INTERNATIONAL TROPICAL TIMBER ORGANIZATION

I T T O

PROJECT PROPOSAL

TITLE	DEVELOPMENT OF CLONING FOR SAMBA (OBÉCHÉ), WEST AFRICAN MAHOGANY AND TIOKOUÉ TREE SPECIES
SERIAL NUMBER	PD 377/05 Rev. 3 (F)
COMMITTEE	REFORESTATION AND FOREST MANAGEMENT
SUBMITTED BY	GOVERNMENT OF CÔTE D'IVOIRE
ORIGINAL LANGUAGE	FRENCH

SUMMARY

This Project aims at the genetic improvement and industrial-scale propagation of reforestation species for timber production.
The reforestation species include :

- SAMBA (Obéché)**,** for which previously undertaken studies will be continued in order to complete the tree breeding programme already initiated ;
- WEST AFRICAN MAHOGANY, to be the subject of propagation trials by cuttings for those genotypes most resistant to borers obtained during past breeding programmes and/or and those to be obtained during future breeding programmes ;

The project will also undertake cuttings propagation trials for **Tiokoué**, a lesser-known species intensively harvested by the communities for the chewing stick trade; the species does not regenerate easily by sexual propagation.

EXECUTING AGENCY	*SOCIETE DE DEVELOPPEMENT DES FORETS* (SODEFOR – FOREST DEVELOPMENT CORPORATION)	
COOPERATING GOVERNMENTS	-----	
DURATION	36 MONTHS	
APPROXIMATE STARTING DATE	UPON FINANCING	
BUDGET AND PROPOSED SOURCES OF FUNDING	Source	Contribution in US $
	ITTO	**404,860**
	Govn't of Côte d'Ivoire	227,134
	TOTAL	**631,994**

LIST OF ACRONYMS

CIDA [ACDI] : Canadian Agency for International Development
AfDB : African Development Bank
CFD : *Caisse Française pour le Développement* / French Development Fund
CDC : Commonwealth Development Corporation
CNRA : National Centre for Agronomic Research
CPF : *Commission Paysans – Forêts* / Farmers-Forest Commission
CPFN : *Commission Paysans – Forêts National* / National Farmers-Forest Commission
C.T.F.T. – CI : *Centre Technique Forestier Tropical de Côte d'Ivoire*
FAC : *Fonds d'Aide à la Coopération* / African Cooperation Fund
FAO : UN Food and Agriculture Organization
EFD [FED] : European Fund for Development
FORIG : Forestry Research Institute of Ghana
ITTA : International Tropical Timber Agreement
GTZ : Deutsche Gesellschaft für Technische Zusammenarbeit
IDEFOR/DFO: Institut Des Forêts / Département Foresterie
KFW : Kreditanstalt Für Wiederaufbau
NAU : Northern Arizona University, School of Forestry, USA
ONADEF : *Office National des Forêts (Cameroun)* / National Forest Department, Cameroon
NGO : Non-Governmental Organization
WFP [PAM] : World Food Programme
PDF : *Plan Directeur Forestier* / Forest Master-Plan
PSF : *Programme Sectoriel Forestier* / Sectoral Forest Programme
SODEFOR : *Société de Développement des Forêts* / Forest Development Corporation
SDRD : Sous Direction de la Recherche Développement à la Direction des projets, de la Recherche et de la Cartographie.

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SOMMAIRE

PART ONE : CONTEXT

1 - ORIGIN

The degradation of Côte d'Ivoire's forests – a process spanning several decades – and its serious consequences are a permanent cause for concern for the authorities of Côte d'Ivoire. Faced with this situation, significant reforms undertaken by the national Government have resulted in the development of the 1988 Forest Master-Plan (*Plan Directeur Forestier*, PDF) covering the years 1988-2015.
The objectives of the PDF included *inter alia* a reforestation programme due to cover at least 250,000 ha with timber species. Half way through the PDF, this target still lies far ahead. As part of its mission, the Forest Development Corporation SODEFOR (*Société de Développement des Forêts*) – founded in September 1966 – has been implementing substantial reforestation programmes with the support of the forestry research community. At present, SODEFOR has the use of a 170,000-ha land base supporting forest plantations of various species. During the 1990-2000 decade, the average annual reforestation area was 7,000 ha, which fell far short of the 10,000 ha objective set in the PDF. Nationwide, the annual area effectively reforested during the first half-period of the Forest Master-Plan did not quite average the 10,000-ha mark.

Several difficulties have hindered the achievement of these objectives.

Concerning SODEFOR, two major problems have been identified:

- Some donor countries withdrawing their financial support, which have resulted in a slowing down of new reforestation programmes ;
- The significant decline of the rate of success of forest plantation projects, due in part to poor planting stock quality.

As it is, the quality of seedlings produced has not significantly improved for 80% of manual plantations.

At national level:
- Community reforestation projects have not met the success that had been expected ;
- Following the reorganization of forest logging operations, timber operators (logging companies and timber industrialists) were required to implement compensatory reforestation projects. This provision would lead to a significant increase in reforested areas on an annual basis (around 10,000 ha/year). Unfortunately, tenure problems in rural areas – combined with bushfires which destroyed several established plantations – have prevented achieving the expected results.

Therefore, as a whole, reforestation objectives set for a number of years in several national plans have not been attained.
To remedy this situation, and to increase reforestation areas, there is a range of actions and policies for the forest sector to engage in. They include the following:

- Seek fresh funding to implement ambitious reforestation projects ;
- Better manage compensatory reforestation projects implemented by logging companies, both in the rural domain and in gazetted forests ;

- Ensure the success of reforestation programmes (mechanized, land conversion, covercropping/intercropping) implemented by SODEFOR (using its own resources) and timber industrialists ;
- Seize the opportunity of private sector being granted access to forest management for raising the level of reforestation ;
- Develop private forestry including forestry development efforts by local authorities (towns and villages authorities, district and regional Governments) as this trend is likely to continue during the coming years.

For this purpose, it is important for reforestation species to be broadly diversified, in contrast with the current trend where Teak remains the main plantation species. All these new prospects should lead to the effective expansion of the areas to be reforested each year.

Consequently, the needs for high quality planting stock are very large with both SODEFOR and other operators.
To address these growing needs, likely to grow even further in the future, improving both planting stock quality and production technique has become a necessity.
The improvement of planting stock in terms of quality and production standard is very advanced for the Teak species.

For Obéché (*Triplochiton scleroxylon*, locally named « Samba »), planting stock improvement work began some twenty years ago and has led to the selection of 100 odd clones and the establishment of the *Centre de Bouturage de Téné* (Cuttings Production Centre in Tene), but this work is less advanced than for Teak.

West African Mahogany has not undergone any genetic improvement in spite of several growth and response trials, although this species is one of the early red-coloured timber species to have been exploited in Côte d'Ivoire. However, some genetic improvement work has been initiated by SODEFOR since 2002.

The Tiokoué species (*Garcinia afzelii)* is intensively harvested as the source of some chewing stick (or « tooth-pick ») and has only been studied in the seed germination aspect, which is a slow process having a 3-month lag phase.

In the light of the above, this project « to develop cloning for Obéché, West African Mahogany and Tiokoué » should be seen as an opportunity.

2 – SECTORAL POLICIES

« Mining » type of forest logging and extensive swidden agriculture have progressively degraded the forest cover of Côte d'Ivoire. In order for the Côte d'Ivoire State to achieve its target to increase the forest cover to 20% of the national territory, as recommended by the PDF (1998-2015), it has entrusted SODEFOR with the management of all gazetted forests in February 1992. SODEFOR's reforestation experience accumulated since it was created in September 1966 and it has been put to use in all gazetted forests to serve the stated objective.

In the course of implementation, the measures decided have proven insufficient, which called for a mid-term review of PDF in 1998. Following this review, fresh proposals were put forward in consistency with the new policy aimed at increasing the size and improving the quality of the forest cover. These measures included granting private operators access to gazetted forests – a

significant decision for the development of forest management outside the conventional channels of the Forest Authority and SODEFOR.

The design of the "Cloning Development Project for Teak, West African Mahogany and Tiokoué", is in line with the main objectives of both the Forest Master-Plan and New Forest Policy, including their strategies relating to the increase of planted forest areas.

3 - OPERATIONAL PROGRAMMES AND ACTIVITIES

Since 1978, several projects have contributed to a number of significant achievements both in terms of natural forest management, reforestation and the involvement of local communities in forest management

Thus since 1989, SODEFOR has executed large-scale projects based on the policy guidelines of the Forest Master-Plan as part of its mission; these include the Forest Sector Project (*Project Sectoriel Forestier*, PSF) funded by several donors, aimed at achieving the objectives of the Emergency Plan identified in the PDF. These donors included inter alia the World Bank, CDC, GTZ, KFW, FED, CIDA, AfDB, CFD, FAC, FAO, WFP and ITTO.
The total amount of these external supports has amounted to FCFA 57 billion.
These various programmes have enabled SODEFOR to score some significant results, including the following:

- To-date, over 170,000 ha have been reforested with various hardwood timber including Teak (44%);
- The demarcation of 105 gazetted forests covering over 2.5 million hectares (over 67% of the gazetted forest estate) and the implementation of related studies, including inventories, socio-economic studies and 1:20000 vegetation maps ;
- The preparation of management plans for some 82 gazetted forests;
- The establishment of a joint-management system with the communities aiming at bringing solutions to the illegal use of gazetted forest lands for farming, with the creation of the Forest-Farmers Commissions (*Commissions Paysans-Forêts*, CPF) which also reflects the constant concern for stakeholders consultation.
- the establishment of 69 local *Commissions Paysans-Forêts* (CPF) and that of the National CPF (CPFN);
- the establishment of four (4) Forest Workers Cooperatives (*Coopérative de Travailleurs Forestiers*, CTFO);
- the control of sub-contractors.

The various results achieved have translated into numerous technical achievements within the Corporation. Between 1988 and 1991, SODEFOR benefited financing from FAC (*Fonds d'Aide et de Coopération* – a French overseas development fund) for the establishment of a nursery with 250,000 Obéché cuttings (in interplanting with Cedrela and Gmelina species). One outcome of this programme has been the establishment of the Cuttings Production Centre in Téné.

ITTO began providing funding to SODEFOR as of the early 90s. This funding support has been as follows:
Project PD 18/92 Rev.2 (F) "Identifying a forest typology according to silvicultural treatments"

This project was implemented by SODEFOR between 1996 and 2000 in the Haut Sassandra gazetted forest (102,400 ha) situated in the closed semi-deciduous forest area and helped build

upon the results of previous studies conducted on these forest stands by incorporating the soil data components.
Thus, for the future sustainable management of this forest, the following data are available:

- Recent mapping work ;
- Knowledge of soil-related constrains;
- Recommendation for further forest development work;
- Terms of reference and costs of silvicultural treatments;
- Geographical information system (GIS) whose open-access will enable the incorporation of available data and data to be collected in the future.

In addition, the lack of a definite adequacy between soil types and the types of existing natural stands has been ascertained. That is why the implementation of the silvicultural prescriptions identified and the surveillance of this forest call for particular attention, in order to avoid any degradation that might hinder the rehabilitation process.

Finally, drawing from the results of PSF, a forest typology and forest work prescriptions by stand types have been identified.

Project PD 3/95 Rev.2 (F) ***Improving Iroko genetic resistance to Phytolyma lata*** jointly implemented by FORIG (Ghana) and ONADEF (Cameroon) and NAU (United-States).

Phytolyma lata is an insect whose attacks cause gall-like formations and shrivelling (periphery necrosis) of leaves, which disturb or cause the death of Iroko plant growth, inescapably resulting in the failure of reforestation projects.

The main objective of this project had been to conduct studies on the genotypic resistance and/or tolerance of Iroko to the attacks of this insect and to identify appropriate silvicultural response treatments in order to establish Iroko industrial plantations, as previous attempts to control the pest had met only little success or no success at all due to the highly versatile behaviour of the insect.
Following the implementation of this project, significant results were achieved in relation to the specific objectives ascribed to the project, which, concerning Côte d'Ivoire, had been to participate to:

- Iroko seed collection at national level, seed exchange programmes with project partners and pest resistance trials conducted on this stock;
- The establishment of conservation plots using Iroko provenances;
- The establishment of Iroko plantations in interplanting with both indigenous and exotic companion species.

As for the first objective, in the major part of *Milicia sp.* natural range area, a total of 4.8 kg of seeds from 231 seed trees were collected between 1996 and 1999.
In addition, by way of exchange, the seeds of twelve (12) provenances from Ghana, Kenya and Sierra Leone were delivered by FORIG. In return, all seeds collected in Côte d'Ivoire provenances were delivered to FORIG in order to be disseminated among project partners.
Finally trials were conducted to test Iroko resistance and/or tolerance to Phytolyma lata, resulting in the selection of over eighty (80) clones from the entire set of provenances.
The selection was made on trees established in timber arboreta, using their apparent vigour as selection criterion.
Individuals selected were those most vigorous individuals free of attacks; they were propagated by cuttings from stump shoots and the clones obtained were established in a clone park.

These clones were monitored so as to classify them in relation to their sensitivity to the pest attacks. The mean height of thirty (30) clones with the clone park, after two years of growth, varied between 133 and 354 cm, with a general mean height of 228 cm. As a whole, the *M. regia* species turns out to be the least sensitive to the attacks of the pest *M. excelsa.*
These investigations led to the development of a series of clone park management prescriptions for timber production and best practices in clone selection for *Phytolyma lata* control, in addition to the production of plants from stump shoot cuttings – an experience which can be built-upon to serve the purpose of the "Samba, African Mahogany and Tiokoué Clone Development Project".

Regarding the second specific objective: in the Kani Gazetted Forest a 1-ha conservation plot had been established using provenance germplasm received from FORIG; a total of 1111 individual stems had been planted, which resulted after seventeen (17) months in healthy plants demonstrating an efficient initial growth rate (123.5 cm average total height, ranging between 36 and 176 cm). The results achieved have also shown a sensitivity to pest attacks greater among the Kenya provenance than among the Ghana and Sierra Leone ones; the trial also showed that provenances with strong environmental adaptation capabilities and lowest mortality rates were also those having the best growth performances (KB Provenance from Kenya; AA 12, AA 30 and AA 3 Provenances from Ghana and four provenances from Sierra Leone). This finding may also be used by the "Samba, African Mahogany and Tiokoué Clone Development Project".
Unfortunately, this parcel was ruined by a bushfire occurrence in February 2000. This should be taken as lesson to minimize the risks of bushfire although the site of the project "Development of Cloning for Samba (Obéché), West African Mahogany and Tiokoué tree species" is not as vulnerable to bushfire as the Kani site.

The timber park (1.5 ha) and clone park (0.1 ha) also have their own respective role in the provenances and clones conservation processes.

