Evidence –based policies for good governance

The applicability of growth and yield modelling in the Guyana forest sector

TECHNICAL REPORT

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Executive Summary

1. The aim of this report is to assess possibilities for adoption of two growth and yield modelling techniques (SYMFOR and MYRLIN) and, by implication, use of the results which these models will produce. Possible adoption is studied in Guyana (both by the industry and by the Guyana Forestry Commission or other independent bodies) in the context of the broad objective of poverty reduction and sustainable use of the environment. **As the report will demonstrate, growth and yield models will have greatest use as a tool to promote dialogue and interaction between different stakeholders with different power relations – leading, it is hoped, towards evidence-based policy.**

2. **The phrase "evidence-based policy" can be taken to mean policy formulations which are rooted in fact** rather than in tradition or estimation. In this particular case, accurate models of the growth of Guyanese forests, the consequent allowable yields for sustainable management, and the likely income from such harvesting activities can be used to refine forestry codes of practice, enforcement activities and revenue collection.

3. **This report is timely** because there are grave concerns over current harvesting levels in Guyanese forests. The Guyana Forestry Commission has recently instituted a national silvicultural survey to assess the impact of current harvesting practices on the optimal timing and likely yields of future harvesting.

4. **The Guyana timber industry is heterogeneous**. The industry can be divided loosely into six sectors: (A) Forest authorities and other government agencies; (B) externally financed multinational companies with large Timber Sales Agreement (TSA) concessions and sawmills; (C) Guyanese owned companies with medium to large Woodcutting Lease (WCL) or TSA concessions and sawmills; (D) Guyanese owned companies with small States Forest Permission (SFP) concessions and / or small sawmills or chainsaw lumber production; (E) Indigenous Amerindian reserves without sawmills but with some chainsaw lumbering; (F) Illegal chainsaw lumbering operations. It proved possible to interview all of these sectors except the last (which is a matter of some concern, given the importance of this sector reflected in the various stakeholder analyses).

4. **The Guyana timber industry is partially horizontally integrated**. That is to say, some sectors depend partially or entirely on other sectors. For example, some multinational companies purchase timber from the other three sectors. Amerindian reserves depend almost entirely on the other sectors and particularly on neighbouring sawmills and concession owners for markets and to hire extraction equipment. There is also fierce competition between the sectors. The consequences of this are that individual timber

industries cannot be considered in isolation. This report shows that pressures, and responses to those pressures by individual enterprises, will have a knock-on impact on other sectors of the industry.

5. **Different stakeholder groups have different opinions about which groups have the most influence over timber extraction activities. There are some some similarities between government and non-government sectors. There are also some important discrepancies, however, which need to be addressed**. These include (1) the apparent lack of weight given by the GFC to inter-ministerial co-ordination of land use policies; (2) the lack of attention given by the GFC to markets, the value chain and middlemen, and the need for regulatory structures to ensure equitable distribution of benefits along the value chain; (3) the lack of potential for contract workers to contribute to good management in the eyes of the forest industry; (4) the lack of perceived value of research by the forest industry; and (5) the uniformly perceived importance of marketing (especially of lesser known hardwood species) but absence of formal structures to address this deficiency.

6. **The Guyana timber industry is under pressure**. Published reports on stumpage value in Guyana suggest that the industry is at best marginally profitable. Poor infrastructure imposes particularly heavy burdens in terms of transport costs and wear on capital equipment. Where interest rates are high (in Guyana interest rates stand at more than 18%) high profits are needed to repay loans on extraction and sawmilling equipment. The need to maintain profits is independent of circumstances under which the industry operates. When the industry is "squeezed" either through falling markets for timber products, high interest rates or through additional management requirements imposed by monitoring authorities such as the Guyana Forestry Commission, this pressure must be absorbed while maintaining profits. **This report presents evidence based on socio-economic indicators of performance that the Guyana timber industry is being "squeezed" in various ways.**

7. **The poorest sections of the Guyanese timber industry are under most pressure.** Within any particular enterprise there are owners / managers / supervisors, and also a low paid labour force. Profits must accrue to the owners, particularly where those owners are external investors. Managers or supervisors are scarce and valuable commodities. These elements of an enterprise are therefore usually protected from any external "squeeze" on the industry**. N.B. When the upper management and investors complain of hardship in the forest industry they are not stating necessarily that no profits can be made, merely that the rate of return is insufficient to compete with alternative investments**. Unless a specific rate of return is achieved by a timber company, investors will ultimately turn to more profitable alternatives.

8. When a timber enterprise is squeezed, prior to switching to alternative investments, management will usually try to find additional efficiencies or cost reductions in production or labour costs**. These efficiencies and cost reductions are often borne by the low paid labour force**. Since the late 1990's when the markets for Guyanese timber deteriorated, this report presents examples of short term job losses, overtime cuts, increasing work for the same pay, reduction in benefits, increasing job insecurity and reduced benefits. It is perfectly justifiable to argue that short term "pain" is necessary for longer term "gains". But where the people who experience the pain are not the same as those experiencing the gains, it is perhaps time to look for alternative policy options.

9. **Economic pressures on the industry exacerbate detrimental environmental impacts**. The impact on the environment of timber operations depends on various factors. Detrimental impacts are to some extent linked to the economic health of the industry. The recent "squeeze" on the industry has resulted in a shortening of perspectives with regard to

the resource base. Examples are given of detrimental impacts resulting from short term needs to maintain economic profits.

10. **Growth and yield models allow calculations both of future yields given current harvesting practices and of the "allowable" harvest of timber**. The word "allowable" refers to ecological and economic sustainability. These results will be of interest to forest authorities, providing a sound basis for forest policies which juggle the longer-term interests of maintaining the forest environment with the shorter-term socio-economic interests of employment and profit. For the timber industry, results from analyses using growth and yield models might show a variety of possible scenarios:
    (a) The "allowable" harvest may be: (i) sufficient to generate profits which are acceptable both to investors and the aspirations of current workers; (ii) feasible within the current and future market context, and; (iii) possible within the enterprises technical capability.
    (b) The "allowable" harvest may be sufficient to generate profits which are acceptable to investors, but unacceptable to workers and only feasible with major changes to the current workforce.
    (c) The "allowable" harvest may be sufficient to generate profits, but these may be unacceptable either to investors or to meet the aspirations of current workers.
    (d) The "allowable" harvest may be sufficient to generate profits, but this may be hard to determine reliably because of the vagaries of current and future markets.
    (e) The "allowable" harvest may be sufficient to generate profits, but carrying out such a harvesting regime is beyond the technical capability of the enterprise in question.
    (f) The "allowable" harvest is not sufficient to generate a profit.

11. **Adoption of growth and yield models by different stakeholders will depend both on the extent to which they are aware of these different scenarios, and on their assessment of which will hold true for their organisation**. It is postulated that growth and yield models will be adopted for one of three reasons:

    (i) if there is a reasonable possibility that they will show a sustainable harvesting regime which is acceptable to the enterprise and / or forest authority in question (scenario (a) or (b) above) (ENFORCED SUSTAINABILITY).
    (ii) if there is little possibility that they will show an acceptable "allowable" harvest (scenarios (c) – (f) above), but there is a desire to quantify the economic margin between sustainable forest management (SFM) and current practice in order to devise incentives which might bridge the gap and promote SFM. (SUBSIDISED SUSTAINABILITY)
    (iii) if there is little possibility that they will show an acceptable "allowable" harvest (scenarios (c) – (f) above), but there is a desire to calculate how long remaining timber stocks will last at current extraction rates in order to devise alternative policy and land use options. For example, it may be desirable to allow planned conversion to potentially sustainable land use alternatives. (LEGITIMISED NON-SUSTAINABILITY).

12. In order to assess the possibilities for adoption of growth and yield modelling techniques it has been necessary to investigate both governmental, management and workforce perspectives (with separate interactive session for male and female workers). Investigations have attempted to shed some light on the current state of the forestry industry and its **capacity to utilise** such models. Based on the scenarios above the economic state of the industry has been discussed so as to assess the **incentive to adopt**

such models. Since the longer term acceptability of the forest industry will inevitably be linked to societal benefits, a further consideration must be the **impact on poverty** which adoption of the findings from growth and yield models would bring about. A final consideration is the likely **impact on the environment** which the adoption of growth and yield models might bring.

13. Temporal considerations are important on two counts. Firstly, conditions for different sectors within the timber industry vary over time, altering the capacity to utilise and the incentive to adopt growth and yield modelling techniques. Conclusions relating to the Guyanese forest industry today may not be relevant in the future with changing economic conditions. **The current general economic outlook for the Guyana forestry sector is bleak, governed by short term economic imperatives, with little scope for long term planning integral to the use of growth and yield models for enforced sustainability**.

14. A second temporal aspect is that the impacts of adoption and application of results from growth models differ depending on whether a short-term or long-term perspective is used. For example, measures to increase efficiency and sustainability in the short term may have a negative impact on the income of forest workers in the short term, but may ensure longer-term employment opportunities. Measures to minimise environmental damage in the short term, might result in industrial closures which result in long term more damaging changes to the environment. **The argument is made in this report that the social cost of sustainable management for many sectors in the Guyanese forest industry is unacceptable. Alternative policy solutions must be found, which may include the use of incentives for sustainability or the sanction of unsustainable forest use, ultimate migration out of the forest and conversion of short-term capital gains into alternative sources of employment**.

