

# The gloomy outlook for cocoa production in The Ivory Coast and strategies for sustainable solutions for recovery and improvements of productivity

Joachim Milz  
Ecotop Consult  
La Paz, Bolivia  
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j.milz@ecotop-consult.de

## ***Introduction***

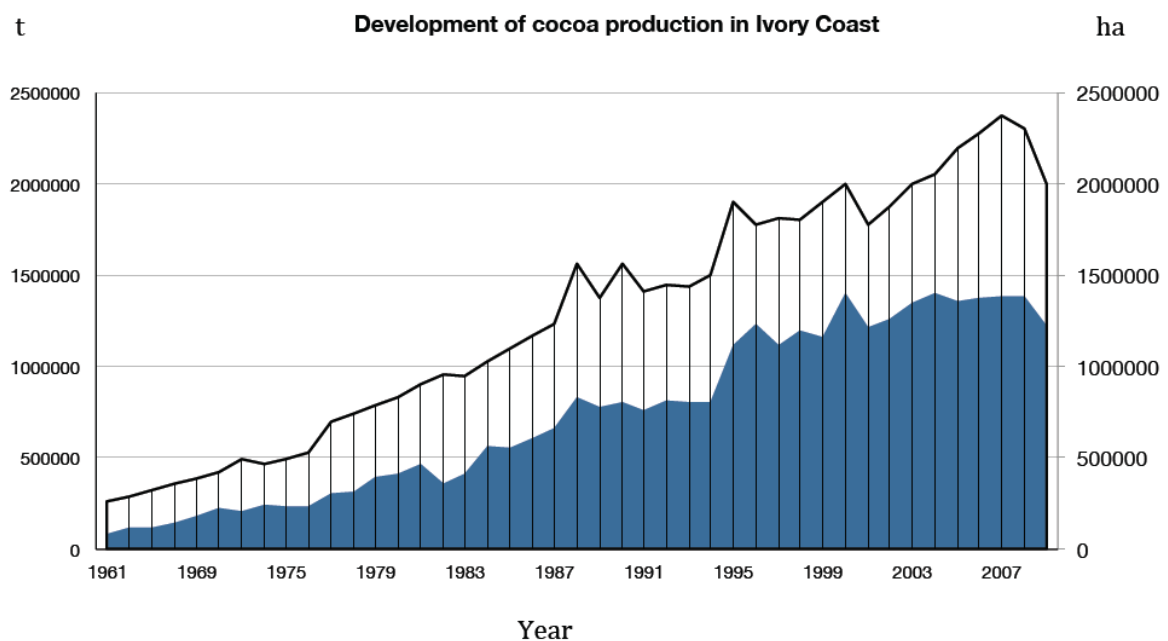
On behalf of the IDH-Biopartenaire-Barry Callebaut Project in The Ivory Coast, ECOTOP started with a training program of 21 farmer trainers in Dynamic Agroforestry Systems (DAF) in the Region of Yamoussoukro. After a practical 3 days workshop DAF plots were installed on each trainer farm, distributed in the whole region according to the particular situation of the cocoa plantation. During a final workshop the lessons learnt were systematized and the basic principles deepened. Under the supervision of one ECOTOP and one Biopartenaire technician, each trainer will now start to apply his knowledge, assisting at least 30 farmers in the neighborhood of his own village. Detailed reports of the workshop and a plot description have been elaborated.

During the mission many cocoa plantations were visited in the whole region.

In the following report some general impressions will be given related to the overall situation of agricultural production and cocoa production in the visited regions of Yamoussoukro and areas visited in San Pedro in particular during a short mission in October 2011.

## ***Cocoa Production in The Ivory Coast***

The Ivory Coast is still the world largest cocoa producing country with more than 1.5 million tons of cocoa beans produced in 2011. Nevertheless the continuous growth of cocoa production could only be achieved by expanding the agricultural frontier towards the last reserves of primary forest areas by slash and burn. However forest reserves to be slashed down for new cocoa plantations are not available anymore and the peak of growth of cocoa production seemed to be reached.



*Fig. 1: Development of cocoa production in The Ivory Coast from 1961 to 2009 (FAOSTAT 2011)*

In the meantime productivity per ha has been in continuous decrease over the last decade from 700kg/ha in 2000 to 611kg/ha in 2009 (FAOSTAT 2011) and a huge amount of cocoa plantations are in a really deplorable situation. Production under full sun, lack of any management practices and the increase of pests and diseases may conduce to the collapse of cocoa production in the near future. As if this weren't enough, staple food production like yams, manioc, maize and peanuts are in crisis as well and are even in competition with cocoa for availability of land surface. Demographic growth and reduction of farm size due to partition of farms by inheritance will aggravate this situation more. And finally, a continuous export of energy from the field to villages, towns and cities in the form of firewood and charcoal combined with burning of all organic matter in the fields have lead to an energy crisis and lack of metabolic energy in the soil for further crop production.