Interplanting Iroko with other local or exotic companion species (specific objective 3) has been effectively achieved.
Four Iroko parcels have been established in Kani, between 1997 and 2000 on a 5.7-ha total surface area, in interplanting with several species – West African Mahohany (*Khaya sp*), Fraké (*Terminalia superba*), Framiré (*Terminalia ivorensis*) Fromager (*Ceiba pentandra*), Gmelina *(Gmelina arborea)*, Lingué (*Afzelia africana*), Samba (*Triplochiton scleroxylon*) and Teak (*Tectona grandis*).
Although some of these parcels were damaged by fire, others remain.
Interplanting proportions are 12.5 to 50% Iroko, with a plantation density of 400, 1,111 an 10,000 plants per hectare. The results of measurement carried out on juvenile plantlets (5 months after planting) on one of the burnt parcels show that, in relation to the control parcel, interplanted parcels are associated with a strong growth of Iroko stems, i.e. 19.7 cem and 29 cm average heights for the control parcel and the interplanted parcels respectively.
Regarding the interplanting proportions and the choice of companion species, the following interplanting proportions yielded the best performances: Teak+Mahogany with 33% Iroko (33.8 cm); Teak+Framiré with 33% Iroko (32 cm); Gmelina+Framiré with 33% Iroko (33 cm) and Teak+50% Iroko (33.7 cm).
Regarding the rates of attack, interplanted parcels still show the best results with an average of 2 (0.3 to 4.3) gall occurrences per stem, as opposed to 6 galls for the control group. Interplanting mixtures most successful in fending off pest attacks are : Samba with 50 % Iroko (0,3 gall), Mahogany+Fraké with 33 % Iroko (0,9 gall) and Gmelina+Framiré with 33 % Iroko (1 gall).
Similar results have been achieved in Ghana by FORIG, in collaboration with NAU of USA and SCU of Australia (Wagner M.R. ; Cobbinah J.R. ET Ofori D.A., 1996).

All these results are valuable data which may prove of great use for the "Samba, African Mahogany and Tiokoué Clone Development Project".

<u>Project PD 22/98 Rev.1 (F)</u> « Development of Teak cloning and establishment of industrial plantations » whose development objective was to implement a clonal selection and Teak plantation silviculture intensification programme, pursued three specific objectives each corresponding to four expected outputs. The outputs effectively achieved, in relation to objectives, are summarized below:
Teak genetic improvement programme (Specific Objective 1). The selection of best progenies from the Sangoué 82 seed tree orchard (Result 1.1) was undertaken and enabled the selection of twenty-five high performing clones out of some hundred tested clones. In addition, this selection process highlighted the fact that best performing progenies for the most part had parent stock provenances from India (Virnolige Range, Purunakote and Nilambur), Tanzanie (Bigwa and Kihuhwi) and Thaïlande (Mae Huat).

The establishment of smaller pauci-clonal orchards with high genetic yields (Output 1.2) was effectively implemented with the establishment of three (3) hectares of seed tree orchards in Téné with ramets from parent stock obtained from best performing progenies.

The introduction and testing of new high-quality provenances (Output 1.3) have been implemented.

There are six (6) newly introduced provenances: two provenances from India, three provenances from Costa Rica and one provenance from Ghana. A comparative provenance trial was also established in Sangoué with these six provenances.

The establishment of conservation parcels (Output 1.4) has been implemented. A total of twenty-four (24) hectares of conservation parcels established between 2000 and 2006, with a Thai provenance, the best performing progenies from the Sangoué seed tree orchard and the six newly introduced provenances.
In addition, a 1-ha conservation parcel with all selected clones has been established.

- **Industrial Teak cloning (Specific Objective 2)**

The goal to establish propagule cuttings nursery having a 500,000-plant mean capacity (Output 2.1) has been largely exceeded – the Téné propagule cuttings nursery, equipped with trickle-irrigation and misting systems has an annual production capacity exceeding 1 million plants.

The establishment of three (3) hectares of parent stock plantation (Output 2.2) has been effective.

- **Clone selection (Specific Objective 3)**

Output 3.1 which consisted in the implementation of primary clone trials (2.5 ha/year) has been largely attained with the establishment of trial plots covering 5 ha in Soungourou and 7,5 ha in Téné. The results of the Téné trials have led to the selection of twenty-five (25) high performing clones based on initial growth increments and stem conformation data.

The establishment of clone behaviour parcels (100 ha/yr) constituted Output 3.2. This output has also been largely achieved with the creation of 303 ha of clone behaviour parcels including 78 ha in Soungourou and 225 ha in Téné. Better still, clone parcels covering 1,400 ha in total have been created in three gazetted forests.

Beyond the results obtained in relation to specific objectives, other outcomes have been recorded:

- **Project impacts**

The high performance and good conformation of selected clones under the project have raised considerable interest among the economic operators of the forest sector. The use of clones by these operators, associated to a simple asexual propagation technique developed by the project would contribute to a greater expansion of reforested areas, and consequently to the improvement of the national forest cover.

In addition, the economic impact of teakwood use (a species with high commercial value) in reforestation projects is invaluable, both for users themselves and the Côte d'Ivoire nation.
Besides, certain timber industrialists have already created clone plantations using planting stock supplied by the Project, as part of a government forest land management partnership linking them to SODEFOR.
Outside Côte d'Ivoire, the project experience could be of use to other countries willing to engage in the establishment of industrial Teak clone plantations.
Furthermore, communities living in the project area have organized themselves into forest workers' cooperatives and executed nursery work. Thus, they have benefited from substantial and regular income sources over the entire project duration.

- **Plant production techniques and silviculture**

In addition to the plant production technique by propagule cuttings in polybags under misting – shoots collected from the parent stock park, dressed or conditioned into propagule cuttings are placed in polybags for rooting – another technique was developed. This alternative consisted in producing stumps from shoot cuttings by direct field planting (no prior rooting in polybags), which significantly reduced production, transport and planting costs. The plants produced using this method have shown promising behaviour patterns under open field conditions.

Different density trials have been established; the resulting date show that larger spacings (4 m x 4 m or 5 m x 5 m) have no negative impact on clone stem conformation. This means an opportunity to use these clones in a taungya system.
The "Samba, African Mahogany and Tiokoué Clone Development Project" will draw from the results of Project 22/98 Rev.1 (F).

Project PD 24/98 Rev.2 (F) « Intensification of Teak Silviculture» specifically aimed to improving the silviculture of existing parcels and their regeneration after clear cutting. The implementation of this project, which was based in Bouaké, an area currently under military occupation by the "Forces Nouvelles", has been disturbed by the current crisis currently affecting Côte d'Ivoire. In the light of this situation, transferring this project to Séguié (Agboville) has been requested and granted in order to ensure the continuation of activities, and these project activities have indeed just resumed in 2006.
However, interesting results had been achieved in the initial project area before the onset of the crisis: regarding the improvement of existing or present Teak parcels, trial shaping (preliminary pruning) operations in juvenile parcels and the organization of early thinnings have been undertaken and completed, respectively.
Thus, the analysis of partial measuring data on trees aged 1 to 3 years (height, girth and other measurements) show that the shaping operations have had a positive impact on tree growth.
Regarding thinning operations, a positive impact of stronger thinning on lateral and/or thickness growth of trees (girth) has been achieved, in line with recorded partial results.

Regarding the regeneration of parcels after clear cutting, partial results also show that the selection of one shoot per coppice at two years of age seems to be required to achieve the most efficient treatments.
The results recorded only hint at trends that await confirmation, inasmuch as the data capture process has not been completed.
However, these results should be taken into account in the execution of the "Samba, African Mahogany and Tiokoué Clone Development Project".

This is a follow-up project to the previous project "Development of Teak cloning and establishment of industrial plantations" in that it provides plantation condition experiments for clones previously tested in nursery conditions. The project has conducted regeneration trials using tree-stump shoots after clear-felling and has helped identify and establish teak regeneration silviculture. These results are being used by SODEFOR.

Apart from the results of ITTO-funded projects, there is the Khaya Project, **"Project to develop an integrated strategy for reducing the impact of the bud borer on African Mahogany in montht tropical forests".**
The Khaya project, currently under implementation at SODEFOR in partnership with FORIG (Ghana) and FRIN (Nigeria), with a funding from the African Academy of Sciences (A.A.S.) has listed the following objectives:

- To identify and select Mahohany genotypes less sensitive to borer attacks for establishing plantations;
- To assess the most promising silvicultural techniques for reducing the impact of borers on African Mahogany buds.

At the current implementation stage, the project shows promising results regarding the selection and growth of the two Mahogany species (*Khaya anthotheca* and *Khaya ivorensis*), in line with objectives.
As it is, mean growth results achieved in progeny trials established in Mopri (semideciduous forets), Téné (semideciduous forest) and Yapo Abbé (evergreen forest), after one season of growth are encouraging and are best in Téné, with mean heights ranging from 135 cm to 170 cm for *Khaya ivorensis* and 130 to 160 cm for *Khaya anthotheca*.
Besides, for *Khaya anthotheca,* the best growth increments have been recorded with lower mixing proportion (50% and 75% of *Heritiera utilis* or Niangon), as opposed to pure stand plantations or mixed plantation containing a higher Niangon proportion.
On all three plantation sites, after one year of growth, no borer attack has been recorded on the overall population of plants.
This absence of attacks and the high initial plant growth rate are encouraging for further industrial plantation establishment, although trial results were assessed on juvenile stems only.
Results have also been achieved on seed conservation. The conservation and germination tests carried out have confirmed the microbiotic character of West African Mahogany seeds, having germination rates reduced by almost half (from 62% to 32% for Khaya ivorensis and from 76 % to 40 % for Khaya anthotheca) after two months of storage in a cold chamber, and reduced to nothing three months later.

PART TWO: THE PROJECT

1 - PROJECT OBJECTIVES

1.1 Development Objective

The overall objective of the Project is « **The diversification of tree plantation species in Côte d'Ivoire ».** This project will contribute to the establishment of a programme of cloning and seedling production technique improvement aimed at accelerating the development of OBÉCHÉ/SAMBA, WEST AFRICAN MAHOGANY and TIOKOUE industrial plantations.

1.2 Specific Objective

The project specifically aims at Developing strategies to ensure a regular supply in selected and improved planting stock (OBÉCHÉ/SAMBA, WEST AFRICAN MAHOGANY and TIOKOUE) to reforestation programmes.

Expected outputs are as follows :

- **Clone breeding of OBÉCHÉ/SAMBA continues;**
- **Borer-resistant genotypes of WEST AFRICAN MAHOGANY selected and cuttings produced;**
- **TIOKOUE propagation by cuttings is effective.**

2 - PROJECT JUSTIFICATION

2.1 Problem to address

2 1 1 Obéché*/Samba

Obéché (*Triplochiton scleroxylon*) belongs to the Sterculiaceae family; it is one of the most intensively harvested species among internationally traded timber species. Around 1975, Obéché was the first source of timber exports in Côte d'Ivoire in volume terms, making up 34.6 per cent of total log exports. Because of this strong extractive pressure, regrettably, the species has become increasingly rare. However, Obéché is a promising reforestation species with a regular, 25-30 year growth cycle and end-of-cycle timber yields averaging 200 m3/ha. Besides, Obéché

* Obéché goes by the name of "Samba" in Côte d'Ivoire; it is also known as "wawa" or "African whitewood" in some English-speaking markets and "ayous" in some French-speaking markets.

is a heliophilic (full-sunshine) species fit for single-species industrial plantations. Nevertheless, seed supply for this species is a serious constraint for the establishment of full-size plantations because of the attacks by the larvae of a weevil of the genus Apion - *Apion ghanaensis. Vos* – which set upon flower buds, blossoms and seeds during maturation. In addition, lethal deformations of flower organs and fruits are often caused by *Mycosyrinx nonveilleri* fungal infestation. As a result, planning large-size Obéché plantation programmes can prove difficult.

Yet another, no less serious constraint is the irregular fruiting pattern of the species, with widely varying length of time between two consecutive fruiting periods, which makes any planning virtually impossible. Obéché fruiting has not occurred for some ten years except for from some rare individual trees.

The status of the species has led CTFT-CI – subsequently renamed as IDEFOR/DFO – to engage in tree breeding activities and produce 151 clones, in addition to establishing the Cuttings Production Centre en Téné. The Centre, which should have an annual production capacity of 250,000 seedling was created with funds provided by FAC but currently only produces teak (an average of 700,000 seedlings each year), as the funding for the Obéché tree breeding programme was suspended at a time when vegetative seedling production problems – declining rooting rate of cuttings in nursery environment and lower striking rate in plantations – were the most acute.

Considering the economic significance of Obéché, and the need to diversify plantation species in the light of all above considerations, this project would enable SODEFOR to produce selected seedlings and establish large-scale plantations in order to reduce the impact of deforestation and address the raw-material supply problems experienced by industrial timber processing units.

In addition, this project would make it possible to

- resume Obéché industrial cloning activities
- build upon the technical and scientific results of previous work and monitor the behaviour of older industrial plantations;
- continue the genetic improvement of planting stock and undertake large-scale plantation trials ;
- disseminate to neighbouring countries the results achieved in the various reforestation sites.

2 1 2 West African Mahogany

There are several species of the Khaya genus that go by the name of “Acajou” (African Mahogany). They include *Khaya ivorensis* (Grand Bassam Mahogany), *Khaya anthotheca* (White Mahogany), *Khaya grandifoliola* (Benin Mahogany) and *Khaya senegalensis* (“Cailcédrat” or Senegal Mahogany).

The Grand Bassam Mahogany – a tree species growing in closed montht evergreen forests – is the one targeted by the Project for having been among the most intensively harvested timber species in Côte d’Ivoire during the 60s decade. In addition, it can be safely assumed that plant production techniques to be researched under the project will be applicable to the other three species. Grand Bassam Mahogany is a softer wood species which varies in colour from light pinkish-brown to a deep reddish shade; it is of medium weight, easily peeled and sliced into veneer and it seasons rapidly with little degrade – a valuable species for the furniture and cabinet-making trade, decoration and joinery.

The interest for African Mahogany timber has caused drastic stock depletion in natural forest environment through excessive harvesting spurred on by a strong demand from both domestic and international markets. The depletion of African Mahogany stocks in natural forest stands should be offset by the establishment of timber plantations. Unfortunately, the destruction of terminal shoots by micro-lepidoptera such as *Hypsipyla robusta* and, to a lesser extent, *Gyroptera robertsii* (commonly known as Mahogany borers) constitutes a major obstacle to the development of African Mahogany plantations. The destruction of terminal shoots undermines the apical dominance of seedlings, resulting in the deformation of younger seedlings in plantation conditions and growth delays associated with the sprouting of lateral bud and the formation of forks. Furthermore, there are other factors which, to a lesser extent, constitute obstacles to the development of African Mahogany plantations: irregular fruiting habits and pest attacks on seeds from both caterpillars of micro-lepidoptera and rodents.

In order to lift these constraints, research work was focused on the behaviour of the species in pure cultivation environment and in intercropping conditions, and on phyto-pathological trials. These research efforts were interrupted when agronomic research underwent a process of restructuring in Côte d'Ivoire in 1998, and therefore efficient borer control methodologies could not be identified for industrial-scale application. However, available research findings contain recommended silvicultural treatments, including the use of associated species to fend off pest attacks and/or reduce their intensity and frequency. It should be reminded that African Mahogany never benefited from any genetic improvement programmes such as those undertaken for Teak or Obéché.

Research work has recently been reactivated by SODEFOR who has sought to obtain individual Grand Bassam Mahogany and White Mahogany trees resistant to borer attacks. In consistency with this effort, the Project would enable the production of "true copies" trees of selected resistant individuals and make them available as planting stock for reforestation purposes. In addition, the search for borer-resistant genotypes will continue.