15. **The adoption of growth and yield modelling in order to enforce sustainability is likely only to have relevance for the forest authorities and wealthiest sectors in the industry**. The impacts on poorer companies or poorer levels within a particular industry (i.e. the lowest classes of forest workers) are likely to be negative. The report draws the following conclusions about the potential adopting of growth and yield modelling techniques and the likely impacts of adoption for six different sectors of the forest industry:

(A) FOREST AUTHORITIES AND OTHER GOVERNMENTAL AGENCIES (examples include the GFC, EPA, and the Ministry of Amerindian Affairs)

(i) Capacity to utilise growth and yield models

Stakeholder analyses highlight the important influence over timber extraction activities of the GFC, the EPA and the Ministry of Amerindian Affairs. The Guyana Forestry Commission has the best capacity in the country to utilise growth and yield models (along with the non-governmental Iwokrama Rainforest Centre). Both institutions have competent technical staff with the mathematical and computing skills necessary to run the models and interpret results. **The GFC has made particularly promising investments in staff training and national silvicultural survey case studies and is the logical home for future evidence based policy work based on growth and yield models**. The EPA is currently tackling pollution rather than forest degradation (the latter being the preserve of the GFC) and has no capacity to engage with or use growth and yield models. The Ministry of Amerindian Affairs does not have a forestry unit or the capacity to use such models, despite the fact that logging is almost sole source of employment for many Amerindian communities. The need for self-regulation in the Amerindian reserves is particularly acute because of their independence from normal GFC regulation. Building capacity within the Ministry of Amerindian Affairs might therefore be considered a priority.

(ii) Incentives to adopt growth and yield modelling techniques

As the country's forestry regulatory body, the GFC has perhaps the strongest incentive to adopt growth and yield models and apply results across its monitoring activities. Calculating the "allowable" harvest is certainly central to the aims of the Commission. The EPA has devolved responsibility for environmental monitoring involving forests to the GFC and has little incentive to adopt growth and yield models. The Ministry of Amerindian Affairs might have increasing incentive to adopt growth and yield modelling predictions as it engages with the principal and threatened logging activities of many Amerindian communities. **The whole process of self-regulation in the Amerindian reserves needs further analysis and support, with the formation of a working group involving at least the communities, the GFC and the Ministry of Amerindian Affairs.**

(iii) Impacts on poverty

For both the GFC and the Ministry of Amerindian Affairs, of more interest than the question of "whether to apply the results from growth and yield models" is the question of "how to apply the results from growth and yield models". **Evidence from this report suggests that ENFORCED SUSTAINABILITY using an "allowable" yield might result in the collapse of much of the forestry industry and ultimately of the GFC which depends on timber revenues**. There would be immediate short-term escalations of logging on unregulated Amerindian lands leading to serious long-term detrimental impacts. Any collapse in different sectors of the industry would result in widespread poverty for the many thousands dependent on small or medium sized enterprises. In short, what is "allowable" for the forest may prove not to be "allowable" on social grounds.

The challenge will be to negotiate innovative evidence-based policy alternatives based on yield predictions. Some of these policy options will inevitably involve cross-ministerial dialogue. Options which need to be debated include:

SUBSIDISED SUSTAINABILITY

(1) the creation of a proactive marketing broker institution with the capacity (and government guaranteed financial backing) to develop markets for a wider range of

species, offer fixed prices for key timber species dependent on compliance with sustainable practice, and negotiate supply to external and internal buyers. The challenge lies in maintaining prices for a wide enough range of species so that sustainable timber extraction (based on growth and yield predictions) can be economically viable.

(2) restructuring of the industry through a process of concessionaire screening and concession enlargement or the formation of management co-operatives with major new incentive schemes to cover the cost of the adoption of sustainable harvesting practices, linked to a programme of independent monitoring, perhaps by an external certification body.

LEGITIMISED NON-SUSTAINABILITY

(1) legitimised short-term and non-sustainable forest exploitation geared towards income generation to finance new employment alternatives. This would eventually consign the forest to alternative uses, perhaps including carbon sequestration, bioprospecting, ecotourism, NTFP harvesting or land conversion;

(2) periods of legitimised non-sustainable forest exploitation followed by compulsory concession-fallows, with preferential access to new concession areas for past concession holders to avoid sudden unemployment. This system of rotating concessionaires between different areas with fallow recovery periods might provide a basis for an unusual sustainable certification system (viewed over the long term). There might currently be insufficient available land for this system to operate without closure of a number of forest operations;

(iv) Impacts on the environment

It is difficult to predict the impacts on the environment for the adoption of growth and yield models and the application of results relating to "allowable" yield. It depends very much on the policy options developed above. A simplistic assumption might be that enforcing the "allowable" yield could not fail but to have positive environmental impacts in the short and long term. However, even the most naive assessment of short term impact must take into account the inevitable exacerbation of exploitation of timber from unregulated Amerindian lands that would follow hot on the heals of such enforcement. On those Amerindian lands the likely environmental impact would be catastrophic in both the short and long terms (if the existing situation is not already in that category). Any collapse of the forest industry resulting from onerous and economically non-viable harvesting regulation would fuel the demand for land use conversion. This would have serious long-term environmental consequences for Guyana.

(B) MULTINATIONAL COMPANIES WITH LARGE TSA CONCESSIONS AND SAWMILLS (examples include Barama and Demerara Timbers Ltd).

(i) Capacity to utilise growth and yield models

The large scale of operation in this sector means that enterprises can afford to retain staff with the technical skills necessary to gather data relevant to growth and yield modelling. Permanent Sample Plots (PSPs) at both Barama and Demerara Timbers Ltd (DTL) provide a good platform for the model SYMFOR. Both companies also have 100% inventory data and records of harvesting by block (although neither currently practice 100% enumeration). The history of data acquisition by company staff has also developed some interpretive capacity (although DTL has recently laid off all such staff) and provides a strong incentive to employ models to make use of the data that has been gathered. **Nevertheless, one must not underestimate the financial difficulties facing companies in this sector which work against long term planning** (in DTL's case leading to a sale announcement).

(ii) Incentives to adopt growth and yield modelling techniques

Of all the sectors within the Guyanese timber industry, this sector has the highest incentive to adopt growth and yield models. These large companies operate at a scale which insulates them from some of the more sporadic changes in markets. The large concession areas allow considerable volumes of timber to be harvested using existing blocking systems with a 25-30year cycle. It is conceivable, at least for Barama, that the "allowable" harvest per unit area might not be very different from current practice and might furnish profits which are acceptable to investors and the workforce alike. More likely, it is probable that there would need to be some reorganisation of, and capacity building within, the workforce. There is some interest in certification, which would be assisted by information of the type these models would supply. Assuming the "allowable" harvest not to be acceptable to investors or the work force, there is still enough interest in calculations relating to likely future harvest volumes to make the adoption of growth and yield models likely.

(iii) Impacts on poverty

Should model simulations show an acceptable "allowable" harvest, it is likely that major changes would be required to the current workforces. New skilled staff would have to be recruited. Unskilled labour might be lost. Retained staff might have to take on more work for no extra pay. More onerous harvesting requirements would penalize labour contracted on a pay-per-unit-volume basis (i.e. the poorest workers). Reduced profitability might result in the reduction of benefits for staff or the loss of staff. Lost or reduced incomes would impact on a family's locational stability, housing (often provided by the company), nutrition, education and health. It is unlikely that long-term employment benefits would accrue to existing workers since staff turnover in remote concession location is on average sufficiently high as to mean that only new workers would benefit from company stability. **If yield predictions are used to enforce sustainability without new incentive schemes it is likely that the impact on poverty will be negative**.

(iv) Impacts on the environment

The ultimate aim of growth and yield models is to guide sustainable planning and management. The likely environmental impacts of the adoption of growth and yield models is likely to be positive (assuming that the companies use the results to implement sustainable management regimes).

(C) GUYANESE-OWNED COMPANIES WITH MEDIUM TO LARGE WCL OR TSA CONCESSIONS AND SAWMILLS (examples include Willem Timber and Trading Co. Ltd and Toolsie Persaud Ltd.)

(i) Capacity to utilise growth and yield models

Neither of the two companies surveyed had the capacity necessary to utilise growth and yield models. While Toolsie Persaud Ltd currently employed one university educated inventory person; no inventory had been carried out at the Manaca site since the previous year. Willem Timber and Trading Co. Ltd does not currently employ inventory staff, nor does it currently conduct inventory work. Neither company employs dedicated research staff with the ability to use or interpret results from growth and yield models. Both companies site the cost of employing such staff as a major impediment. The scale of operation simply does not allow such luxury (i.e. the fixed costs are similar to much larger operations but the profits are much smaller). More important is the fact that investment in such inventory was not perceived to

provide any benefits to the company. Willem Timber and Trading Company Ltd had employed inventory personnel at one stage and using CIDA support had prepared inventory maps of their concessions, but there was no one within the company currently able to interpret or use these maps in the field. While there might be some benefit in employing professional foresters who could do inventory alongside other sound forestry business tasks, this was not currently seen as a priority.

(ii) Incentives to adopt growth and yield modelling techniques

There is little or no incentive for the medium sized companies to adopt growth and yield modelling techniques. Given the current financial difficulties in this sector (described in the report) results pertaining to the "allowable" yield would almost certainly be financially unacceptable or even unprofitable. In addition, the companies would not have the technical capacity to implement the harvesting regimes needed to ensure sustainability. Only major conditional incentive (tax reductions, waivers of acreage fees, subsidies etc.) schemes or previously unheard of price premiums for certified products would be likely to change this situation.

(iii) Impacts on poverty

There is a persistent complaint by this sector that even the recently introduced regulations (defined in the code of practice) will put these companies out of business. Already there are examples of staff losses, temporary suspensions without pay, reduced overtime, increasing workloads and / or work hours without increases in pay and reduced benefits (e.g. electricity rationing). Calculation and implementation of "allowable" yield is unlikely to improve this situation. Enforcement of such "allowable" yields and subsequent reduced profitability might result in the reduction of benefits for staff or the loss of staff. Lost or reduced incomes would impact on a family's locational stability, housing (provided by the company), nutrition, education and health. Company closure would spread these negative impacts over the entire workforce.

