would allow a better evaluation and analysis of the drivers of deforestation and forest degradation.

2. It is recommended to monitor in the Congo Basin countries the public support to agriculture (Maputo engagement), the investment climate for agriculture and the indicators of agricultural development beyond the usual food balance sheets. For example, some indicators of land and labour productivities in agriculture are not available.

3. It is recommended as part of the Congo Basin forest monitoring, to track all commercial plantation development, including replanting of existing plantations and new plantation development. There is presently no systematic information available on such developments.

4. It is recommended that in the annual edition of "Etat des Forêts", produced by OFAO and PFBC, with the support of the European Commission, a chapter be included on the incidence of agriculture and livestock production on deforestation and forest degradation. Presently, agriculture is totally absent in the analysis of the state of the forests in the Congo Basin.

5. At present, we have no information at all, not even anecdotal, about the length of fallows in shifting cultivation in the Congo Basin. A sample survey on this important indicator is recommended. Particularly the link between rural population density and the length of fallows is interesting. This could be the subject of an important study. Also, it is not known under what conditions farmers prefer to return to old fallows or clear new (virgin) forest land.

6. It is recommended that a competitiveness study be done for Central African perennial crops, particularly oil palm and rubber, as compared to South East Asia (Malaysian, Indonesia, Papua).

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