2 1 3 Tiokoué

The Tiokoué species (*Garcinia afzelii*), locally referred to as " the tooth-pick tree", is a shrub of Côte d'Ivoire forests widely sought by Africans for chewing sticks and tooth picks. This species is the subject of illegal and uncontrolled harvesting by traders and merchants which is practiced on a very large scale. Not a week goes by without large illegal consignments of the species being seized, especially on Côte d'Ivoire's eastern border. And indeed, in 1988 and 1998, Prof. Ake Assi did declare – in research papers published in Missouri science journals and in the forestry journal *Le Flamboyant* – that Tiokoué was an endangered species in Côte d'Ivoire.
In addition, according to a study implemented in "Higher Dodo" in 2003 by Mr. Edouard Kouassi as part of his doctoral thesis, it was demonstrated that Tiokoué poles were primarily shipped to Ghana. A 15-tonne consignment transported by lorry would be made of 240 poles 3-4 metres long, with a 19-cm diameter at the thicker end (but-end of pole). Such a consignment, if it were legal, could be valued between FCFA 500,000 and FCFA 800,000 FCFA, including a FCFA 12,500 authorization and a FCFA 50,000 security deposit.

Tiokoué is not harvested for wood only. The same study has shown that roots – also used as chewing stick – are very popular. These root products would command a strong market position in countries of the sub-region – Burkina Faso, Mali, Niger and Senegal.

To mitigate the effect of unsustainable practices carried out on the species, SODEFOR decided to engage in the marketing of Tiokoué wood so as to better control harvest volumes. Exploitation

of the species, however rational, requires the renewal of the resource base. Such a renewal can only be made possible through the production of nursery seedlings. However, studies conducted in 1998 by the forest research community on seeds germination have shown that seeds germinate very slowly over long, discontinuous periods of time (a 3-month lag phase is common, with a 56% germination rate by the eighth month) and that plantlets have very slow initial growth rates (around 2 cm average height reached eight months after sowing).

The Project would therefore aim at enabling the development of vegetative seedling production techniques with fast initial growth for the establishment of industrial plantations, without which the extinction of the species would appear ineluctable.

2 2 Project implementation areas

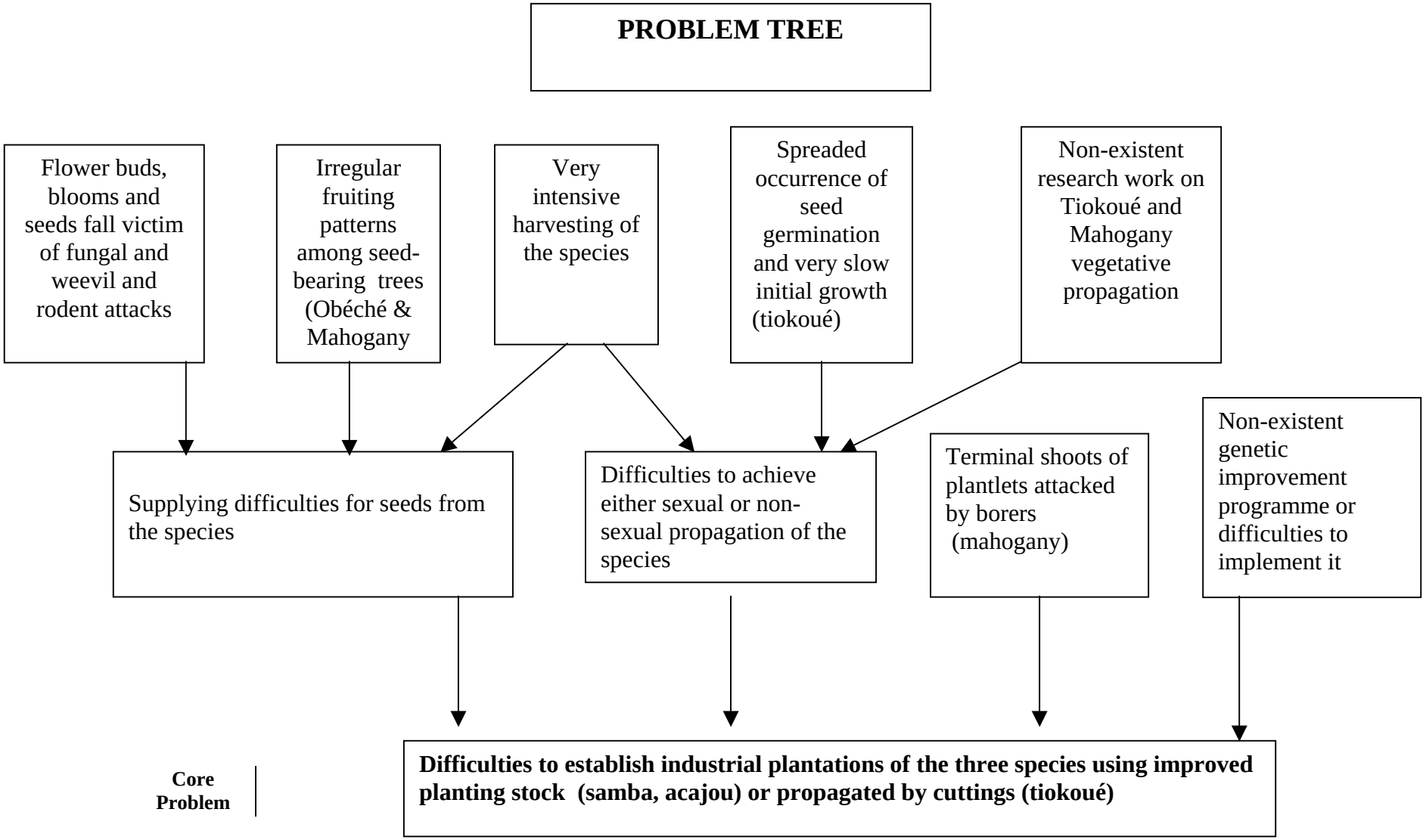
The main implementation area for this project will be the Téné gazetted forest and there will be three distinct sites for the three species, in the Cagnoa Management Centre (see attached map) 12 km from the town of Oumé (6”19 North ; 5”22 W).

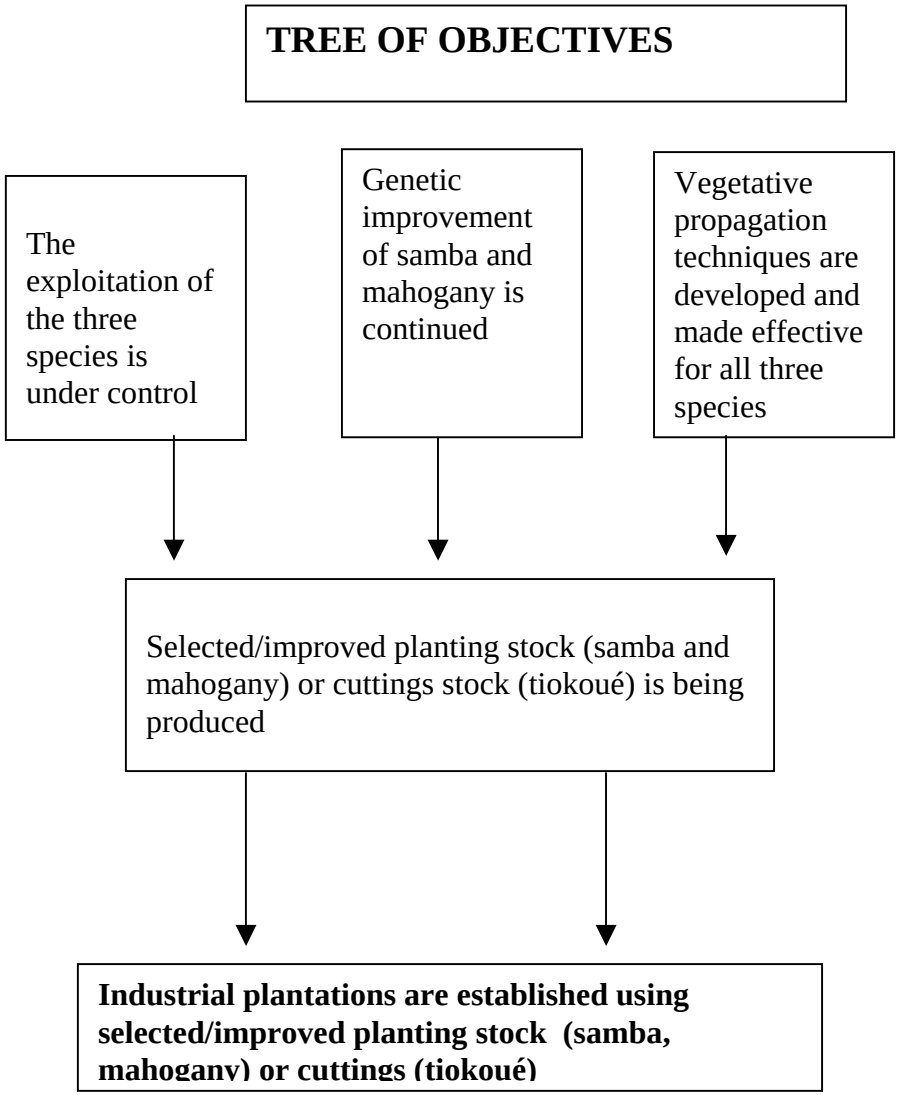
The Téné gazetted forest belongs to the close moist semi-deciduous forest type.

The dominant climate in the Téné area is sub-equatorial caracterized by four distinct seasons: two rain seasons (longer rain season from March to June and a shorter rain season from September to October) and two dry seasons (a longer dry season between November and February and a shorter dry season in July/August).

Annual rainfall are between 1,300 and 1,400 mm and mean temperature is close to 26°C, with variations reaching a maximum amplitude of 10°C. The atmosphere is dry during two to three months, whilst the rest of the time, relative humidity levels are high and vary between 50 and 60%.

The terrain is that of rolling high plains. The bedrock is of granite and granite-gneissic nature supporting lightly or moderately unsaturated ferralsols.


PROBLEM TREE
Flower buds, blooms and seeds fall victim of fungal and weevil and rodent attacks
Irregular fruiting patterns among seed-bearing trees (Obéché & Mahogany
Very intensive harvesting of the species
Spreaded occurrence of seed germination and very slow initial growth (tiokoué)
Non-existent research work on Tiokoué and Mahogany vegetative propagation
Supplying difficulties for seeds from the species
Difficulties to achieve either sexual or non-sexual propagation of the species
Terminal shoots of plantlets attacked by borers (mahogany)
Non-existent genetic improvement programme or difficulties to implement it
Core Problem
Difficulties to establish industrial plantations of the three species using improved planting stock (samba, acajou) or propagated by cuttings (tiokoué)


TREE OF OBJECTIVES
The exploitation of the three species is under control
Genetic improvement of samba and mahogany is continued
Vegetative propagation techniques are developed and made effective for all three species
Selected/improved planting stock (samba and mahogany) or cuttings stock (tiokoué) is being produced
Core Objective
Industrial plantations are established using selected/improved planting stock (samba, mahogany) or cuttings (tiokoué)

2.3 Situation expected at Project completion

At project completion, SODEFOR will have selected:

- 50 OBÉCHÉ/SAMBA clones in existing trials ;
- 50 superior trees ("Plus Trees") of the same species in industrial land parcels.

SODEFOR will have the use of:

- 1-ha park of selected OBÉCHÉ/SAMBA parent stock (year 1 : 0;25 ha, year 2 : 0.25 ha and year 3 : 0.5 ha at 1 m x 1 m, i.e. 10,000 seedlings/ ha) ;
- 0.3-ha park of selected borer-resistant AFRICAN MAHOGANY parent stock (0.1 ha / yr, at 1 m x 1 m) ;
- 0.3-ha park of TIOKOUE parent stock (0.1 ha / yr, at 1 m x 1 m).

These mother-tree/root stock parks will produce :

- 300,000 selected OBÉCHÉ/SAMBA seedlings (150,000 seedlings in year 2 and 150,000 seedlings in year 3) ;
- 50,000 borer-resistant MAHOGANY seedlings (25,000 seedlings in year 2 and 25,000 seedlings in year 3);
- 50,000 TIOKOUE cuttings (25,000 seedlings in year 2 and 25,000 seedlings in year 3).

Produced seedlings would enable the establishment of:

- 100 ha of OBÉCHÉ/SAMBA industrial plantations (50 ha in years 2 and 3) ;
- 100 ha of AFRICAN MAHOGANY industrial plantations mixed with other species (50 ha in year 2 and 50 ha in year 3) ;
- 10 ha of TIOKOUE plantations (5 ha in year 2 and 5 ha in year 3).

OBÉCHÉ/SAMBA cloning trials will have been established over a 4-ha total area, including 2 ha the second year and 2 ha the third year in order to continue the cloning of the species. 2-ha cloning trial plots for African Mahogany will also be established.

In addition, one 0.2-ha conservation plot of selected OBÉCHÉ/SAMBA clones (0.1 ha in year 2 and 0.1 ha in year 3) will be established, together with a 0.03-ha conservation plot of borer-resistant AFRICAN MAHOGANY (0.015 ha in year 2 and 0.015 in year 3).

Finally, seedling production techniques using vegetative propagation for OBÉCHÉ/SAMBA, AFRICAN MAHOGANY and TIOKOUE will be fully operationalized.

2.4 Project Strategy

During the execution of this project, several strategies will contribute to the implementation of its objectives.
Regarding human resources, the hiring of qualified personnel (engineers, technicians and specialized maintenance workers) will be required.

Apart from the staff involved in direct project management who are part of SODEFOR human resources, local manpower will be enlisted to implement field work.

As it is, in addition to SODEFOR's specialist staff, Samba testing inventories will occasionally require ad hoc manpower to maintain the parcels.

The mobilization of the clones selected (Samba) or selected trees (Mahogany and Tiokoué) will require the services of a tree-feller day labourer.

Nursery work (filling up polybags, planting and maintenance of clone parks, cutting production) will be executed by the Kimoukro cooperative which has been implementing Teak cutting propagation work for several years under Project PD 22/98 Rev.1 (F).

Regarding land preparation, plantation establishment and maintenance work sub-contrated manpower will be used.

On the human resources plane: the hiring of skilled personnel (Engineers, technicians and specialized manpower);

On the technical plane :

- previous studies and research work will be duly taken into account for OBÉCHÉ/SAMBA and AFRICAN MAHOGANY.

Indeed, during past research efforts, trials and experiments helped developing a number of cuttings propagation techniques using parent stock from clone parks (OBÉCHÉ/SAMBA). The results of these experiments will be used and the research will be continued;

- the establishment of OBÉCHÉ/SAMBA, AFRICAN MAHOGANY and TIOKOUE plantations using the methodologies of SODEFOR derived after years of research;
- the development of production capacities at the Téné cuttings centre (purchase of an engine-driven pump, shaded pre-nursery and misters).