(iv) Impacts on the environment

The enforcement of "allowable" yields would almost certainly reduce the profits of timber industries in this sector below the threshold required by investors to remain in the industry. The impact on the environment which ensuing changes, closure, company acquisition etc would bring about are almost impossible to determine. It is likely that government policy in such a volatile situation would be the determining factor.

(D) GUYANESE-OWNED COMPANIES WITH SMALL SFP CONCESSIONS AND / OR SAWMILLS (examples include the Ituni Small Loggers and Chainsaw Association, Doodnauth Naraime, R. Singh and Sadiek Juman)

(i) Capacity to utilise growth and yield models

Holders of SFP concessions are not required to "manage" the forest in the traditional sense of the word. Instead they abide by quotas developed by the GFC's own interpretation of growth and yield (a strong justification for GFC's further development and use of growth and yield modelling techniques). Without any requirements for planning, blocking and enumeration, it is unreasonable to expect this sector to develop the capacity to use growth and yield models.

(ii) Incentives to adopt growth and yield modelling techniques

There are scarcely any incentives for this sector to adopt growth and yield models, *unless* the SFP concession holders wish to convert or expand their concessions to more secure WCLs. In this case management planning become an important priority and insights from growth and yield modelling become relevant to this process. Conversely, any use of growth and yield models to restrict timber harvesting on adjacent Amerindian reserves would have a major negative effect on these small concessionaires because of the close linkages between the two tenure types.

(iii) Impacts on poverty

Given the current fragility of this sector, any further harvesting restrictions would have negative consequences for the poor labour force. However, in situations where the SFP holders are attempting to gain longer tenurial security *or additional land* by applying for a conversion to WCL, it is conceivable that reduced and more sustainable harvesting might be compensated for by a larger concession area. In this unique instance, the results from growth and yield modelling might be enforced in a way which has a positive impact on poverty.

(iv) Impacts on the environment

In many instances the additional restrictions which might be applied to harvesting (through the quota system) would be compensated for by increasing harvests from adjacent Amerindian lands. The latter would experience further negative environmental impacts. In situations where conversion from SFP to WCL was accompanied by increasing concession area, the environmental impacts might be positive.

(E) INDIGENOUS AMERINDIAN RESERVES (examples include the Orealla and Moraikobai communities).

(i) Capacity to utilise growth and yield models

There was no evidence of forest management in the strict sense in the two Amerindian reserves surveyed, although systems of harvesting allocation existed. There was no capacity to use or interpret growth and yield model predictions.

(ii) Incentives to adopt growth and yield modelling techniques

There are no restrictions on timber harvesting in Amerindian reserves. **Any incentives to determine and abide by harvesting restrictions (derived from quotas perhaps set by the GFC based on growth and yield predictions) will have to come from the Amerindian communities themselves**. Since logging operations are among the only means of generating income in these reserves, the incentive to adopt harvesting restrictions will inevitably be determined by the perceived balance between short-term financial imperatives and longer term concerns for sustainable employment. In the two reserves surveyed, the exploitation of timber resources has already been such that future sustainability has been compromised - i.e. managing the remaining timber stocks in a sustainable manner would generate a very low rate of return. In short, the damage has already been done.

(iii) Impacts on poverty

The Amerindian reserves are not in a strong bargaining position. Without transport or advanced processing facilities they are forced to accept the terms and conditions of neighbouring concessionaires and processing facilities. Self-imposed restrictions on harvesting based on growth and yield predictions and the “allowable” yield would reduce current income still further, but would have benefits for future generations. Unless

accompanied by a more thorough review of production and pricing within the Amerindian reserves (with negotiated agreements governing the same) it is unlikely that timber will provide reasonable returns in the short term, or any returns in the long term.

(iv) Impacts on the environment

The current impact of the existing system on the environment in the Amerindian reserves might already be termed catastrophic. Increased restrictions on regulated timber production elsewhere might exacerbate this situation. Internal adoption of self-regulation of harvesting might ameliorate the environmental situation, but may prove socially unacceptable in the short term.

(F) ILLEGAL CHAINSAW LUMBERING OPERATIONS

(i) Capacity to utilise growth and yield models

While it was not possible to interview (knowingly) any actors in this sector, it is clear that illegal logging by definition stands opposed to the management planning based on growth and yield model predictions. There is therefore no possible capacity to adopt or use growth and yield models in this sector.

(ii) Incentives to adopt growth and yield modelling techniques

Since adoption of growth and yield models and the resultant “allowable” yield depends fundamentally on secure tenure and freedom from illegal incursions into concessions, illegal logging and growth and yield models stand juxtaposed to one another.

(iii) Impacts on poverty

Illegal logging may occur for a number of reasons, including short-term profiteering or financial necessity. In the latter case, control of illegal logging will have negative impacts on poverty in the short term, and, unless alternative employment is developed, in the longer term as well.

(iv) Impacts on the environment

A reduction in illegal logging, through wider enforcement of sustainable forest management will have a positive impact on the environment. This simple assertion should not be taken as an underestimate of the serious logistical difficulties that controls on illegal logging would pose.

RECOMMENDATIONS

16. In order to continue to improve forest governance in Guyana, there is need to continue to improve various hierarchical tiers of activities. Continued work is needed on the foundations of simple secure property rights, constitutional guarantees, institutional capacity and marketing. Participative policy development must continue to form the central plank of GFCs activities (building on excellent discussion processes such as that on certification). At the higher levels where standards for SFM are defined and incentive or enforcement structures established, there is a need for iterative review. Growth and yield modelling is by no means the only, nor necessarily the most important element in such a pyramid of forest governance activities, but it does have a contribution to make. Increasing accuracy of information on growth and yield can help to inform all stakeholders about the realistic options for the use of Guyanese forests.

17. In the light of the analysis in this report, summarised above, it is possible to **make a series of recommendations**:

To DFID and other donors:

- 1. It is recommended that donors continue to support a process of dialogue between different stakeholder groups, using yield predictions as a policy platform from which to develop realistic options for the forest-dependent poor (i.e. do not ring bark the tree just before it is about to bear fruit).

- 2. It is recommended that yield predictions, and the socio-economic impacts of policy alternatives based upon them are discussed at a regional level (e.g. lesson learning between adjacent countries in the Guyana Shield and in neighbouring countries such as Brazil).

To the Universities of Oxford and Edinburgh:

- 3. It is recommended that a case study initially be developed with Barama (using SYMFOR) as an example of a large-scale company with perhaps the greatest potential to use and interpret the results from growth and yield models.

- 4. It is recommended that a case study initially be developed with the Ituni Small Loggers and Chainsaw Association - ISLCA (using MYRLIN) which will provide the dual benefit of (1) raising awareness of cogent information in the process of management planning for the ISLCA in the proposed move from SFP to WCL; (2) provide data for the GFC on growth and yield on white sand sites as part of the existing national silvicultural survey process.

- 5. It is recommended that University of Guyana lecturers in growth and yield accompany the case studies (funded by the FRP) in order to equip them with teaching examples for the relevant modules in the new curriculum and institutionalise growth and yield models within forestry education.

- 6. It is recommended that simple practical manuals on the growth and yield models MYRLIN and SYMFOR be submitted to the University of Guyana (and to any successful bid by the International Tropical Timber Organisation (ITTO) / Tropical Forest Foundation (TFF) to establish a vocational training centre in Guyana).

- 7. It is recommended that student projects at the University of Guyana be considered as a means of supporting the case studies or any follow-up activities.

To the GFC:

- 8. It is recommended that staff trained in the use of SYMFOR and MYRLIN take responsibility for the logistics of the case studies under the overall coordination of Julian Evans.

- 9. It is recommended that a working group on growth and yield be established under the leadership of the new GFC research unit (but which would include representatives of key stakeholder groups identified in this report). This would encompass the case studies outlined above, analysis of results from the national silvicultural survey, and discussions pertaining to policy options implied by the above.

- 10. It is recommended that further economic analyses are performed to study the economic viability of sustainable management (using required rates of return, not the existence or absence of profit, as the baseline measure of viability).

- 11. It is recommended, in the light of findings from the above, that GFC develop a programme of incentives which links improved practice (perhaps independently verified through certification) to appropriate financial support, bridging the gap between economic returns from current practice and the additional costs of sustainable management.

- 12. In the light of findings that the poorest employees within the forest industry bear the brunt of any “squeeze” through declining markets or new regulations, it is recommended that the GFC define standards and incentives to alleviate the negative livelihood impacts which result for marginalised workers and include such standards within a Guyanese approach to certification.

- 13. It is recommended that policy options be studied which legitimise non-sustainable use of the forest in the short term and devise strategies to cope with the implications of non-sustainability in the long term.

- 14. It is recommended that a major programme of outreach and assistance be directed towards the Amerindian reserves in association with the Ministry of Amerindian Affairs in order to address current problems of exploitation and current / future problems of resource degradation.

- 15. It is recommended, in the light of unanimous agreement across the sector of the importance of marketing and current marketing deficiencies, that the GFC reconstitute the previously abandoned marketing wing of its operations in order to improve prospects for a wider number of commercial timber species.

- 16. It is recommended that the GFC together with the FPA conduct market chain analysis for timber products and implement structures to ensure more equitable distribution of benefits, particularly to producers in situations where low value works against SFM.

- 17. It is recommended that the GFC prepare and distribute information which clearly outlines to buyers the growth and yield of different species and the

implications of timber purchase orders for economically viable SFM (e.g. higher species numbers, increased regularity, broader distribution across different producers etc.).