*Fig. 2: Charcoal and firewood for sale*

Vast areas of primary forest have already been converted into savannahs during the last decades, a process which is still going on at a rapid pace. One of the most commonly mentioned problems by farmers is the erratic rainfall distribution and the threat of drought due to local and global climate change.



*Fig. 3: Slash and burn*

*Fig. 4: Erosion in a community*



*Fig. 5: Formerly primary forest has been converted into Savannah.*

Therefore soil erosion and soil depletion will not be stopped by mineral fertilizer applications and increasing problems with pests and diseases will not be solved by spraying pesticides either.

So what can be done now?

### ***Agro-ecological Requirements of the Cocoa Tree***

The natural habitat of the cocoa tree is the tropical rainforest where it is predominantly found in alluvial forests within the sphere of the influence of the rivers. Both, the annual floods and the higher wind speeds above the water lead to a regular rejuvenation of these ecosystems.

With a height of up to 9 meters, the cocoa plant is a small understory tree of the primary forest. It is associated with a vast mixture of tree species, providing a stratified forest structure and a constantly high input of organic matter.

The cocoa tree has to be considered therefore as a “non timber forest product”. To grow cocoa in a sustainable and healthy way, it is indispensable to design agroforestry systems which are close to the structure of local native forests, respecting a high biodiversity and stratification of the production system.

Dynamic Agroforestry Systems correspond in a perfect manner to these requirements

One of the most important measures for the improvement and maintenance of soil fertility in dynamic agroforestry production systems is the continuous addition of woody (ligneous) organic material to the soil, of which large amounts become available every year as a result of pruning activities.

The lifecycle of a cocoa tree can span well over a hundred years. Some few old but still productive and healthy cocoa plantations of an age of more than 80 years seen during the mission bare witness to this..



*Fig. 6: An old but still productive and healthy cocoa plantation of an age of more than 80 years*

The more complex the design of an agro-ecosystem the fewer interventions are further required to regulate diseases and pests in cocoa production:

***Measures proposed to improve cocoa sustainability and productivity in the project area of Biopartenaire***

Two main aspects should be considered:

– *System Approach*

(stratification, diversity, high energy flow)

– *Management practices*

(pruning, selective weeding, stratification, grafting, reducing densities of cocoa plants, elimination of unproductive cocoa trees, selection of high productive healthy cocoa plants in the neighbourhood).

*System Approach*

The objective should not be maximization of yields in a short term but *optimization of the overall farm production system in a long term*, considering also aspects of *food security and diversity*. More diversity of income could also heighten the interest of farmers in cocoa production. Rubber should not be considered as a competitive crop but complementary to cocoa production systems, occupying the higher level of the forest canopy. The middle strata should be occupied by fruit trees like Oranges, Mango, Avocado and others (Rambutan, Mangosten etc. which could be introduced) as well as by Oil palm. The lower stratus is than occupied by cocoa trees.

The easiest way to achieve significant improvements is the technique of selective weeding, which were trained and practised during the farmer training. That means that naturally germinating trees and shrubs are not weeded while grasses and other weeds are eliminated manually. This naturally regenerated vegetation has to be managed later on in relation to the crops of interest for the farmer.

Land clearing for new plantations should be carried out without burning. Slash and burn for staple food production is one of the main reasons for bushfire and desertification due to the expansion of Savannahs. Some practical alternatives were experimented with during the workshop.

### *Management practices*

Management practices consist of maintenance of an adequate architecture of the tree canopy by pruning and elimination of water shoots and suckers. Diseased parts of the tree have to be eliminated in regular periods. The cocoa canopies should not overlap each other, however the extremely high plant density makes it difficult to achieve this objective. Tree height should be maintained low to facilitate management as well as harvest practices.

Practice and training of pruning techniques in different plantations were realized during the mission.

Unproductive cocoa trees should be rehabilitated by side grafting into the main trunk or by crown grafting on suckers. Grafting material could be achieved by the farmer himself, identifying the most productive and healthy cocoa trees of his own plantation or of the ones in his neighbourhood.

### ***Outlook***

All the previously mentioned techniques could be implemented step by step by farmers, achieving a significant improvement of the whole production system in a period of a few years without requirement of external inputs. Soil fertility of depleted soils can be recovered in a short time by employing the principles of dynamic agroforestry and food security will be improved. However this type of knowledge intensive approach requires training and accompanying of the process for a couple of years.

There is not much time to lose anymore. It is expected that the dynamic agroforestry component of the IDH – Barry Callebaut – Biopartenaire project will be able to improve productivity of at least 1.000 smallholders in a sustainable way. This may be the start of a breakthrough of further radical changes in agricultural production systems towards a more respectful interaction with natural resources. In this way destroyed ecosystems could be recovered for agricultural use, especially for cocoa production in forest systems.