2.5 Targeted beneficiaries

The beneficiaries targeted by the project are as follows :

a) Timber industrialists will be able to use the planting stock produced by the project to carry out reforestation work in logging compartments. Because the project will contribute to promoting the establishment of new plantations with the three timber species, the problems mills have encounter to find adequate supply of raw material having high technological and commercial value could be solved;

b) The rural communities will have access to new job opportunities offered by the project through the establishment of nurseries, plantations, and the medium- to long-term exploitation of forest products and by-products;

c) Any planters interested to gain access to species managed by the project could acquire improved planting stock and receive technical guidance for plant production, planting and plantation monitoring;

d) The State of Côte d'Ivoire due to the positive impact the reforestation project will have on the environment with increased reforested areas and fiscal revenues from the timber trade;

e) The State of Côte d'Ivoire due to the positive impact the reforestation project will have on the environment with increased reforested areas and fiscal revenues from the timber trade;
f) The international timber market with the diversification of plantation products;
g) Private structures and NGOs in charge of reforestation through the increased availability of various reforestation species;
h) The research community through the increasing biological potential of tropical forests;

i) Countries of the sub-region through the availability of project results (technical paths from cuttings to plantation) and their dissemination through extension services, harvesting and the use of TIOKOUE as traditional chewing stick.

2.6 Scientific and Technical aspects

2.6.1 OBÉCHÉ/SAMBA clone selection

The genetic improvement of OBÉCHÉ/SAMBA led to the initial selection of 151 clones and the establishment of the Cuttings Production Centre in Téné, currently being operated exclusively for teak production. Cloning trials have been established in order to compare clones and select the best ones.
The work to be implemented under this follow-up project will mainly focus on conducting further surveys and inventories of existing trial parcels; the identification of the best individual stems (plus trees) in industrial OBÉCHÉ/SAMBA plantations, the mobilization and propagation of selected clones and plus trees, the establishment of a parent stock park/orchard using this plant stock and the production of selected seedlings for the establishment of industrial timber plantations.

2 6 1 1 Trial inventories

Surveys and inventories on OBÉCHÉ/SAMBA trials, which had been suspended for several years, have resumed in Téné in 2004 with Trials 1988 (4.3 ha) and 1989 (7 ha). The follow-up inventories will apply to the 1987 Mopri Trial (2.3 ha) and the 1990 Sangoué Trial (6.3 ha), the other trials (1991 3.1-ha and 1992 2.2-ha Clone Testings in Mopri) having been destroyed by bushfire. These inventories will make it possible to select 50 clones out of 151 to be planted and propagated in the clone park in order to be used in industrial reforestation projects.
The clone selection criteria will be the girth at 1.3 m above ground level (measured) and the estimated merchantable height (height to the first major defect), stem straightness, cylindricity/roundness and taper (appraised).

2 6 1 2 Selection in industrial plantations

The industrial OBÉCHÉ/SAMBA parcels (other than Mopri 1979 from which 115 clones were selected out of the 151 available ones) established with planting stocks grown from seeds remain to be surveyed in order to identify the 50 best individual stems by using the same criteria as those of the trials.

2 6 1 3 Mobilization and propagation of selected clones

* **Mobilization of selected clones**

Clones selected from the cloning trials will be mainly mobilized from a clone breeding parcel situated in the Anguededou Gazetted Forests. This parcel supports 110 clones out of the total 151. Based on fifty (50) clones to be selected, one hundred (100) will be felled, at the rate of two trees per clone. Selected clones not present in the Anguededou clone parcel will be recovered wherever they can be found. As for the 50 “plus trees” selected in the industrial parcels, they will also be mobilized by vegetative propagation after felling.

Suckers will be harvested in several successive passes by a team from the Téné Cuttings Production Centre and will be propagated in the Centre.

*** Propagation of selected clones**

Suckers harvesting will make 3,500 trial clone cuttings available for rooting, at the rate of 70 cuttings per clone. These cuttings will lead to the production of at least 20 seedlings per clone, i.e. a total of 1000 seedlings to be established in the parent-stock arboretum.
Regarding the plus trees, by doubling suckers collection period, a minimum of 20 seedlings per clone, i.e. 1000 seedlings in total to be produced and established in the parent-stock arboretum.

*** Establishment of the Parent-stock Arboretum, trials and industrial plantations**

A parent-stock arboretum ("Mother-Trees Park") will be established from the 100 selected clones. The Park will enable the production of seedlings for the implementation of trials, the establishment of a conservation plot and industrial plantations.

2 6 2 African Mahogany breeding/selection and propagation by cuttings

Borer-resistant Mahogany genotypes selected under a previous project named "Projet Khaya" will be propagated by cuttings. New resistant genotypes will be sought and a parent-stock arboretum ("Mother-trees Park") and industrial plantations will be established.

2 6 3 Propagation of Tiokoué by cuttings

Individual stems identified in natural forests will be mobilized by felling and suckers harvesting in order to be established and propagated by cuttings in a timber park. Cuttings propagation techniques remain to be identified. A high density plantation (1 m x 1 m) will be created using cuttings from the timber park.

2.7 Economic aspects

West African Mahogany is a valuable marketable timber species which was among the earliest harvested species in Côte d'Ivoire (harvested for timber since the 1900s). The overexploitation of Mahogany has spelled the gradual demise of the species in natural forest stands. This situation has led operators of the timber economy to develop an interest for alternative timber species such as Samba. The tables below compare the development of Samba and Mahogany timber exports.

Table of SAMBA/OBÉCHÉ and AFRICAN MAHOGANY exports in 1,000 m^3

	1960	1965	1970	1975	1980	TOTAL
SAMBA	188	416	717	836	497	
Mahogany	97	125	137	81	97	

Table	of	Exports	in	Million	FCFA	
SAMBA	949	2310	4265	8564	12,465	
Mahogany	620	1076	1309	1554	3919	

Source : Retrospective Agricultural and Forestry Statistics Yearbook of Côte d'Ivoire, Years 1900-1983, Vol. III.

Statistics of the last few years do not provide detailed figures by species. However, in 2004, a total of 236,393 m^3 SAMBA were processed, for only 70,687 m^3 of MAHOGANY.

The propagation of these species in plantation environment will address, at least partly, the survival problem, and hence the sustainability of the species, its supplies to timber industrial units, in addition to generating revenues both for SODEFOR (sales of standing timber) and for the Government of Côte d'Ivoire (rent capture/fiscal revenues).

As it is, the timber supply problem of the processing plants of Côte d'Ivoire is becoming acute with a significant timber supply deficit – including Samba and Mahogany – being recorded.
Therefore, planting those species would contribute both short-term and long-term solutions to of the supply problem experienced by timber processing plants. In addition, this would mean an increase of activities by the industrial sector creating fresh job opportunities.
Furthermore, stumping fees and export quotas would enable the Government to collect substantial fiscal revenues, which would significantly contribute to the GDP growth and the national balance of payment.

As for Tiokoué, because of its use as traditional chewing stick, the species is in high demand both in the domestic and international markets. The organization of the harvesting and marketing of the product is being considered for the short term in view of the fact that its harvesting is illegal and largely uncontrolled. There is no doubt that revenues to be derived from Tiokoué exploitation will be substantial although they have not been quantified yet.

2.8 Environmental aspects

The forest cover of Côte d'Ivoire has degraded during the past few years under the impact of agriculture and the logging industry.
This degradation, if it continues unabated, will have serious consequences on the environment.
Indeed, the degradation of the national forest cover is likely to bring about an imbalance in the flora, fauna and the climate.
In order to address this degradation process, the Project should contribute to increasing the national forest cover, through reforestation efforts not only in degraded areas or on fallow lands, but also inside certain gazetted forests which have been affected by selective logging. In so doing, the Project will contribute to the conservation of the ecological and climatic balance, while avoiding the local extinction of these three species.

In addition to the above, plantations have a beneficial impact on the environment inasmuch as they act as carbon sinks for carbon emissions of human origin. Their foliages absorb greenhouse gases contained in the atmosphere, which help mitigate the risks associated with climate changes and contribute to improving the climate status.
Plantations will create a viable environment for the fauna and flora. In other words, they will help restore the balance required for the conservation of animal and plant diversity and contribute to soil and water maintenance.

2.9 Social aspects

Communities living in and around these forests depend on their use, through harvesting their timber or non-timber forest products – fruits, traditional chewing-sticks, agricultural products, and forest game.
Forest is therefore a constitutive part of their livelihood. To protect the forest is more to the benefit of local, forest-dependent communities than it is to any other entity.

Indeed, the installation of industrial plantations will contribute to reducing unemployment and rural migration trends by providing employment to local communities whose manpower will be used in nursery operations, planting and plantation maintenance work. These tasks are to be sub-contracted to local community members and will enable them to receive substantial incomes.

Besides, the existence of industrial plantations in a village community leads to the creation of small-scale industries (joinery, cabinet-making, craft industry) and thereby to a growth in revenue.

In addition, for each species, particular interests can be raised.

Specifically, the creation of industrial Samba, Mahogany and Tiokoué plantations offers considerable interest for the local communities.
Samba is a tree species whose leaves are consumed by the communities and Samba tree trunks house caterpillars relished as food by some communities. Industrial Samba plantations will enable those communities who consume these leaves and caterpillars to increase their supply of plant and animal proteins from these sources.

As for Mahogany, its bark is used in the medical treatment of various diseases including malaria; therefore mahogany trees are most of the time barked. Establishing mahogany stands would mean contributing to the pharmacopoeia and providing medical relief to those low-income communities who cannot afford the cost of medicinal products sold in pharmacies.

Regarding Tiokoué, its use as a chewing stick/tooth pick is a cultural feature. The wood and roots of this species, highly sought-after by these communities, are traded nationally and internationally. The establishment of industrial plantations using well-defined cutting cycles for each plot will have the merit to generate incomes for the communities and traders, while avoiding its local extinction.

Considering the social significance of these three species, community forest plantations may be established which would contribute to the development of community and/or private forestry – one of the objectives in the New Forest Policy of Côte d'Ivoire.

2.10 Risks

In principle, there are no risks associated with this project that could impede its smooth execution, except bush fires which could destroy the seed-trees and existing clone parks the research work will use as base.

In order to mitigate this risk, the findings and recommendations by Project PD 51/98 Rev.1 (F) titled "Forest fire management in Côte d'Ivoire on an experimental basis" will be implemented under this project as preventive measures.
Preventive measures will be as follows :

- Establishing fire-breaks in order to protect both parent-stock arboreta and plantations ;
- Forming NGOs to combat wildfire ;
- Affixing signs to dissuade communities (from burning practices) ;
- Holding meetings at regular intervals to raise awareness among farming communities before the onset of dry seasons, etc.

All planned activities will be mainly implemented in gazetted forests of the permanent forest estate where land management responsibilities lies with SODEFOR exclusively. Consequently, there are no foreseeable tenure problems to be solved.

The problems posed by Obéché/Samba seeds suffering pest attacks is to be solved through the use of propagule cuttings to ensure the effective and safe propagation of the planting stock.

Interplanting trials on Mahogany with companion species are under way to minimise any risks of pest attacks.

As for TIOKOUE, there are no sanitary problems to report.

3 - OUTPUTS

Outputs linked to Specific Objective « Developing strategies to ensure a regular supply in selected and improved planting stock (OBÉCHÉ/SAMBA, WEST AFRICAN MAHOGANY and TIOKOUE) to reforestation programmes) » are introduced below :

Output 1 : Clone breeding of OBÉCHÉ/SAMBA continues

The purpose of the selection will be to establish a clone orchard using selected germplasm.

Output 2 : Borer-resistant genotypes of WEST AFRICAN MAHOGANY selected and cuttings produced

Equipment will be purchased in order to establish a nursery that could produce larger quantities of seedlings in order to establish larger plantations.

Output 3 : TIOKOUE propagation by cuttings is effective

The technical facilities of AFRICAN MAHOGANY nurseries will be used to produce Tiokoué cuttings and establish experimental plantations.

4 – ACTIVITIES

Specific Objective : Developing strategies to ensure a regular supply in selected and improved planting stock (OBÉCHÉ/SAMBA, WEST AFRICAN MAHOGANY and TIOKOUE) to reforestation programmes

<u>Output 1</u> : Clone breeding of OBÉCHÉ/SAMBA continues

<u>Activity 1.1</u>. : Selecting the best clones in industrial plantations

This activity will consist in pre-designating plus trees, recording their features and parameters, process the data and selecting the best stems (plus trees).

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors.
paint, brushes, thinners, machetes, filers.

<u>Activity 1.2</u> : Selecting the best clones from existing cloning trials.

This will consist in drawing up inventories of on-going OBÉCHÉ/SAMBA cloning trials, processing data and selecting the best individual clones.

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors (tree climbers, data entry operators, workers).

Nursery equipment : Purchase of an engine-driven pump, pipes, mister, shaded pre-nursery, paint, brushes, thinners, machetes and filers.

<u>Activity 1.3</u> : Mobilizing selected clones and plus trees

Clones selected from the cloning trials will be mainly mobilized from a clone breeding parcel situated in the Anguededou Gazette Forests. Clones not taken from this cloning parcel will be mobilized from cloning trials inventoried in the Mopri, Sangoué and Téné Gazetted Forests.

Plus trees will be mobilized from industrial plantations.

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors (tree climber, tree feller, workers).

<u>Activity 1.4</u> : Establishing the parent stock arboretum (“mother-tree park”)

This will consist in preparing land and soil, staking and making holes for planting in a 1-ha land parcel in the TENE Nursery. Each clone will be tagged with a sign.

Input : the TENE Cuttings Production Centre, the cooperative

<u>Activity 1.5</u> : Producing cuttings

The clones selected will be propagated from the mother-tree park.

<u>Input :</u> the TENE Cuttings Production Centre, Cooperatives.

Equipment:

- 1 two-seat van with tarpaulin
- 1 motorcycle
- 1 computer, 1 printer and 1 power surge converter.

Equipment: purchase of wheelbarrows, machetes, rakes, filers, picks, larger spades and gardener's spades, polybags, coconut fibre, ribbon, rooting hormone, 50-m ribbon.

Activity 1.6. : Establishing cloning trials and one conservation parcel

Selected clones are compared in cloning tests in order to refine the selection. One conservation parcel will be established at the nursery.

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors.

Activity 17 : Monitoring trials

Inventories will be drawn up in order to select the best clones.

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors.

Activity 1.8. : Establishing 100 ha of industrial plantations with the selected clones

The selected seedlings produced will be used in reforestation programmes.

Input : Management Centres, Sub-contractors.

Activity 1.9 : Maintaining the plantations

- two tending operations on year 0 of plantation;
- four tending operations on Year 1 of foliation;
- three tending operations on Year 2 ;
- One tending on the third Year.

Input : Sub-contracting with Cooperatives for plantation maintenance using machetes.

Output 2 : Borer-resistant genotypes of WEST AFRICAN MAHOGANY selected and cuttings produced

Activity 2.1. : Collecting seeds

Progeny will be collected in the species range in order to be tested in nursery environment.

Input : SDRD, Sub-contractors (tree climbers, workers).
1 4-seat vehicle, fuel, mission expenses.

Activity 2.2 : Producing seedlings and establishing a timber park/arboretum.

This will consist in producing seedlings in polybags and installing them in the timber park

Input : the TENE Cuttings Production Centre and the cooperative.

Nursery Equipment : purchase of engine-driven pump, pipes, shaded pre-nursery.

Activity 2.3 : Selecting borer-resistant seedlings

Observations will be undertaken in order to identify those seedlings not yet attacked by the borer in order to be propagated and established in the clone park. The clones of the timber park will also be monitored in order to identify the most resistant ones.

Input : SDRD, the TENE Cuttings Production Centre, the Cooperative.