To the Ministry of Amerindian Affairs:

- 18. It is recommended that the Ministry of Amerindian Affairs set up a unit dedicated towards the assistance of Amerindian logging operations (as these comprise the major source of employment and income for some communities).

- 19. It is recommended that this unit collaborate with the GFC in a major programme of outreach and assistance directed towards the Amerindian reserves in order to address current problems of exploitation and current / future problems of resource degradation.

- 20. It is recommended that the Ministry of Amerindian Affairs reanalyse together with the Amerindian communities, the costs and benefits associated with their exemption from logging restrictions.

To the Timber Sector and the Forest Products Association:

- 21. It is recommended that the industry engage with and take advantage of research directed at calculations of future yields and incorporate such predictions in future planning so as to have the best possible knowledge of the impact of current harvesting practice.

- 22. It is recommended that the industry reconsider the per volume incentive systems used for contracted extraction workers, as these tend to act as disincentive to good forestry practice.

- 23. It is recommended that the FPA collate evidence on requirements for economic viability and the growth and yield of available forest resources in order to boost the FPA's strategic planning capability and develop a position on future policy options for the industry.

- 24. It is recommended that the FPA make special efforts to incorporate smaller forest businesses and representatives from Amerindian reserves, in view of their perceived importance for the Guyana timber industry.

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Abbreviations

BFMP	Berau Forest Management Project
DTL	Demerara Timbers Limited
EPA	Guyana Environmental Protection Agency
FMD	(GFC) Forest Monitoring Division
FRMD	(GFC) Forest Resource Management Division
FRP	Forestry Research Programme
GEA	Guyana Energy Authority
GFC	Guyana Forestry Commission
GGMC	Guyana Geology and Mines Commission
GLSC	Guyana Lands and Surveys Commission
IERM	Institute for Ecology and Resource Management
MoU	Memorandum of Understanding
MTAA	Ministry of Tourism and Amerindian Affairs
MYRLIN	Methods of Yield Regulation with Limited Information
NTFP	Non-Timber Forest Product
OFI	Oxford Forestry Institute
PDD	(GFC) Policy and Development Division
PSP	Permanent Sample Plot
RIL	Reduced Impact Logging
SFM	Sustainable Forest Management
SFP	State Forest Permission
SYMFOR	Silviculture and Yield Management for tropical FORests
TGP	Tropenbos Guyana Programme
TSA	Timber Sales Agreement
UG	University of Guyana
UU	Utrecht University
WCL	Woodcutting lease

1 Introduction

1.1 Background to consultancy

1.1.1 The aim of this consultancy was to assess the options for the application of yield regulation models in Guyana. The justification is that, as Palmer (1975) stated in talking of tropical forest management "the principle managerial difficulty is in setting the allowable yield". Accurate information on growth and yield is essential, regardless of which policy alternatives that information is used to develop. Quarter of a century later, in the Guyanese national context, Zagt *et al.* (2000) still reported that "growth and yield models are not currently available to guide management decisions, but they are developed as part of the research projects". Under what circumstances might growth and yield models actually be taken up and applied in routine forest management decisions? Using participative approaches in representative categories of forest enterprise, this consultancy aimed to provide a preliminary answer to that question.

1.1.2 This visit to Guyana was funded as part of a project cluster dealing with the same thorny tropical forest management question of how to calculate future yields and develop evidenced-based policies which are an appropriate response to those yields. Two FRP projects have developed models to do just that. While separately funded under the exit phase of FRP project R7278, this consultancy was effectively a follow up to visits made under FRP project R6915 and ZF0151 by Dr Paul van Gardingen in October 2000 (van Gardingen 2000) and March 2001 (van Gardingen 2001a) and by Dr Paul Phillips in May and June 2001 (Phillips 2001).

1.1.3 This consultancy also followed a partnership and planning workshop in Edinburgh at which Guyanese representatives from the Guyana Forestry Commission (GFC) and Iwokrama has been present (van Gardingen 2001b). At that planning workshop, it was noted that additional to the difficulties in setting the allowable yield, there were numerous other constraints which impede the effective regulation of goods and services from forests. The workshop recommended a thorough stakeholder analysis of these additional constraints. This analysis would provide important information regarding the circumstances under which yield regulation models could assist different stakeholder categories in making management decisions.

1.1.4 The consultancy formed part of the exit strategy of FRP project R7278 entitled "Humid and semi-humid tropical forest yield regulation with minimal data" led by Mr Howard Wright of the Oxford Forestry Institute (OFI), Department of Plant Sciences, Oxford University (Wright 2001). The project based at the OFI has developed a modelling system called "Methods of Yield Regulation with Limited Information (MYRLIN)". This has been based on a study of the growth of tropical mixed forest taken from a consolidated database. Data has been used from permanent sample plots in Brazil, Costa Rica and Papua New Guinea through the co-operation of Embrapa Amazônia Oriental, CODEFORSA and Portico AS in Costa Rica, and the forest Research Institute of Papua New Guinea. MYRLIN uses data from 1628 genera and tree species from 335 permanent sample plots over two years to predict growth and yield for different species groups. It allows forest decision makers with only static inventory data (from one point in time) to examine the impact of different harvesting operations on future growth and yield. The model acts as a *what-if* platform for testing different management regimes.

1.1.5 The visit was also linked to the exit strategy of FRP project R6915 entitled "Growth and yield modelling framework to determine ecological and economic sustainability of managed tropical moist forest systems" led by the Institute of Ecology and Resource Management (IERM) of the University of Edinburgh. The project has developed a modelling framework called "Silviculture and Yield Management for tropical FORests (SYMFOR)". SYMFOR includes species based models of forest growth and yield developed from permanent sample plot data in Indonesia in collaboration with the Ministry of Forestry (BPK Samarinda) a concession holder PT Inhutani and the Berau Forest Management Projects (BFMP). Provided PSP data is available (from more than one point in time), this modelling framework also allows forest decision makers to select management strategies and predict the growth and yield of the forest into the future. While MYRLIN is less demanding in terms of input data required, SYMFOR is able to assess in more detail the impacts of different management decisions at the species level.

1.2 Context

1.2.1 Guyana is situated on the northern coast of South America, covering an area of 214,970km² and bordered by the Atlantic Ocean, Suriname, Brazil and Venezuela. Of this total area almost 168,000km² is covered in forest (80%) – see Figure 1.

1.2.2 Enshrined in the National Forest Policy is the fact that the ownership of all forest resources, except those on private property and on Amerindian lands, shall be vested in the State (GoG 1997). Since 1953, the GFC has been issuing timber concessions on State Forest land. Forest lands allocated to timber production are referred to as "permanent production forests", one of seven categories of State Forests. In 1997, of the total area of forest cover, State Forests encompassed an area of 89,000km² (Van der Hout 1999). In 1996, some 69,000km² (73%) of the State Forests had been allocated for timber harvest as permanent production forests, mainly in the central and north western part of the country (see Figure 2)

1.2.3 Allocations for timber harvest are given according to three forms of tenure (see Figure 3):

(1) **Timber Sales Agreement** (TSA) - Post 1980, contracts that provide exclusive rights for periods of up to 25 years for areas exceeding 24,290ha (60,000 acres): with an option for renewal. Some 17 of these contracts encompass 41% of the total concession area

(2) **Woodcutting lease** (WCL) - Pre and post 1980, contracts that provide exclusive rights for periods of 3-15 years for areas between 8,000ha (20,000 acres) and 24,290ha (60,000 acres); with an option for renewal. Nine of these contracts cover 14% of the total concession area.

(3) **State Forest Permissions** (SFP) - licenses issued annually for areas of less than 8,000ha with the option for their renewal, but without exclusive rights to the resources. Approximately 480 of these contracts cover the remaining 45% of the total concession area.

1.2.4 In the past decade (1987-1996) the contribution of the forest industry to gross domestic product rose from 1% to almost 5% and it reached its highest ever contribution of 8% in 1999. Recent years have seen a dramatic annual increase in the average quantity of timber harvested, from 220,000m³ in 1993 to 520,000 m³ in 1997. Van der Hout (1999) estimated that the total estimated area of logged forest stands at approximately 2.2 million ha (see Figure 4)

Figure 1. Vegetation map of Guyana showing forest cover

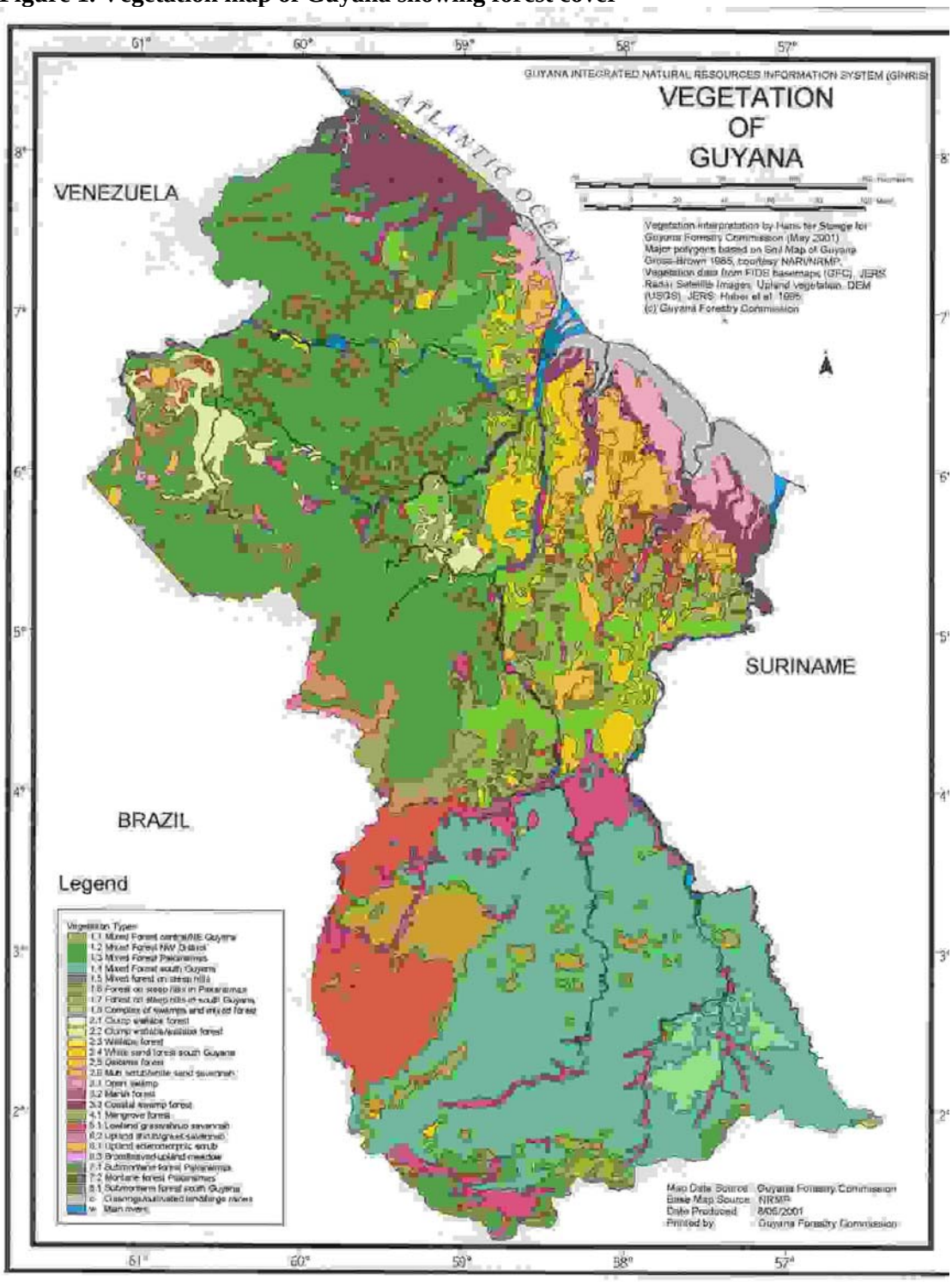


Figure 2. Map showing distribution of state forests by date

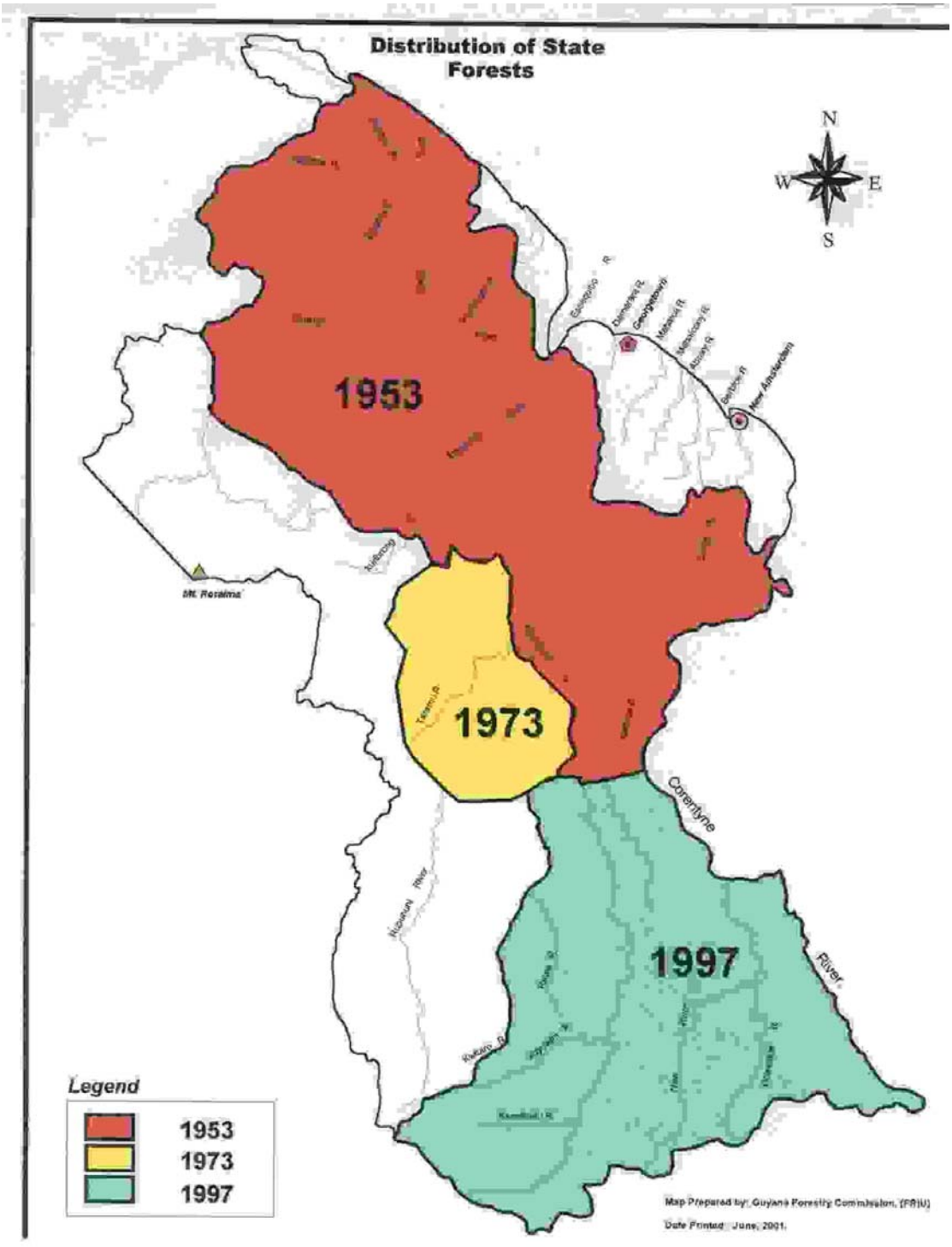


Figure 3. Allocation of State Forests into different concessions

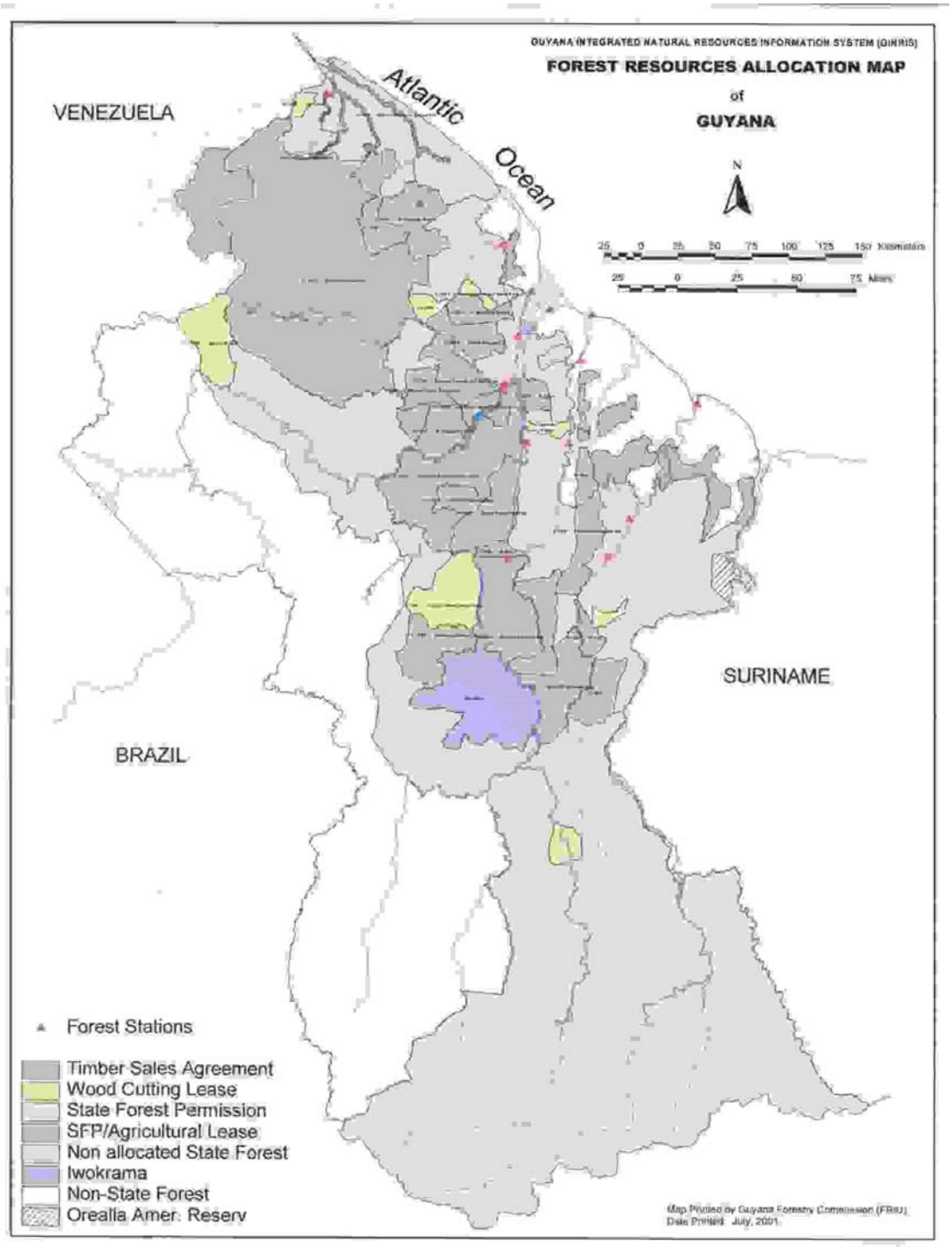
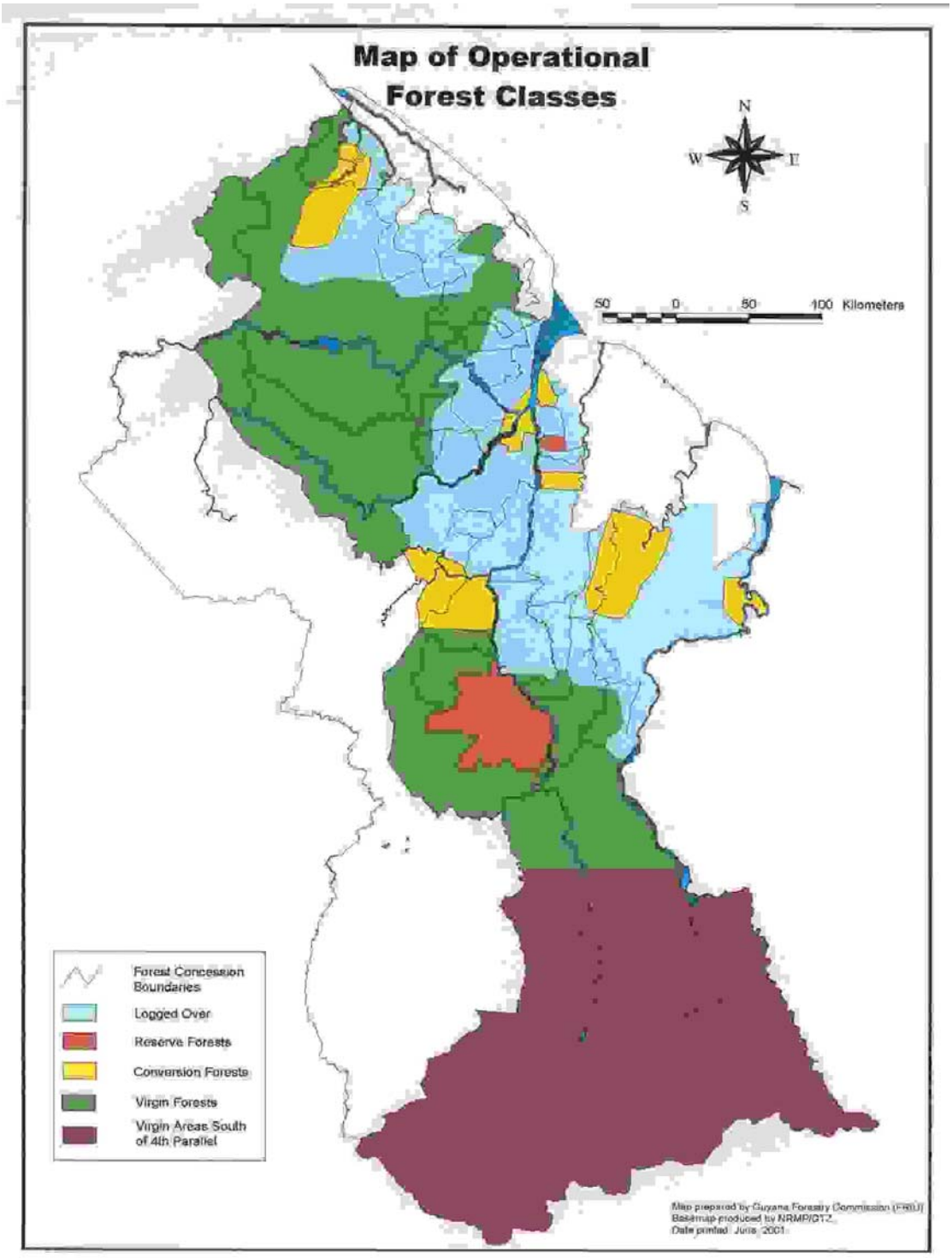


Figure 4. Map of operational forest classes



1.2.2
1.2.3
1.2.4

1.2.5 Until 1990, Harvesting of Greenheart made up almost 40% of the annual log extraction. With the arrival of foreign owned timber companies and the erection of the large Barama plywood mill in 1993 other species suitable for plywood became in demand and Baromalli (*Catostemma commune and Catostemma fragrans*) took over the leading position in annual log extraction (Van der Hout 1999). In 1999 there were 85 active sawmills of which 70% were recorded as in need of recapitalisation (GoG, 2000).

1.2.6 There is no national land use plan in Guyana, so while the GFC might issue timber allocations, other forms of land use (particularly mining - controlled by the Guyana Geology and Mines Commission - GMC) often take precedence over timber concession rights. Other major sectoral authorities include the Land and Surveys Commission (LSC), the Ministry of Tourism and Amerindian Affairs (MTAA), the Guyana Energy Authority (GEA) and the Environmental Protection Agency (EPA).

1.2.7 The population in 1998 was 863,000 with an annual growth rate of 2.3%. Most of the population lives along the northern coastal plane. Direct employment in the forest industry was estimated to be 19,000 in 1999 (GoG 2000).

1.3 Forest Policies, yield regulation and profitability.

1.3.1 The Guyana Forest Department was established in 1925 (GFC 1998). In 1953 a simple but effective Policy Statement was produced which limited harvesting to a minimum girth of 42 inches at breast height (35cm DBH). Since 1992, the expanding scale and intensity of timber extraction has meant that the renamed Guyana Forestry Commission is implementing more rigorous control over harvesting activities.

1.3.2 With this background, a new National Forest Policy was published (GoG 1997) which revised associated legislation. In section B of this policy dealing with Forest Management Strategies it is stated in Part 2b that “the utilisation of the permanent production forests shall be based on the inherent capability of the forests, and their sustainable use”.