Activity 2.4. : Producing cuttings

The most resistant clones in both already existing and new trials will be propagated by cuttings.

Input : The TENE Cuttings Production Centre, the Cooperative

Activity 2.5. : Establishing cloning trials and one conservation plot

Selected clones will be compared in cloning tests in order to refine the selection. A conservation parcel will be established in the nursery.

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors.

Activity 26 : Monitoring trials

Inventories will be implemented in order to select the best clones.

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors.

Activity 27. : Establishing 200 ha of industrial African mahogany plantations from selected clones

The selected clones produced will be used in reforestation.

Input : Management Centres, Sub-contractors.

Activity 28 : Maintaining established plantations

- two tending operations on year 0 of plantation;
- four tending operations on Year 1;
- four tending operations on Year 2 ; and
- One tending on the third Year.

Input : Sub-contracting plantation maintenance work by machetes to Cooperatives

Output 3 : TIOKOUE propagation by cuttings is effective

Activity 3.1. : Identifying and mobilizing plant stock

Stock to be propagated will be sought, felled and harvested in the form of suckers to be propagated as cuttings.

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors.

Activity 32 : Establishing the Mother-Tree Park

This will consist in preparing land and soil, staking and making holes for planting in a 0.3-ha land parcel in the TENE Nursery.

Input : the TENE Cuttings Production Centre, the Cooperative.

Activity 3.3 : Producing cuttings

Parent stock will be propagated for plantation establishment.

Input : the TENE Cuttings Production Centre, Cooperatives.

Activity 3.4. : Establishing a 10-ha Tiokoué plantation

Selected seedlings will be used in reforestation projects.

Input : Management centres, Sub-contractors.

Activity 3.5 : Maintaining plantations

- two tending operations on year 0 of plantation; (to prevent the smothering up of young trees);
- four tending operations on Year 1;
- four tending operations on Year 2;
- One tending on Year 3.

Input : Sub-contracting with Cooperatives for plantation maintenance using machetes.

Activity 3.6. : Monitoring established plantations

Inventories are to be implemented in order to monitor seedlings growth and behaviour

Input : SDRD, the TENE Cuttings Production Centre, Sub-contractors.

5 - LOGICAL FRAMEWORK MATRIX

The project logical framework matrix introducing indicators, means of verification and relevant assumptions required to achieve expected project outputs are as follows:-

PROJECT COMPONENTS	INDICATORS	MEANS OF VERIFICATION	REVELANT ASSUMPTIONS
Development Objective The diversification of tree plantation species in Côte d'Ivoire	Gradual resumption of OBÉCHÉ/SAMBA, AFRICAN MAHOGANY and TIOKOUE species	-Statistics relating to forest plantations - Visits of planted parcels - Increasing demand for seedlings	
Specific Objective Developing strategies to ensure a regular supply in selected and improved planting stock (OBÉCHÉ/SAMBA, WEST AFRICAN MAHOGANY) and propagation cuttings (TIOKOUE) to reforestation programmes.	Existence of selected clone parks and selected cuttings	- Reports on the establishment **of Clone Parks** and propagation cuttings - Project Progress Reports - Technical reports on planting stock	Burning of seed-bearing trees and parent-stock
Output 1 : **Clone breeding of OBÉCHÉ/SAMBA continues**	As of the second quarter of Year 1: - "Plus trees" have been identified and mobilized - Clonal tests have been established - A parent stock arboretum has been established	- Planting records available - Progress reports - field visit : selected clones and timber parks exist - work sub-contracts - work completion report	Availability of clone parks and industrial parcels
Output 2 **Borer-resistant genotypes of WEST AFRICAN MAHOGANY selected and cuttings produced**	By the end of Year 2, Experimental parcels have been planted using selected clones	- Progress reports, - Work sub-contracted - Official acceptance - Completion reports on planting work.	Burning of experimental trial parcels; Seed-trees available in natural forest stands
Output 3 : TIOKOUE propagation by cuttings is effective	By the end of Year 2, experimental parcels have been planted with propagated cuttings	- Progress reports, - Official acceptance report for planting work.	Burning of experimental trial parcels; Availability of seed trees

6 – WORK PLAN

Project Activities	Responsible Party	YEAR 1												YEAR 2												YEAR 3											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
OUTPUT 1: Clone breeding of OBÉCHÉ/SAMBA continues																																					
Activity 1.1: Selecting the best clones in industrial plantations	**SDRD, TENE, M.O**																																				
Activity 1.2 : Selecting the best clones from existing cloning trials	**SDRD, TENE, M.O**																																				
Activity 1.3 : Mobilizing selected clones and plus trees	**TENE, Cooperatives**																																				
Activity 1.4 : Establishing the parent stock arboretum	**TENE, Cooperative**																																				
Activity 1.5 : Producing cuttings	**TENE, Cooperative**																																				
Activity 1.6 : Establishing cloning trials	**SDRD, TENE, M.O**																																				
Activity 1.7 : Monitoring trials	**SDRD, TENE, M.O**																																				
Activity 1.8 : Establishing 200 ha of industrial plantations with the selected clones	**Management Centres**																																				
Activity 1.9 : Maintaining the plantations	**Cooperatives**																																				
OUTPUT 2: Genotypes of AFRICAN MAHOGANY selected and cuttings produced																																					
Activity 2.1: Collecting seeds	**SDRD, M.O**																																				
Activity 2.2: Producing seedlings and establishing a timber yard	**SDRD,TENE, Cooperat**																																				
Activity 2.3 : Selecting borer-resistant seedlings	**SDRD,TENE, Cooperat**																																				
Activity 2.4 : Producing cuttings	**TENE, Cooperatives**																																				
Activity 2.5 : Establishing cloning trials and one conservation plot	**SDRD, TENE, M.O**																																				
Activity 2.6 : Monitoring trials	**SDRD, TENE, M.O**																																				
Activity 2.7 : Establishing plantations	**Management Centre**																																				
Activity 2.8 : Maintaining established plantations	**Cooperatives**																																				
OUTPUT 3: TIOKOUE propagation by cuttings is effective																																					
Activity 3.1: Identifying and mobilizing plant stock	**SDRD,TENE, Cooperat**																																				
Activity 3.2: Establishing the parent stock arboretum	**TENE, Cooperat**																																				
Activity 3.3: Producing cuttings	**TENE, Cooperat**																																				
Activity 3.4: Establishing plantations	**Management Centre**																																				
Activity 3.5: Maintaining the plantations	**Cooperatives**																																				
Activity 3.6: Monitoring established plantations	**SDRD,TENE, Cooperat**																																				

SDRD: Sub-Directorate for Research and Development
TENE: TENE Cuttings Production Centre
M.O: Workers, Contractual labourers

7. BUDGET

7.1: Overall Project Budget by activities (samba, mahogany, tiokoué)								
Outputs / Activities +	**10**	**20**	**30**	**40**	**50**	**60**		
Non-activity linked expenses	**Project Personnel**	**Sub-contracting**	**Duty Travels**	**Capital Goods**	**Consu-mables**	**Miscel.**	**Quarter**	**Total**
OUTPUT 1: Clone breeding of OBÉCHÉ/SAMBA continues								
Activity 1.1: Selecting the best clones in industrial plantations	2 000	480	2 400					**4 880**
Activity 1.2 : Selecting the best clones from existing cloning trials	2 000	480	2 400	**4 725**	2 000			**11 605**
Activity 1.3 : Mobilizing selected clones and plus trees	2 000	1 000	2 400					**5 400**
Activity 1.4 : Establishing the mother tree park (Parent Stock Arboretum)	2 000	1 000						**3 000**
Activity 1.5 : Producing cuttings	1 000	15 000	2 400	**18 750**				**37 150**
Activity 1.6 : Establishing cloning trials	1 000	1 200	2 400	34 750				**39 350**
Activity 1.7 : Monitoring trials	2 000	360	2 400					**4 760**
Activity 1.8 : Establishing 200 ha of industrial plantations		30 000						**30 000**
Activity 1.9 : Maintaining the plantations		14 400						**14 400**
Sub-total 1	12 000	63 920	14 400	58 225	2 000	-	-	**150 545**
OUTPUT 2: Genotypes of AFRICAN MAHOGANY selected and cuttings produced								
Activity 2.1: Collecting seeds	3 000	2 000	2 400	**25 000**				**32 400**
Activity 2.2: Producing seedlings and establishing a timber yard	2 000	4 000						**6 000**
Activity 2.3 : Selecting borer-resistant seedlings	2 000	1 000	1 600					**4 600**
Activity 2.4 : Producing cuttings		13 000	2 400					**15 400**
Activity 2.5 : Establishing cloning trials and one conservation plot	2 000	1 200						**3 200**
Activity 2.6 : Monitoring trials	2 000	200						**2 200**
Activity 2.7: Establishing 200 ha of industrial plantations		30 000						**30 000**
Activity 2.8 : Maintaining the plantations		14 400						**14 400**
Sub-total 2								**-**
OUTPUT 3: TIOKOUE propagation by cuttings is effective	**11 000**	**65 800**	**6 400**	**25 000**	**-**	**-**	**-**	**108 200**
Activity 3.1: Identifying and mobilizing plant stock								
Activity 3.2: Establishing the parent stock arboretum	**2 000**	**3 000**	2 400	**21 875**				**29 275**

Activity 3.3: Producing cuttings	**2 000**	**180**						**2 180**
Activity 3.4: Establishing a 10-ha Tiokoué plantation		**10 000**	1 600					**11 600**
Activity 3.5: Maintaining the plantations		**3 000**	1 600					**4 600**
Activity 3.6: Monitoring established plantations		**2 880**						**2 880**
Sub-total 3		**4 000**	2 400					**6 400**
NON-ACTIVITY LINKED EXPENSES	**4 000**	**23 060**	**8 000**	**21 875**	**-**	**-**	**-**	**56 935**
1- Spare parts								
2- Fuel and lubricants					**7 500**			**7 500**
3- Office supplies					**32 400**			**32 400**
4 - Insurance contracts (vehicles)					**3 000**			**3 000**
5 - Completion report preparation and publishing						1 500		**1 500**
6- Bank charges					**-**	3 000		**3 000**
7- Monitoring Committee						1 800		**1 800**
8 - Translation and documentation			2 400			1 500		**3 900**
9- Audit						1 000		**1 000**
10 - Contingency fund						6 000		**6 000**
11 - Salaries						3 000		**3 000**
- Engineer, SDRE Coordinator								**-**
- IEF Engineer - Head of TENE Division	13 200							**13 200**
- Technician, Division Assistant-Manager	25 920							**25 920**
- 4 Forest Technicians	75 600							**75 600**
- 1 Data processing operator	2 400							**2 400**
- 1 tree climber	1 800		3 570					**5 370**
- 4 workers	9 600							
- 1 Security Guard	3 600							**3 600**
12 - Executing Agency Management Costs								
Sub-total 4	**132 120**	**-**	**5 970**	**-**	**42 900**	**17 800**		**189 190**
TOTAL	**159 120**	**152 780**	**34 770**	**105 100**	**44 900**	**17 800**		**504 870**
Sub-total (ITTO)	**25 920**	**152 780**	**34 770**	**72 200**	**41 400**	**17 800**	**-**	**421 060**
Sub-total (Executing Agency)	**135 000**	**-**	**-**	**16 025**	**1 500**	**-**	**-**	**227 134**
TOTAL	***160 920***	***152 780***	***34 770***	***88 225***	***42 900***	***17 800***		***648 194***

7.2: Overall Yearly Project Budget by Expense Categories and Sources (Samba, Mahohany, Tiokoué)							
					1 $ US = 500 fcfa		
	BUDGET COMPONENTS	UNIT	NB	UNIT PRICE	AMOUNT ($US) C. I	ITTO	TOTAL AMOUNT ($US)
10	**PROJECT PERSONNEL**						
	11- National Experts						
	- Engineer - SDRE Coordinator	month	18	1 500	27 000	1 800	28 800
	- IEF Engineer - Head of Division	month	12	1 000	12 000	1 200	13 200
	- Technician, Division Assistant-Manager	month	24	1 000	24 000	1 920	25 920
	- 4 Forest Technicians	month	72	1 000	72 000	3 600	75 600
	13 - Other Project Staff						
	- Data processing operator	month	6	400		2 400	2 400
	- 2 tree climbers	month	6	300		1 800	1 800
	- 4 workers	month	96	100		9 600	9 600
	- Security Guard	month	36	100		3 600	3 600
	14- Fellowships and training						
	15- International experts					-	
	19 Component Total						-
	PROJECT PERSONNEL				**135 000**	**25 920**	**160 920**
20	**Sub-Contracting**						-
	21-OBÉCHÉ/SAMBA selection, mobiliz.°, cuttings propag.	hectare	100	78		19 520	19 520
	22- OBÉCHÉ/SAMBA planting	hectare	100	300		30 000	30 000
	23- OBÉCHÉ/SAMBA plantation maintenance	hectare	400	36		14 400	14 400
	24- W.A. Mahogany harvesting, selection, cuttings propag.	hectare	100	107		21 400	21 400
	25- W.A. Mahogany plantation	hectare	100	300		30 000	30 000
	26- W.A. Mahogany plantation maintenance	hectare	400	36		14 400	14 400
	27- Tiokoué production, mobilization, cuttings prop.	hectare	10	171,8		17 180	17 180
	213- Tiokoué planting	hectare	10	300		3 000	3 000
	214- Tiokoué plantation maintenance	hectare	80	36		2 880	2 880
	29 Component Total					**152 780**	**152 780**
30	**Duty Travels**						-
	D.S.A. Output 1	Man-Day	90	40		14 400	14 400
	D.S.A. Output 2	Man-Day	90	40		6 400	6 400
	D.S.A. Output 3	5d/qtr - MD	60	40		8 000	8 000
	Internal Monit. Eval. - E.A.	Man-Day	60	40		2 400	2 400
	Driver	Man-Day	60	17		3 570	3 570
	Other missions					-	-
	39 Component Total				**-**	**34 770**	**34 770**
40	**Capital Goods**						
	43- Vehicle						
	- Vehicle 4x4 4 seats	unit	1	35 000	8 750	35 000	43 750
	44- Equipment						
	- Personnel Computer	unit	2	1 500	375	3 000	3 375
	- Laptop Computer	unit	1	2 000	500	2 000	2 500
	- printer	unit	2	600	150	1 200	1 350
	- power surge protector		1	2 000	500	2 000	2 500

	45- Other equipment						
	Nursery Equipment	unit	1	20 000	5 000	20 000	25 000
	Small durable equipment	year	3	3 000	750	9 000	9 750
	49 Component Total				**16 025**	**72 200**	**88 225**
50	**Consumables**						
	51- Spare parts	year	3	2 000	1 500	6 000	7 500
	52- Fuel and lubricants	Km/month	2500	12litres/100		32 400	32 400
	53- Office supplies	year	3	1 000		3 000	3 000
	59 Component Total				**1 500**	**41 400**	**42 900**
60	**Miscellaneous**						
	61- Sundries						
	- Insurance contracts (vehicles)	3 years	1	500		1 500	1 500
	- Completion report preparation and publishing	lumpsum	1	3 000		3 000	3 000
	- Bank charges	36 months	36	50		1 800	1 800
	- Monitoring Committee	lumpsum	3	500		1 500	1 500
	- Translation and documentation	lumpsum	1	1 000		1 000	1 000
	62- Audit	lumpsum	3	2 000		6 000	6 000
	63- Contingency fund	lumpsum	1	3 000		3 000	3 000
	69 Component Total				**-**	**17 800**	**17 800**
	SUB-TOTAL 1				**152 525**	**344 870**	**497 395**
70	**Managt. Cost (Exec. Agency)**				**74 609**		**74 609**
	79 Component Total				**227 134**	**344 870**	**572 004**
	SUB-TOTAL				**227 134**	**344 870**	**572 004**
80	**ITTO Monit., Eval. and Admin.**						
	81- Monit & Eval. Costs	year	3	10 000		30 000	30 000
	82- Evaluation Costs					15 000	15 000
	83-Programme Support Costs 8%					31 190	31 190
100	**GRAND TOTAL**				**227 134**	**421 060**	**648 194**

7.3 : Yearly consolidated Project Budget (samba, mahogany, tiokoué)				
BUDGET COMPONENTS	**TOTAL ($US)**	**YEAR 1**	**YEAR 2**	**YEAR 3**
PROJECT PERSONNEL				
11- National Experts				
- Engineer - SDRE Coordinator	28 800	9 600	9 600	9 600
- IEF Engineer - Head of Division	13 200	4 400	4 400	4 400
- Technician, Division Assistant-Manager	25 920	8 640	8 640	8 640
- 4 Forest Technicians	75 600	25 200	25 200	25 200
13 - Other Project Staff	0			
- Data processing operator	2 400	800	800	800
- 2 tree climbers	1 800	600	600	600
- 4 workers	9 600	3 200	3 200	3 200
- Security Guard	3 600	1 200	1 200	1 200
14- Fellowships and training				
15- International experts				
19 Component Total				
PROJECT PERSONNEL	160 920	53 640	53 640	53 640
Sub-Contracting				
21-OBÉCHÉ/SAMBA selection, mobiliz.°, cuttings propag.	19 520		9 760	9 760
22- OBÉCHÉ/SAMBA planting	30 000		15 000	15 000
23- OBÉCHÉ/SAMBA plantation maintenance	14 400		7 200	7 200
24- W.A. Mahogany harvesting, selection, cuttings propag.	21 400		10 700	10 700
25- W.A. Mahogany plantation	30 000		15 000	15 000
26- W.A. Mahogany plantation maintenance	14 400		7 200	7 200
27- Tiokoué production, mobilization, cuttings prop.	17 180		8 590	8 590
213- Tiokoué planting	3 000			
214- Tiokoué plantation maintenance	2 880		1 440	1 440
29 Component Total	**152 780**	**50 927**	**50 927**	**50 927**
Duty Travels				
D.S.A. Output 1	14 400	4 800	4 800	4 800
D.S.A. Output 2	6 400	2 133	2 133	2 133
D.S.A. Output 3	8 000	2 667	2 667	2 667
Internal Monit. Eval. - E.A.	2 400	800	800	800
Driver	3 570	1 190	1 190	1 190
Other missions				
39 Component Total	**34 770**	**34 770**	**34 770**	**34 770**
Capital Goods				
43- Vehicle				
- Vehicle 4x4 4 seats	43 750	43 750		
- motorcycle				
44- Equipment				
- Personnel Computer	3 375	3 375		
- printer	1 350	1 350		
- power surge protector				
45- Other equipment				
Nursery Equipment	25 000	25 000		
Small durable equipment	9 750	9 750		
49 Component Total	**88 225**	**88 225**		
Consumables				
51- Spare parts	7 500	3 750	3 750	3 750
52- Fuel and lubricants	32 400	16 200	16 200	16 200
53- Office supplies	3 000	1 500	1 500	1 500
59 Component Total	**42 900**	**21 450**	**21 450**	**21 450**

Miscellaneous				
61- Sundries				
- Insurance contracts (vehicles)	1 500	750	750	750
- Completion report preparation and publishing	3 000	1 500	1 500	1 500
- Bank charges	1 800	900	900	900
- Monitoring Committee	1 500	750	750	750
- Translation and documentation	1 000	500	500	500
62- Audit	6 000	3 000	3 000	3 000
63- Contingency fund	3 000	1 500	1 500	1 500
69 Component Total	17 800	8 900	8 900	8 900
SUB-TOTAL 1	**497 395**	**165 798**	**248 698**	**248 698**
Managt. Cost (Exec. Agency)	74 609	24 870	37 305	37 305
79 Component Total	572 004	190 668	286 002	286 002
SUB-TOTAL	572 004			
ITTO Monit., Eval. and Admin.				
81- Monit & Eval. Costs	30 000			
82- Evaluation Costs	15 000			
83-Programme Support Costs 8%	31 190			
OVERALL TOTAL	**648 194**			

Yearly Project Budget by Source: ITTO – Samba – W.A. Mahogany - Tiokoué							
BUDGET COMPONENTS	**UNIT**	**NB**	**UNIT**				
			PRICE	**ITTO**	**YEAR 1**	**YEAR 2**	**YEAR 3**
PROJECT PERSONNEL							
11- National Experts							
- Engineer - SDRE Coordinator	month	18	1 500	1 800	600	600	600
- IEF Engineer - Head of Division	month	12	1 000	1 200	400	400	400
- Technician, Division Assistant-Manager	month	24	1 000	1 920	640	640	640
- 4 Forest Technicians	month	72	1 000	3 600	1 200	1 200	1 200
13 - Other Project Staff					-	-	-
- Data processing operator	month	6	400	2 400	800	800	800
- 2 tree climbers	month	6	300	1 800	600	600	600
- 4 workers	month	96	100	9 600	3 200	3 200	3 200
- Security Guard	month	36	100	3 600	1 200	1 200	1 200
14- Fellowships and training				-	-	-	-
15- Experts internationaux					-	-	-
19 Component Total				**25 920**	**8 640**	**8 640**	**8 640**
Sub-contracting					-	-	-
21-OBÉCHÉ/SAMBA selection, mobiliz.°, cuttings propag.	hectare	100	78	19 520	6 507	6 507	6 507
22- OBÉCHÉ/SAMBA planting	hectare	100	300	30 000	10 000	10 000	10 000
23- OBÉCHÉ/SAMBA plantation maintenance	hectare	400	36	14 400	4 800	4 800	4 800
24- W.A. Mahogany harvesting, selection, cuttings propag.	hectare	100	107	21 400	7 133	7 133	7 133
25- W.A. Mahogany plantation	hectare	100	300	30 000	10 000	10 000	10 000
26- W.A. Mahogany plantation maintenance	hectare	400	36	14 400	4 800	4 800	4 800
27- Tiokoué production, mobilization, cuttings prop.	hectare	10	171,8	17 180	5 727	5 727	5 727
213- Tiokoué planting	hectare	10	300	3 000	1 000	1 000	1 000
214- Tiokoué plantation maintenance	hectare	80	36	2 880	960	960	960
29 Component Total				**152 780**	**50 927**	**50 927**	**50 927**
Duty Travels					-	-	-
D.S.A. Output 1	Man-day	90	40	14 400	4 800	4 800	4 800
D.S.A. Output 2	Man-day	90	40	6 400	2 133	2 133	2 133
D.S.A. Output 3	5d/Qtr – m.d.	60	40	8 000	2 667	2 667	2 667
Internal Monit. Eval. - E.A.	Man-day	60	40	2 400	800	800	800
Driver	Man-day	60	17	3 570	1 190	1 190	1 190
Other missions				-	-	-	-
39 Component Total				**34 770**	**11 590**	**11 590**	**11 590**
Capital Goods					-	-	-
43- Vehicle					-	-	-
- Vehicle 4x4 4 seats	unit	1	35 000	35 000	35 000		
- motorcycle	unit			-	-	-	-
44- Equipment					-	-	-
- Personnel Computer	unit	2	1 500	3 000	3 000		
- printer	unit	2	600	1 200	1 200		
- power surge protector	unit	1	2 000	2 000	2 000		
45- Other equipment					-		
Nursery Equipment	unit	1	20 000	20 000	20 000		
Small durable equipment	year	3	3 000	9 000	9 000		
49 Component Total				**72 200**	**72 200**		
Consumables							
51- Spare parts	year	3	2 000	6 000	2 000	2 000	2 000
52- Fuel and lubricants	km/month	2500	12litres/100	32 400	10 800	10 800	10 800
53- Office supplies	year	3	1 000	3 000	1 000	1 000	1 000
59 Component Total				**41 400**	**13 800**	**13 800**	**13 800**
Miscellaneous					-	-	-
61- Sundries					-	-	-
- Insurance contracts (vehicles)	3 years	1	500	1 500	500	500	500

- Completion report preparation and publishing	lumpsum	1	3 000	3 000	1 000	1 000	1 000
- Bank charges	36 months	36	50	1 800	600	600	600
- Monitoring Committee	lumpsum	3	500	1 500	500	500	500
- Translation and documentation	lumpsum	1	1 000	1 000	333	333	333
62- Audit	lumpsum	3	2 000	6 000	2 000	2 000	2 000
63- Contingency fund	lumpsum	1	3 000	3 000	1 000	1 000	1 000
69 Component Total				**17 800**	**5 933**	**5 933**	**5 933**
SUB-TOTAL				**344 870**	**163 090**	**90 890**	**90 890**
ITTO Monit., Eval. and Admin.							
81- Monit & Eval. Costs	year	3	10 000	30 000			
82- Evaluation Costs				15 000			
83-Programme Support Costs 8%				31 190			
OVERALL TOTAL				**421 060**			

Yearly Project Budget by Source: CÔTE D'IVOIRE								
				1 $ US = 500 fcfa				
BUDGET COMPONENTS	**UNIT**	**NB**	**UNIT**	**AMOUNT ($US)**				
			PRICE	**C. I**	**YEAR 1**	**YEAR 2**	**YEAR 3**	
PROJECT PERSONNEL								
11- National Experts								
- Engineer - SDRE Coordinator	month	18	1 500	27 000	9 000	9 000	9 000	
- IEF Engineer - Head of Division	month	12	1 000	12 000	4 000	4 000	4 000	
- Technician, Division Assistant-Manager	month	24	1 000	24 000	8 000	8 000	8 000	
- 4 Forest Technicians	month	72	1 000	72 000	24 000	24 000	24 000	
13 - Other Project Staff					-	-	-	
- Data processing operator	month	6	400		-	-	-	
- 2 tree climbers	month	6	300		-	-	-	
- 4 workers	month	96	100		-	-	-	
- Security Guard	month	36	100		-	-	-	
14- Fellowships and training					-	-	-	
15- Experts internationaux					-	-	-	
19 Component Total				**135 000**	45 000	45 000	45 000	
Sub-contracting								
29 Component Total								
Duty Travels								
39 Component Total								
Capital Goods								
43- Vehicle								
- Vehicle 4x4 4 seats	unit	1	35 000	8 750	8 750			
- motorcycle	unit			-	-			
44- Equipment				-	-			
- Personnel Computer	unit	2	1 500	375	375			
- Laptop computer	unit	1	2 000	500	500			
- Printer	unit	2	600	150	150			
- Power Surge protector	unit	1	2 000	500	500			
45- Other equipment				-	-			
Nursery Equipment	unit	1	20 000	5 000	5 000			
Small durable equipment	year	3	3 000	750	750			
49 Component Total				**16 025**	**16 025**			
Consumables				-	-	-	-	
51- Spare parts	year	3	2 000	1 500	500	500	500	
52- Fuel and lubricants	km/month	2500	12 litres/100	-	-	-	-	
53- Office supplies	year	3	1 000	-	-	-	-	
59 Component Total				1 500	500	500	500	
Miscellaneous							-	
61- Sundries								
- Insurance contracts (vehicles)	3 years	1	500					
- Completion report preparation and publishing	lumpsum	1	3 000					
- Bank charges	36 months	36	50					
- Monitoring Committee	lumpsum	3	500					
- Translation and documentation	lumpsum	1	1 000					
62- Audit	lumpsum	3	2 000					
63- Contingency Fund	lumpsum	1	3 000					
69 Component Total								
SUB-TOTAL				152 525				
Management Costs (Executing Agency)				74 609				
79 Component Total				227 134				
OVERALL TOTAL				**227 134**				

PART III : OPERATIONAL ARRANGEMENTS

1 - MANAGEMENT STRUCTURE

SODEFOR will be the sole project management structure.

2 - MONIT., REPORT AND EVALUATION

The Project will be monitoring and evaluated by ITTO Representatives in accordance with the standard ITTO procedures.

2.1 – Project Progress Report

A project starting report on the early progress will be prepared six months after project start. Bi-annual will be submitted to ITTO one month after their preparation. One annual financial audit will also be presented.

2.2 – Project Completion Report

A project completion report will be developed and submitted to ITTO two months after project completion.

2.3 – Technical Project Reports

All technical reports prepared during project implementation will be made available to ITTO and other relevant entities within three months following the closing of the project.

2.4 – Monit., Review and Steering Committee visits

After twelve months of project implementation, the project will be visited by the Steering Committee; March would be most suitable month for this visit in view of climate conditions.

2.5 - Evaluation

After project completion, the project will be subject to an ex-post evaluation and audit control in compliance with the provisions of ITTO project formulation and evaluation manual and in order to prepare the ground for the financing of the final phase.

3- FUTURE OPERATION AND MAINTENANCE

Collected seeds will be stored in SODEFOR cold chamber at SODEFOR's headquarters. **A new, on-going project will upgrade and adapt this cold chamber to international seed storage and conservation standards.**
The costs of maintaining both old and new plantations after project completion will be borne by SODEFOR.

a) Sustainability of project outputs and results

The primary mission of SODEFOR is the sustainable management of forests, which necessarily includes vast reforestation programmes. That is the reason why it initiates this type of project in order to provide selected clones in industrial quantities.

After the end of ITTO financing period, SODEFOR will take charge of post-project work by incorporating the outputs of the project in its daily activities: tending work/silvicultural treatments in plantations **established**; planting and propagation trial surveys and inventories, and maintenance of parent stock arboreta ("Mother-Tree Parks").

These clone parks will continue to produce seedlings for new plantations while established trial monitoring will progress during the project.

This work will be covered by annual activity programmes to provide the basis for annual budgeting.

b) Institutional durability

SODEFOR was created in 1966 to implement public service missions linked to the reconstruction and conservation of the national forest estate. **Since February 1992, SODEFOR manages the entire national forest estate (Government lands).**

After project completion, SODEFOR will continue to conduct its relevant missions.

PART IV : THE TROPICAL TIMBER FRAMEWORK

1 - COMPLIANCE WITH THE OBJECTIVES OF ITTA, 1994

This Project proposal is in full compliance with the objectives of ITTO defined in Article 1 of ITTA, 1994 in the following points:

(c) To contribute to the process of sustainable development ;

(d) To promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests;

(e) To promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests;

(f) To encourage members to support and develop industrial tropical timber reforestation and forest management activities as well as rehabilitation of degraded forest land, with due regard for the interests of local communities dependent on forest resources ;

(m) To promote the access to, and transfer of, technologies and technical cooperation to implement the objectives of this Agreement, including on concessional and preferential terms and conditions, as mutually agreed.