1.3.3 Also in section B of the National Forest Policy, part 2h, there is the commitment that “the Guyana Forestry Commission in association with stakeholders shall develop a Code of Practice, containing the monitoring criteria and indicators to be utilised for forest management”. A draft “Code of Practice for Forest Operations” was first published in December 1994, revised in June 1996 and is now in its final draft (GFC 1998). Peter van der Hout (pvanderhout@solutions2000.net) will be commissioned to revise the code of practice in the light of current ongoing research at DTL, particularly the feasibility study for RIL. There is currently a Forest Act being considered by the Government of Guyana, which, if approved, will make the revised Code of Practice legally binding later this year.

1.3.4 The draft Code of Practice has a number of aims, but it is striking that “sustainable management” is not among them. The aims talk instead of promoting “acceptable forest harvesting practices” or “proper utilisation of Guyana’s forest resources” or “guidelines of good forest practices”. Nevertheless, the intention that harvesting is sustainable is clearly implicit in the document. In terms of yield regulation the Code of Practice addresses planning, pre-harvest inventory, silviculture and harvesting. There is no discrimination between different concession sizes, except for SFPs which are exempt from management planning and where quota systems alone operate.

1.3.5 In terms of planning the Code of Practice currently recommends a forest management plan, an annual plan and a tree-location map. Within the guidelines for the annual plan it is

recommended that there is a complete record of blocks inventoried, including stand tables and where available stock tables.

1.3.6 In terms of the pre-harvest inventory a 100% inventory over 35cm DBH is mandatory. Other than the production of a tree-location map and stand tables there are no prescriptions as to other potential uses of inventory data (e.g. calculations of future yield using yield regulation models). It should be noted that the required 100% inventory is a marked departure from current practice by logging companies. None currently practices 100% inventory, and two companies which did practice 100% enumeration (DTL and Barama) abandoned this on grounds of costs.

1.3.7 In terms of silviculture and harvesting there are mandatory requirements for planning and implementing a logging plan. These limit extraction to 1000trees per 100ha block (and to 300 Greenheart trees per 100ha block) and prohibit extraction of trees within 10m of another harvested tree. Harvesting on slopes steeper than 58% or within 10m of watercourses is prohibited. No more than 35% of the residual stand tree >35cm DBH may be severely damaged or destroyed by felling.

1.3.8 As it currently stands, the Code of Practice is not based on estimates of growth and yield, but it is the intention that recent post harvest national silvicultural surveys furnish figures which will be used to modify diameter limits and therefore bring allowable yield per unit area within appropriate boundaries. These new limits are already being agreed with companies such as DTL.

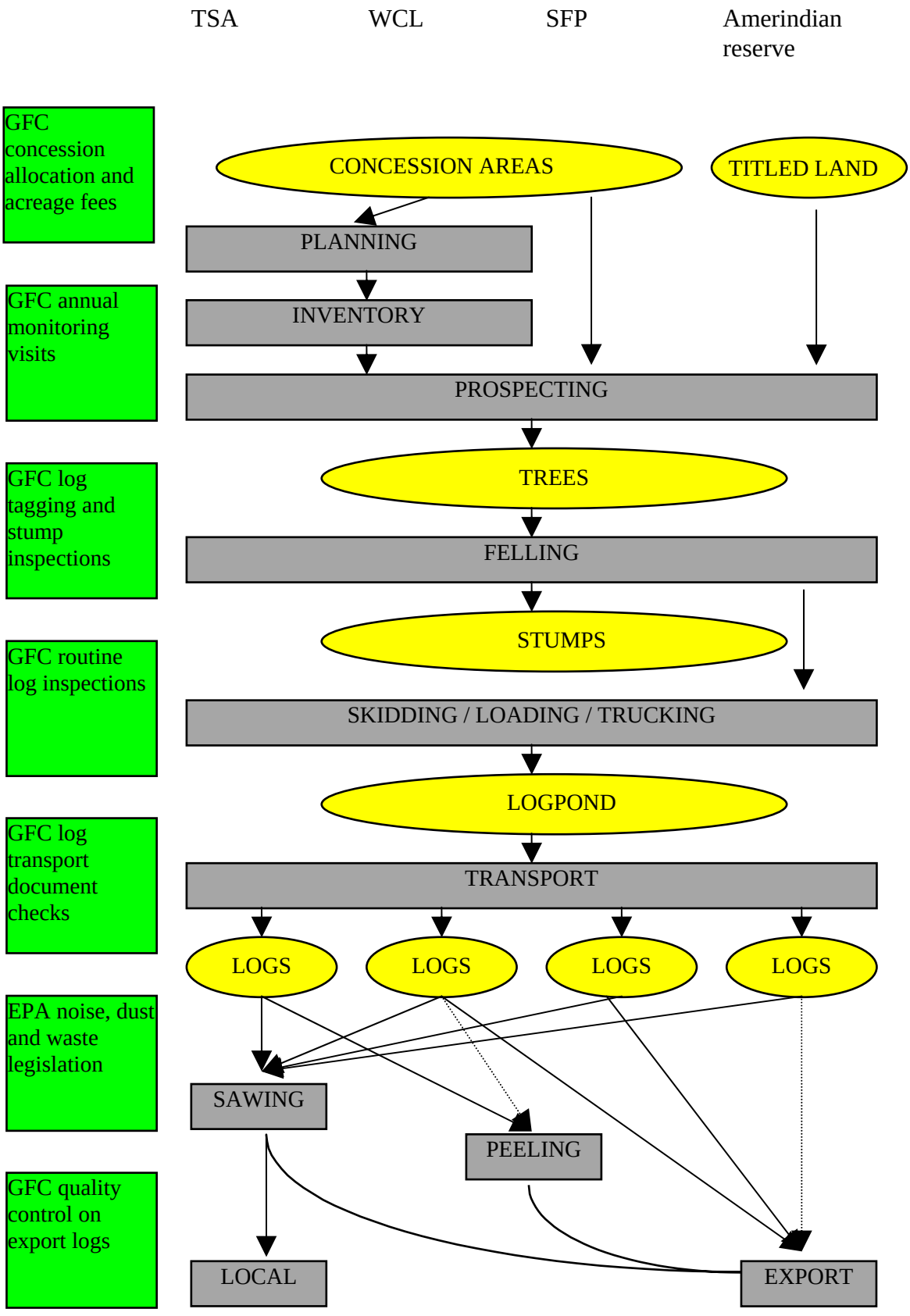
1.3.9 GFC interest in growth and yield modelling began in late 1999 early 2000. A study of 23 SFP concessionaires in the Sandhills / Makouria region concluded that “the survey results present(ed) a bleak picture – discussion with stakeholder groups is now required before management decisions are made. The GFC must now decide whether it can condone unsustainable forest management to safeguard local employment”.

1.3.10 Bird (2000a) drew attention to the implications of the sixty-year felling cycle (promoted on the basis of past Tropenbos research) and suggested alterations to the girth limits in order to bring harvesting on a species basis more in line with growth rates between harvests. In addition it was proposed that a post-harvest silvicultural survey be implemented to gather further information and that an independent consultancy on growth and yield be supported by DFID (N.B. this may be taken as a specific expression of demand for the work carried out by projects R7278 and R6915). Bird (2000b) developed the methodology for the silvicultural survey, using post-harvest methodologies because of the additional insights given to the residual stocking (after harvesting damage) and mortality patterns.

1.3.11 In 2000, three separate 100há post-harvest silvicultural surveys were carried out, two in DTL concession areas, and one in Interior Forest Industries concession. For two of these survey blocks there was evidence of over harvesting, in one case through repeated extractions from the same area. Any return to these concessions within the foreseeable concession future (i.e. within 25-50 years) would not yield significant timber harvests (GFC, 2000a, 2000c). In the other block, low original extraction levels meant that a similar yield could be expected in 25 years time (GFC, 2000b).

1.3.12 There are various regulatory stages which are used to control extraction of timber in Guyana. Figure 2 gives a brief summary of these:

Figure 2. Regulation phases for timber extraction in Guyana



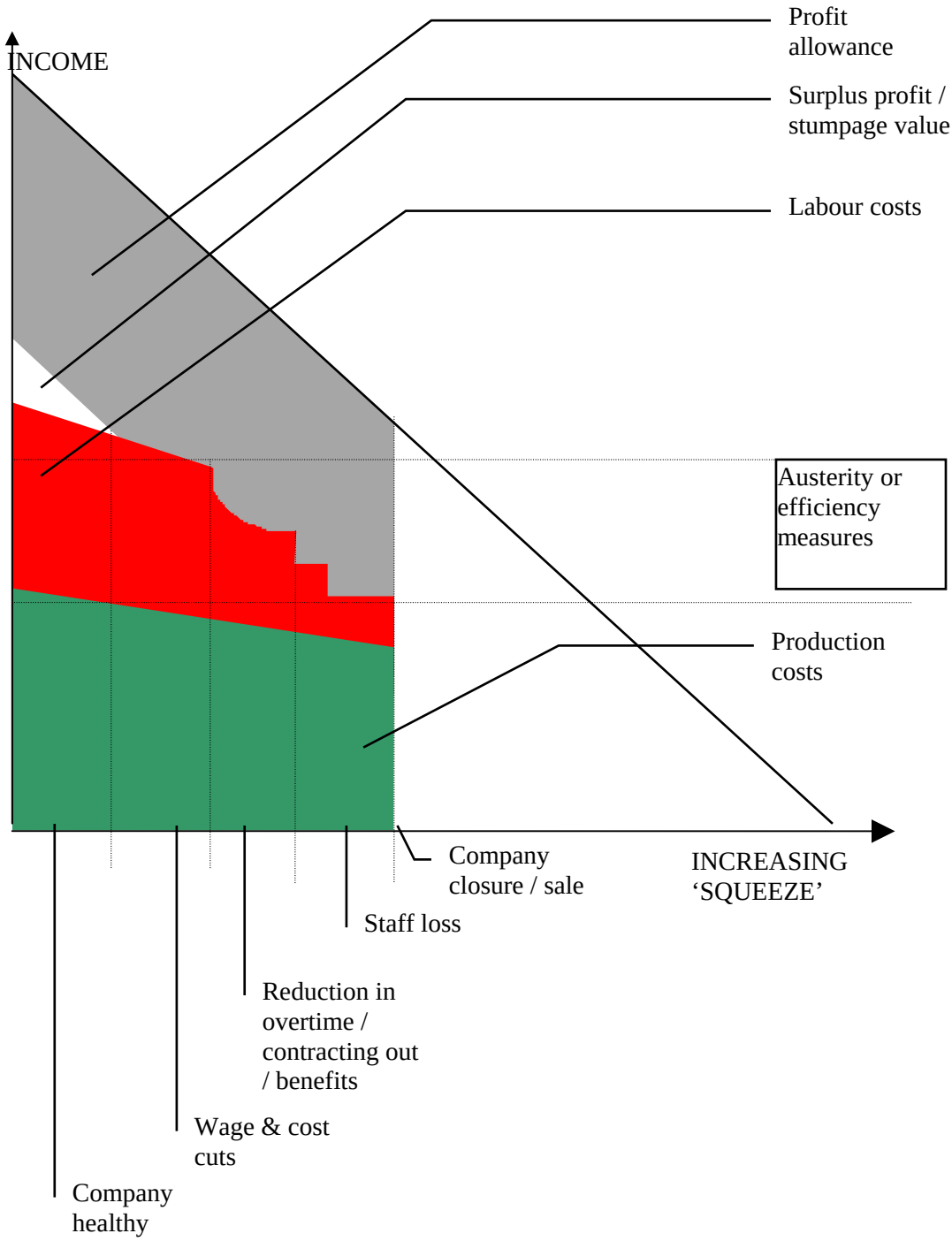
1.3.13 In 1997, Landell-Mills published a particularly useful study of the stumpage values in Guyana based on eight case study industries (Landell-Mills, 1997). The report demonstrated that stumpage value ranged from negative G$30,589 to positive G$1,194 with a median value of negative G$7,507 assuming a 30% profit allowance. Only 2/8 companies earned a 30% return. Sensitivity analyses showed that reducing the profitability allowance to 20% did not increase the number of companies operating profitably. Increasing prices or production by 50% only increased the number of companies earning a 30% return to 3/8.

1.3.14 Landell-Mills (1997) noted that companies may have been under-reporting sales, but it is unlikely that they were under-reporting by 50%. While the figures need to be further developed, it is clear that the economic viability of companies is extremely fragile. Recent down-turns in markets, coupled with increasing revenue collection (due to the log tagging system) will have further squeezed Guyanese companies. The Code of Practice will increase this pressure still further.

1.3.16 A hypothetical model of companies under pressure was developed, with several 'stages' which have associated indicators (see Figure 6). The hypothesis is that profitable companies demonstrate positive stumpage values. As companies are 'squeezed' the stumpage value will fall to zero and then move into negative figures. At some point, the decreasing capacity to maintain company profit allowances will trigger management austerity measures. These may at first be restricted to salary reductions and attempts to decrease production costs (cannibalising equipment, reducing maintenance etc).

1.3.17 When simple attempts to reduce production costs no longer suffice, companies may reduce staff benefits (overtime, moves to contract out workforce, reduced logging camp services etc.). At some point, the company will be forced to lay off staff, usually in a series of stepped phases, often starting with perceived superfluous jobs such as research or inventory teams. Finally, when no further job cuts or cost savings can be found, the company will be forced to close or sell.