2 - COMPLIANCE WITH ITTO ACTION PLAN

The objectives assigned to the project are consistent with certain actions of Goal 3 of the ITTO Action Plan (Libreville Action Plan), including the following:

1) Promote access to, and transfer of, technologies and encourage technical cooperation for sustainable forest management, forest restoration and reforestation.;

2) Enhance networking and technology transfers amongst forest education centres, forest owners and managers, in the fields of natural forest management, harvesting and forest restoration;

3) Design and conduct regional training events to enhance technical and human capabilities to manage the resource base ;

4) Facilitate exchange of information and experience on natural forest management, forest restoration and timber plantations amongst member countries, Non-Governmental Organizations and industries ;

5) Disseminate results and lessons learned from ITTO projects and activities to interested member countries, Non-Governmental Organizations and industries;
6) Encourage and assist Members, as appropriate, to:
   - Test and enhance collaborative models of forest management for tropical production forests;

- Promote and support research in forest dynamics (growth and yield studies) in different forest types and under various management schemes;
- Intensify training of forestry personnel and other stakeholders in silviculture and resource assessment and in the management of both natural forests and timber plantations.

3. COMPLIANCE WITH ITTO PROJECT ACTIVITIES

This project addresses the reforestation development criterion.

Fast world population growth and the globalisation of the economy are the driving force of behind high consumption growth rate, leading to the intensified search for ways to achieve rapid resource renewal.

Regarding forestry, a strong timber demand and the search for land for agricultural production call for forest rehabilitation to be undertaken using valuable species, under efficient technical and economic conditions, without losing sight of the SFM goal.

This Project is fully consistent with this framework, as it will make it possible to create industrial plantations with threatened timber species using selected/improved planting stock (Samba/Obéché and African Mahogany) or propagation cuttings (Tiokoué).

ANNEX A

PROFILE OF THE EXECUTING AGENCY

1. SODEFOR's expertise

The State Corporation "Société de Développement des Forêts" (SODEFOR) was created in September 1966 by Decree N° 66-422 of 15 September 1966 as a Forest Plantation Development Company; its legal status and business purposes were changed three times under Decree N° 80-125 of 28 November 1980 when it became a Public Administrative Institution (*Etablissement Public à Caractère Administratif,* E.P.A.) and under Decree N° 85-132 of 20 February 1985 when its status changed into that of a Public Industrial and Commercial Institution (E.P.I.C.), and Decree N°93-206 of 13 February 1993.

SODEFOR operates under the authority of both the **Ministry of Water and Forest Resources** and the **Ministry of Economy and Finance** will implement the project and coordinate all technical assistance activities.

The GAGNOA Management Centre is a decentralized structure representing SODEFOR Headquarters; it will implement the Project through the TENE Division.

SODEFOR is managed by a Board of Directors comprising nine members.
SODEFOR is subdivided into one General Directorate and **seven** Central Directorates as follows:

- the Engineering Directorate
- the Financial Directorate
- the Projects, Research and Mapping Directorate
- the Commercial Directorate
- the Human Resource Directorate
- the Planning, Monitoring and Control Directorate
- the Statistics and IT Directorate.

Local and Field Service Branches include Six Management Centres – Agboville, Bouaké, Daloa, Gagnoa, Man and San-Pedro – and one Regional Coordination Unit based in Abangourou with executing structures distributed over the entire national territory: twenty-four (24) Divisions and seventy-eight (78) associated sectors.

Since 1990, SODEFOR has had several project and pre-project proposals submitted to ITTO for financing. Of all these proposals, seven (07) projects and two (02) pre-projects have received funding since 1994.

The list of projects and pre-projects financed by ITTO is contained in the following table:

Tableau n°9: Summary list of ITTO-funded projects and pre-projects

TITLE	DURATION	OBSERVATIONS
1. PD 109/90 Rev.4 (F,I) «Support to modernization, restructuring and development policies for timber industries in Côte d'Ivoire »	1994-2000	Completed
2. PD 18/92 Rev.2 (F) « Research-development associated with management operations in the closed forest of Côte d'Ivoire: determination of a forest typology related to silvicultural systems in the Gazetted forest of Haut Sassandra »	1996-2000	Completed
3. PD 3/95 Rev.2 (F) « Iroko genetic stock research and improvement in Kani Gazetted forest, Phase I»	1996-2000	Completed
4. PPD 13/96 Rev.1 (F) « Study towards the establishment of a network of permanent sampling plots to monitor reforestation dynamics in Côte d'Ivoire »	1997-1998	Completed
5. PD 51/97 Rev.2 (F) « Regionalization of volume tables for natural and plantation forests »	May 2002 – April 2005	Operational
6. PD 22/98 Rev.1 (F) « Development of Teak cloning and establishment of industrial plantations »	1998-2004	Operational
7. PD 24/98 Rev.2 (F) « Intensification of Teak forestry »	1999-2004	Operational
8. PD 51/98 Rev.1 (F) « Forest fire management in Côte d'Ivoire on an experimental basis »	2000-2004	Operational
9. PPD 11/99 Rev.1 (I) «Development of rubber wood industries in Côte d'Ivoire, Phase I»	1999-2003	Completed
10. PD 53/00 Rev.3 (F) « Implementation of a permanent network of stands dynamics monitoring plots for the gazetted forests of Côte d'Ivoire »	July 2003 – June 2006	Operational
11. Seeds management and conversation PPD 65/02 Rev. 1	3 months	Completed
12. PD 54/00 Rev. 4 – Iroko Phase 2	3 years	Due to start soon

SODEFOR Infrastructure

SODEFOR is a State-owned Corporation having the capacity required to conduct its mission. It has headquarters equipped with state-of-the-art mapping and computing equipment. Each of its decentralized structures covering the entire national territory has office spaces and forestry technological equipment (machinery, small forestry equipment, etc.), mapping equipments and computer facilities enabling them to operate with full autonomy.

SODEFOR manages 200 gazetted forests covering 2.5 million hectares and 130,000 ha of reforestation projects.

SODEFOR also has seeds production and experimentation centres whose purpose is to make high quality planting stock available for SODEFOR's reforestation programmes and to identify the most efficient silvicultural treatments or "paths" for major commercial timber species.

SODEFOR BUDGET

SODEFOR balanced budget for the past three years is introduced in the following Table showing expenditures only:

Table: SODEFOR's budget for the latest three years

(xUS$1000 ; $US 1=FCFA700)

YEAR	ITEMS	BUDGET
2001	**PERSONNEL+MISSIONS**	**6,143**
	SUB-CONTRACTING	**4,857**
	CAPITAL GOODS	**3,286**
	CONSUMABLES	**2,857**
2002	**PERSONNEL+MISSIONS**	**6.490**
	SUB-CONTRACTING	**4.850**
	CAPITAL GOODS	**2.157**
	CONSUMABLES	**4.726**
2003	**PERSONNEL+MISSIONS**	**7.587**
	SUB-CONTRACTING	**2.774**
	CAPITAL GOODS	**1.420**
	CONSUMABLES	**3.771**

NB : Duty travel expenses being staff-related costs, they have been consolidated with personnel costs under one heading.

PERSONNEL

Total SODEFOR staff includes **860** officers distributed into the following socio-professional groups:

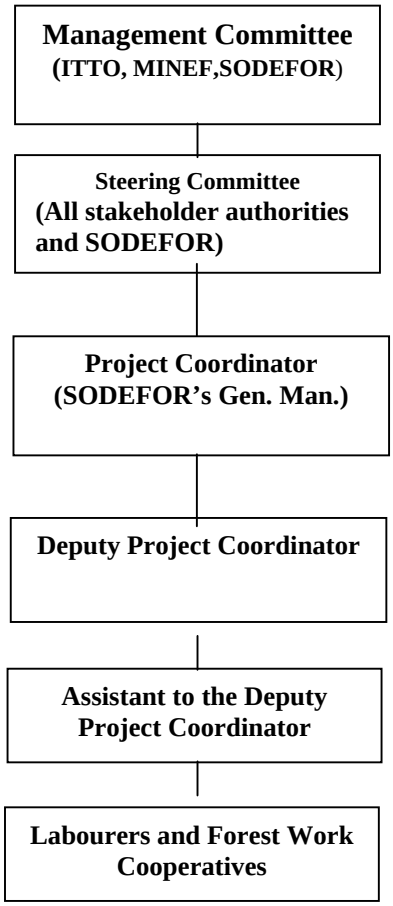
QUALIFICATIONS	STAFF NUMBER
PhD Level EXPERTS	62
MASTER Level EXPERTS	80
ENGINEERS/MIDDLE-RANGE MANAGEMENT OFFICERS	718
TOTAL	**860**

- **Distribution by Professional Categories**

PERSONNEL	STAFF NUMBER
ADMINISTRATION / MANAGEMENT	344
TECHNICAL	516
TOTAL	**860**

1 4 Project management chart

The Project will be implemented and supervised according to the chart below:



ANNEX B **: SCOPE OF WORK / PERFORMANCE SPECIFICATIONS**

Article 1 : Purpose

The purpose of this scope of work is to identify the technical clauses relating to nursery and reforestation work.

Article 2 : Description of work

Nursery work will consist in land preparation work (1.6 ha), compost collection, polybag filling and laying out, establishing rootstock tree parks and implementing propagation by cuttings (establishing cuttings, watering and maintenance).

Planting work will consis in reforesting 210 ha in the Téné gazetted forest in collaboration with local communities and cooperatives; species distribution will be 100 ha Samba; 100 ha W.A. Mahogany and 10 ha Tiokoué.

Plantation work will be carried out during the last two years of project, the first year will be devoted to nursery establishment work.

Sub-contractors will ensure the maintenance and stock replenishment during the contractual period.

Sub-contractors will ensure that only those samba, W.A. Mahogany seedlings and Tiokoué cuttings supplied by SODEFOR in polybags are used as planting stock.

1 – Land clearing (plantation)

a) - **Removing climber plants and vine**

This will consist in removing all creepers and scrubs (trees with a stem diameter under 20 cm) present in the parcel identified by SODEFOR.

b) - **Tree felling and crown collapsing operations**

Tree felling will consist in cutting both live and dead trees (diam > 20 cm) by chainsaw or machete except those valuable commercial timber species. The height of cutting is 10 cm above ground or higher.

Crown collapsing operations will consist in cutting by chainsaw the crown and branches after felling the tree in order to accelerate the drying-up process.

2 – Staking and opening up plantation rows

- **Staking means materialising plantation row orientation and the location of plantlets along plantation rows.**
- **Seedlings will be planted in rows with regular spacing intervals as described.**

- On each plantation line perpendicular to the established rows stakes will be planted at 50 m intervals.

- A rope having a knot every three (3) metres (Samba, W.A. Mahogany) and 2 and 1.5 metres (Tiokoué) will be taunted and fastened to the two stakes of each line. Seedlings will be planted in places indicated by the position of each knot.

Opening up plantation rows will consist in clearing and sweeping the debris along a two (02)-metre wide strip (1 metre on either side of the taunt rope) along the line already staked over. Any trees found along the plantation row will be felled by chainsaw so as to clear the entire plantation row.

3 - <u>Pitting and planting</u>

a) - <u>Pitting</u>

Pitting will consist in digging regularly spaced 30 x 30 cm cubic holes along each plantation row at spots indicated by the knots.

The soil of each and every hole shall be scooped out and deposited by exposing moist soil from surface horizons (top soil) on one side of the hole, and soil from lower horizons (sub-soil) on the opposite side.

Average density of holes dug per hectare shall be according to the equidistant spacing between seedlings.

b) - <u>Planting</u>

Planting means the laying of seedlings in the holes dug as described above and subsequent closing up of the hole. Planters shall proceed as follows:

- filling the bottom part of holes with the moist soil scooped out when digging;

- cutting off the bottom of polybags with a cutting tool;

- laying down the seedlings in the holes in vertical position;

- the root system shall be neither bent nor crooked during planting;

- the rest of the polybag content shall be removed and ought to be laid beside each planted seedling;

- the soil shall be sufficiently compacted around each seedling deeply buried in soil, and the collar shall be adequately enterred (covered by a 2- to 5-cm layer of soil) in order to avoid any "candle wick" effect.

4 - <u>Maintenance</u>

Plantation maintenance means the suppression and removal by machete of unwanted vegetation on plantation rows and in spacing intervals. Plantation maintenance means the suppression and removal by machete of unwanted vegetation on plantation rows and in spacing intervals by

machete. Maximum height of cutting will be 10 cm in spacing intervals. Cutting shall be done at ground level in the plantation rows.
Maintenance operations will be scheduled as follows: 2 runs during the first year of plantation (in order to prevent the smothering up of young seedlings), four (4) runs the second year, three (3) runs the third year and two (2) runs in the fourth year.

Article 4 : Formal Acceptance of Work (FAW)

The formal acceptance of work shall be undertaken by SODEFOR, and will be certified by a record of acceptance to be signed by all attending members.

1 - Arrangements relating to the FAW

Each FAW shall take place no later than seven days after the date of the written notification issued by the Sub-contractor upon the completion of the work concerned. The notification shall be directly addressed to " Monsieur le Coordonnateur délégué du projet " with a true copy addressed to "Monsieur le chef de Division de la TENE " (the Director of the Téné Division").

The Membership of the FAW Mission Team shall be as follows:

- **The Deputy Project Coordinator and his Assistant;**
- **The head of the SODEFOR Divisions in Téné**
- **The Sub-contractor or his representative.**

2 – FAW Criteria :

The FAW shall be based on the systematic inspection of the parcel concerned and the checking of the status of operations implemented against the standards described in these Performance Specifications.

A provisionary FAW shall be undertaken in upon the establishment of the plantation after planting operations are complete. The Provisionary FAW shall take place at the same time as the first maintenance operations. The purpose of the Provisionary FAW is to certify that reforestation planting has been effective.

At the date of the provisionary FAW, the take rate (rate of rooting) for planted seedlings in the entire planted area must be no less than 80% of planned seedling density, except for any extraordinary circumstances beyond the control of the Contractor (very long period of drought, massive pest attacks); if the take rate recorded is below 80%, reinforcement planting shall be implemented until the 80% rate of success has been attained.

The final FAW shall be undertaken when the stand is secured, i.e. in the fifth year of plantation (inclusive of the year of plantation establishment). Tending work required for the maintenance of healthy seedling condition shall be the subject of partial successive FAWs to be undertaken after each intervention. The FAW official record ought to be duly established forthwith and signed by each FAW Team Member. Each Sector Director shall draw up the FAW Official Record.

Upon presentation of the duly signed FAW Official Record, the Deputy Project Coordinator shall issue the Sub-contractor with the corresponding FAW Certificate, with a true copy thereof to be addressed to the General Director of SODEFOR.

ANNEX C : Information on key Project Personnel

CURRICULUM VITAE of the Deputy-Coordinator

PERSONAL IDENTIFICATION

Name :	**ADOU**
Forenames :	**KOUABLAN**
Date and Place of birth :	**16 /12/ 1958 at Ebilassokro S/P d'Abengourou.**
Family Status :	**Married, father of 5 children.**

ACADEMIC RECORD

1975 : Junior School Abengourou, Grade : BEPC.

1979 : *Lycée Moderne Bondoukou* (Junior High School) Grade : BACCALAUREAT "D" Stream (Maths & Natural Sciences).

1980 - 1982 : *Institut Agricole de Bouaké* (11-month academic year; i.e. 4-year training period); grade attained: *Ingénieur des Techniques* option Eaux et Forêts (Engineer in Forest Management Techniques).

1992 - 1993 : University Faculty of Sciences and Techniques in Abidjan (Honours Degree in Plant physiology).

1997-1998 : National Agronomy Training Institute in Rennes, France (correspondence course in plant biotechnologies as part of a distance learning programme conducted by the Agence Francophone pour l'Enseignement Supérieur et la Recherche : AUPELF - UREF).

POSITIONS HELD

1983 - 1996 : Conservation and propagation of planting stock used in reforestation projects
Seed Laboratory Manager.
Project site management duties.

1996 - 1998 : Conservation and propagation of planting stock used in reforestation projects
Seed Laboratory Manager

1999 – 2000 : Germination of seeds, planting and monitoring of seed orchards and clone testing

2000 – 2004 : Manager of Research achievements and technique extension work
Germination of seeds, planting and monitoring of seed orchards, progeny tests and clone testing, tests de

16/09/04 – 20/10/05 : Support to research projects

20/10/05 - : Support to research projects

Deputy project leader for ITTO Project PD 54/00 Rev.4 (F) entitled « Improving the Genetic Resistance of Iroko to *Phytolyma lata*, Phase 2 ».

MILITARY TRAINING

Training for the *Brevet de Préparation Militaire Supérieur* (Staff College Qualification) at the Ground-Air Artillery Battery (B.A.S.A.) in Akouédo, 16 June - 30 August 1986.

SWORN EXPERT

Sworn Professional Expertise at the ordinary court hearing of 27 February 1987 at the District Court of Abidjan. Court Report. N° 941 of 27 Feb. 1987.

TRAINEESHIPS

- **Two-month traineeship in in-vitro breeding techniques at the *Centre Technique Forestier Tropical* (CTFT) in Nogent, France from November 1987 to January 1988. Topic of training: Acacia mangium plantlet regeneration from phyllode fragments and axillary buds.**

  Two-month traineeship at the CIRAD-FORET genetic laboratory (26 Nov.- 20 Dec.) at Montpellier, France. Topic: The use of molecular markers for genetic variability analysis of Teak spp. and/or controlling the legitimacy of clones in the Sangoué seed orchard.

PROFESSIONAL EXPERIENCE

- **Management**

*** Management of a forest research site in Anguédédou for a period exceeding 10 years (1983 - 1996).**
*** Management of "seed-related activities" involving an exchange of correspondences with several research and development and training institutes and structures worldwide.**

- **Finance**

Invoicing the sales of seeds to the various aforesaid entities.

- **Seed exploration and collection**

*** Exploration**

Exploration conducted as part of the provenance and provenance-progeny seed collections.

*** Collection**

Collection of provenance and provenance-progeny seeds by harvesting, tree-felling and tree-climbing within both natural and planted forests.

- **Seed processing**

Seed drying, extraction and packaging.

- **Recordind seed parameters**

Number of seeds per kilogram, seed dormancy periods, percentage of germination, pre-processing, seedbed preparation, types of germination, etc.

- **Seed preservation**

Condition and duration of preservation.

- **Nursery**

Designing and conducting a seedling producing nursery.

- **Planting work**

Land preparation, stake installation and test planting.

- **Mapping**

Topographical survey to implement the site map.

- **Inventory**

Test inventory: height, girth, conformation and tapering data measurement, health status assessment, etc.)

- **Thinning operations**

Selective, systematic or ad hoc protective thinnings.

- **Seed orchard management**
  Pruning and pollarding.

- **Establishing seed-producing parcels**
  Managing an existing parcel.

- **Behaviour of seedlings in nursery condition.**
  Growth patterns in nursery environment.

- **Propagation by cuttings**

The rooting of cuttings is conducted in a polyprogagator with mist spray or in seed beds irrigated manually or by automatic dripping system.

- **In-vitro cultivation**

Two-month traineeship period in in-vitro cultivation techniques in France.

- **Preparation of Project documents**

Participation to the drafting of project documents (Projects: "Production of forest seedlings using compost in hard-shell containers" and « Development of cloning for SAMBA, West African MAHOGANY and TIOKOUÉ »).

- **Training**

*** Trainee supervision**
Seed management

*** Graduation dissertation**

Panel Chairman in for a dissertation submitted by eight students of the Banco Forestry School subsequent to their traineeship at the former IDEFOR/DFO in 1997.

*** Training received**

Training in the use of SYSTAT – a statistic data processing software – in April/May 2005 and Intranet with Outlook Express in November 2005.

Training in R&D experimentation as part of the SODEFOR training workshop for executives and technicians held in Abidjan between 06 and 10 February 2006.

- **Forum**

Participation to the first National Forum on Plant Genetic Resources in Côte d'Ivoire from 12 to 14 December 1994 at I.I.R.S.D.A, Adiopodoumé.

SOME PAPERS PRODUCED

ADOU Kouablan : Brief on plant material exchange between CTFT-CI and overseas institutions, requested by the representative of GERDAT in Côte d'Ivoire. October 1983.
ADOU Kouablan and Togbé Pierre : Trial production and propagation of Samba cuttings (Triplochiton scleroxylon)

- **Study on the impact of different types of growth media on the root generation process for these cuttings.**
- **Study on the water input in the rooting process. August 1984.**

ADOU Kouablan : Some general considerations on seed preservation. August 1984.
ADOU Kouablan : Cuttings production and propagation: What for? (Document prepared by the 1985 Technical Committee). 1985.

ADOU Kouablan : Report on Timber Arboreta Establishment:
II and III for Samba
I for Framiré in Anguédédou. October 1985.
ADOU Kouablan : Report on Timber Arboreta Establishment:
III for Fraké
I for Samba
I for Cedrela in Anguédédou. August 1985

ADOU Kouablan : Work implemented in 1985. February 1986
ADOU Kouablan : Characteristics of the C.T.F.T. forest site in Anguédédou (Part I). June 1986
ADOU Kouablan : Identificaton of a few planted tree, scrub and flower species planted in the city of Abidjan and the Banco area; 10 November 1986. February 1987.
ADOU Kouablan : Acacia mangium plantlet regeneration trials on phyllode fragments and axillary buds. Report on a training received at CTFT Nogent, France between 6 November 1987 and 6 January 1988. February 1989.
ADOU Kouablan, MAMADOU Paul : Exploration and collection of Triplochiton scleroxylon (Samba) seeds in 1989. May 1989.
ADOU Kouablan : Exploration and survey work in preparation for a seed collection on Khaya ivorensis (Acajou bassam) in lower Côte d'Ivoire. October 1989. A. Kadio, A. Kouablan et E. Mahan : Note on the establishment of a Gmelina arborea clone trial in Téné in 1990. October 1990.
Kadio, A. Kouablan and E. Mahan : Note on the establishment of two Samba clone trials in June 1990. October 1990.
ADOU Kouablan : Note on the joint CTFT-SODEFOR Cedrela odorata seed collection campaign in Sangoué in January 1990. October 1990.
A. Kadio, A. Kouablan and E. Mahan : Planting of two Gmelina arborea clone seed orchards in Anguédédou and Sangoué. 1991.
A. Kadio, A. Kouablan and E. Mahan : Implementation of Gmelina arborea clone trials in Sangoué 1- Clone trials
2 – Progeny Testing. 1991.
ADOU Kouablan : Compilation of information on the flowers and seeds of a few forest species.
Part One. July 1992.
ADOU Kouablan : Seed collection of :

- **Tectona grandis (Teak)**
- **Cedrela odorata (Cedrela)**
- **Gmelina arborea (Gmelina), in December 1991 and January 1992. November 1992.**

ADOU Kouablan : Seed collection of :

- **Tectona grandis (Teak)**
- **Cedrela odorata (Cedrela)**
- **Gmelina arborea (Gmelina), in December 1991 and January 1992. Financial Component. November 1992**

ADOU Kouablan et MAHAN Etienne : Financial evaluation of experimental forest plantations in Anguédédou under ocean coast influence. February 1994.
ADOU Kouablan and IVAN Behaghel : Note on the establishment of the Teak clone seed orchard (Tectona grandis), Foro-Foro 1995. October 1995.
ADOU Kouablan et KADIO Adjumane : Note on plantation establishment : Progeny tests on Teak (Tectona grandis), Foro-Foro 1996. June 1997.
ADOU Kouablan and IVAN Behaghel : Note on plantation establishment : Trial on «types of cuttings» regarding 4 Gmelina arborea clones; IDEFOR Mopri 95/2 parcel. December 1997.
ADOU Kouablan and IVAN Behaghel : Note on Teak progeny test establishment (Tectona grandis L.f.), Foro-Foro 1996. April 1998.
ADOU Kouablan : Nauclea diderrichii (Badi) in lower Côte d'Ivoire. Seeds and seedling production. March 1999.
ADOU Kouablan : Germination of Garcinia afzellii Engl (Tiokoué) seeds. January 2000
ADOU Kouablan and EDI Kouassi : Review of Teak seed orchard status and preparation of seed collection campaigns. January 2000.

ADOU Kouablan and EDI Kouassi : Seed collection on 20 clone trees selected in the Sangoué seed orchard. February 2000.

ADOU Kouablan : Use of molecular markers to analyse the genetic variability of Teak and/or controlling the legitimacy of clones in the Sangoué seed orchard.

Report on a training received between 26 November and 20 December 2000 at the plant genetic laboratory of CIRAD-FORET in Montpellier, France.

March 2001.

Dr KADIO Adjumane Aimé and ADOU Kouablan : Note on Teak 2001 trial establishment in Téné:

- **Progeny tests ;**
- **Clone trial ;**
- **Density tests.**

April 2001.

ADOU Kouablan : Project WAFT WP3 Point des prélèvements d'échantillons de feuilles de Teck à Téné et à Séguié, in September 2002.

October 2002.

ADOU Kouablan : Point des activités du projet WAFT WP4.

December 2002.

ADOU Kouablan : Essences Forestières de Côte d'Ivoire : Quelques caractéristiques des Semenciers et des semences. Document validé par le Comité Technique de la SODEFOR.

June 2003.

ADOU Kouablan : Point des prélèvements d'échantillons de feuilles et de rameaux de Teck à Téné et Séguié, in October – November 2003. Project WAFT WP3 ET WP4.

January 2004.

ADOU Kouablan : Note de mise en place à Téné de :

- **L'étude de l'effet du paillage sur l'enherbement dans les parcs à pieds-mères, (The impact of mulching on the grassing process in parent-tree arboreta)**
- **L'essai de production de boutures en conteneurs rigides avec la sciure de bois (cuttings production tests in hardshell seedbeds with sawdust);**
- **L'essai de production de Stumbouts (Stumbouts production testing).**

March 2004.

ADOU Kouablan et OUATTARA Bafitini : Outplanting of clones from Kani to Sangoué. Project PD 54/00 Rev.4 (F) Résistance génétique de l'Iroko au *Phytolyma lata*, phase 2.

March 2006.

ADOU Kouablan et OUATTARA Bafitini : Activités de March à July 2006. Project PD 54/00 Rev.4 (F) Genetic resistance of Iroko to *Phytolyma lata*, Phase 2.

August 2006.

CURRICULUM VITAE OF TECHNICIAN

Assistant to the Deputy-Coordinator

Name : **BAFITINI**

Forename : **OUATTARA**

Date and Place of Birth : **15 – 12 – 1964 à Yakassé s/p Abengourou, Côte d'Ivoire**

Address : **01 BP 3770 Abidjan 01 – Côte d'Ivoire**

Academic grades :

B.E.P.C (Junior High school Certificate) : 1981
BAC « D »(Science Baccalaureate) : 1985
BTS (Engineer's Certificate) Forestry : 1995

Professional activities :

Project Manager ITTO – IROKO de 1999 à ce jour.

ANNEX D

TABLE OF RECOMMENDATIONS BY THE 32nd EXPERT PANEL OF ITTO

1. Provide information on project sites, including a map;
2. Further elaborate the arrangements regarding the involvement of stakeholders in the project implementation;
3. Further elaborate the section related to the management structure in Part III by providing an appropriate organizational chart that at least incorporates the Project Steering Committee;
4. Add an annex including the terms of reference for each sub-contract;
5. Provide information on key project personnel by adding the curriculum vitae of each in the Annex B;
6. Revise the budget in the following way:
    a. Reduce the purchasing cost of a vehicle to a normal level,
    b. Budget Table 7.5 (Yearly Budget by Source / ITTO) should be detailed at the level of budget sub-components as done for Budget Tables 7.1 and 7.3,
    c. Check and correct figures of sub-components for the following budget components: 50 (Consumables), 60 (Miscellaneous), 70 (Executing Agency Management Costs) and 80 (ITTO Monitoring, Evaluation and Administration Costs) in the Budget Table 7.3, in consistency with those in the Budget Table 7.1, and
    d. Recalculate the ITTO Programme Support Costs (sub-item 83) specified in the budget so as to conform with new standard rate of 8% of the total ITTO project costs, as decided by the 35th ITTC (see the model budget table on page 27 in the *ITTO Manual for Project Formulation*); and
7. Include an Annex that shows the recommendations of the 32nd Expert Panel and respective modifications in tabular form. Modifications should also be highlighted in the text.

Expert Panel Recommendations	Amendments introduced	Observations
1 – Provide information on project sites, including a map	**The project sites area has been indicated in the « problem to address » section. A map with the area indicated has been attached.**	**Page 16**
2 – Further elaborate the arrangements regarding the involvement of stakeholders in the project implementation	**The participation of sub-contractors has been further developed in the Project Strategy**	**Pages 22 et 23**
3 – Further elaborate the section related to the management structure in Part III by providing an appropriate organizational chart that at least incorporates the Project Steering Committee	**The Management Chart of the Project has been included in Annex A.**	**Page 36**
4 – Add an annex including the terms of reference for each sub-contract	**The Terms of reference/Scope of Work for sub-contractors have been included in the Annexes**	**Page 44-46**
5 – Provide information on key project personnel by adding the curriculum vitae	**The Curriculum Vitae of the Deputy Coordinator and his assistant have**	**Page 47**

of each in the Annex B	**been added in Annex B.**	
6 – Revise the budget in the following way: **a) Reduce the purchasing cost of a vehicle to a normal level,** **b) Budget Table 7.5 (Yearly Budget by Source / ITTO) should be detailed at the level of budget sub-components as done for Budget Tables 7.1 and 7.3,** **c) Check and correct figures of sub-components for the following budget components: 50 (Consumables), 60 (Miscellaneous), 70 (Executing Agency Management Costs) and 80 (ITTO Monitoring, Evaluation and Administration Costs) in the Budget Table 7.3, in consistency with those in the Budget Table 7.1, and** **d) Recalculate the ITTO Programme Support Costs (sub-item 83).** **.**	**Items 40, 50, 60,70 and 80 of table 7.3 have been adjusted to the relevant items of table 7.1** **Table 7.5 has been detailed** **Items 50 and 60 have been adjusted as well as sub-item 83.** **The 8% budgetary provision has been enterered in the budget to account for ITTO Programme support.**	**See Budget Tables included**
7 – Include an Annex that shows the recommendations of the 32nd Expert Panel and respective modifications in tabular form. Modifications should also be highlighted in the text.	**The Table has been included in Annex.** **All modifications to the documents have been marked in bold letters.**	**Page 52**