Figure 6. Possible impacts of further harvesting restrictions leading to a 'squeeze' on companies in the Guyana forest sector



1.3.18 The hypothetical model above provides a series of indicators of company profitability which may be examined through surveys of company management and workforce. It is clear from Landell-Mills (1997) that the majority of Guyanese companies were already failing to display a positive stumpage value in 1997. The results presented below for each company suggest that most companies have also implemented austerity measures, and almost all have reduced staff benefits and shed large numbers of staff. It is reasonable to conclude that most companies are very close to the line of closure or sale. The inescapable conclusion is that further pressure from new legislation, increasing extraction distances

and declining markets will lead to company closure or sale. New policy options need to be developed to cope with this eventuality.

Recommendations:

1. It is recommended that donors continue to support a process of evidence-based policy dialogue between different stakeholder groups, using yield predictions as a policy platform from which to develop realistic options for the forest-dependent poor (i.e. do not ring bark the tree just before it is about to bear fruit).

2. It is recommended that yield predictions, and the socio-economic impacts of policy alternatives based upon them are discussed at a regional level (e.g. lesson learning between adjacent countries in the Guyana Shield and in neighbouring countries such as Brazil).

8. It is recommended that staff to trained in the use of SYMFOR and MYRLIN take responsibility for the logistics of the case studies under the overall coordination of Julian Evans.

9. It is recommended that a working group on growth and yield be established (which includes representatives of key stakeholder groups identified in this report), which will encompass the case studies outlined above, analysis of results from the national silvicultural survey, and discussions pertaining to policy options implied by the above.

10. It is recommended that further economic analyses are performed to study the economic viability of sustainable management (using required rates of return, not the existence or absence of profit, as the baseline measure of viability).

11. It is recommended, in the light of findings from the above, that GFC develop a programme of incentives which links improved practice (perhaps independently verified through certification) to appropriate financial support, bridging the gap between economic returns from current practice and the additional costs of sustainable management.

13. It is recommended that policy options be studied which legitimise non-sustainable use of the forest in the short term and devise strategies to cope with the implications of non-sustainability in the long term.

2. Identification and documentation of key stakeholders concerned with the yield of timber and non-timber forest products.

2.1 GFC stakeholder analysis

2.1.1 An interactive session was held with 12 members of GFC staff including both senior and junior staff using the method of Mayers (2001). Growth and yield modelling was introduced as a tool which could assess the impact of current timber harvesting and calculate the allowable yield.

2.1.2 A brainstorming session was held to identify the major stakeholder groups which directly or indirectly influenced how much timber was harvested from a typical medium sized concession. These stakeholder groups were ranked in order of numerical size (i.e. the rough number of individuals within the group). Each group was assigned a circle of coloured card proportional in size to the numerical ranking. The main conclusion was that if yield regulation was to result in sustainable yields, many different stakeholders would need to be engaged.

2.1.3 A group discussion was held to rank each stakeholder group in terms of the current power which that group had in influencing what quantities of timber were extracted from the forest. For each group there was a brief discussion about what type of power that group possessed. The main conclusion was that certain groups were clearly more influential than other and that the nature of that influence varied - requiring a different type of engagement for each group.

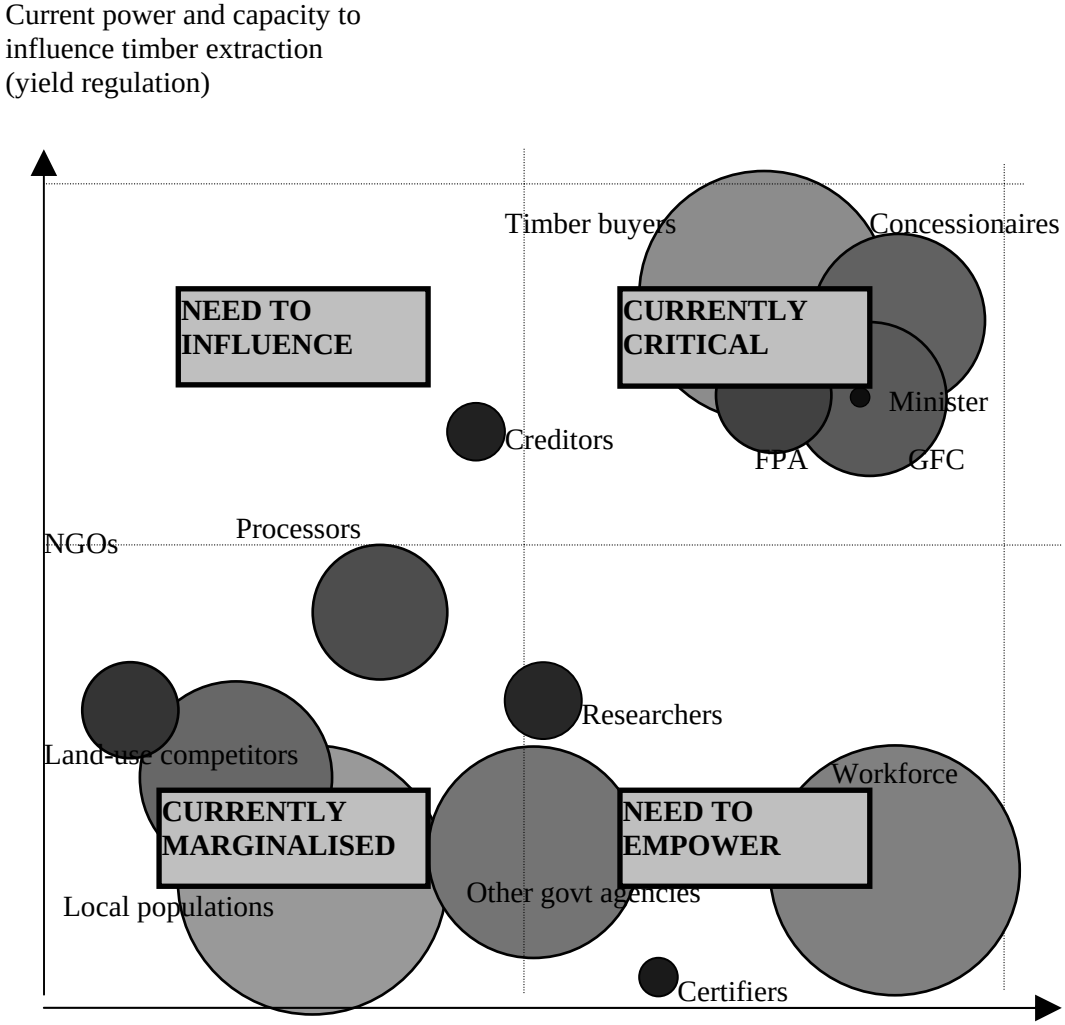
2.1.4 A second group discussion was held to rank each stakeholder group in terms of the future potential that that group had to contribute to good forestry (sustainable yields and livelihoods). Comments were made about the process through which that potential might be realised. The main conclusion was that multiple strategies would be needed to move each stakeholder group towards their maximum potential contribution to good forestry.

Table 1 - Stakeholder influence on extraction - GFC perspective

Stakeholder group	Numerical size rank	Current power to influence what is harvested	Future potential to influence good forestry
Minister	1	12 - positional	10 - advocacy
Certifiers	2	1 - purchasing	9 - markets / monitoring
Creditors	3	9 - conditionality	6 - green funds
Researchers	4	6 - information	8 - influencing legislation
NGOs environmental activists	5	6 - advocacy	2 - advocacy
FPA	6	10 - advocacy	11 - advocacy
Sawmilling / processing competitors	7	6 - purchasing	5- conditionality
GFC	8	12 - legal / control	10 - regulation
Concessionaires	9	11 - operational	13 - management efficiency
Land use competitors	10	5 - potentially destructive	3 - sustainable alternatives
Other Govt agencies	11	4 - legal / land use	7 - land use planning
Contract workforce	12	2 - operational	13 - training
Timber buyers	13	12 - purchasing	10 - purchasing influence
Local populations	14	3 - competition	4 - monitoring / advocacy

2.1.5 A graph was prepared by sticking the coloured circles representing stakeholder groups onto a large piece of paper using co-ordinates defined by their ranking for current power and future potential. A discussion was held regarding the necessity to move all stakeholder groups towards the top right of this graph and the significance of each groups position. For different types of stakeholder groups there are different strategies which are needed to foster improvement. Put simply these can be summarised as the need to influence the powerful or empower those with potential. Most often, there is need for some degree of both strategies for each stakeholder group.

Figure 7. Stakeholder influence on extraction - GFC perspective



2.1.6 A final wrap up session was held to discuss what growth and yield modelling could contribute to the process of influence and empowerment that would be needed to ensure that all stakeholder groups contributed towards good forest management. The main conclusion was that accurate information on growth and yield was a prerequisite both for influencing powerful stakeholder groups and for empowering weak groups with a high potential to contribute to good forest management. But, accurate information was itself not sufficient. Many other processes were also needed (e.g. education and training).

Table 2. Processes that empower or influence

What processes influence?	What processes empower?
Accurate available information Advocacy Public opinion Regular independent monitoring Improved legislative control	Accurate available information Education and training Consensus and association Legitimate representation Stable legislative support

2.1.7 The participants were invited to consider how growth and yield modelling could achieve these aims of influencing and empowering stakeholder groups towards good forest management. The key point made was that accurate available information is the foundation for influencing and empowering stakeholder groups. Without accurate information about growth and yield it is difficult to predict accurately the impact of different types of forest harvesting on the future potential of the forest. Without accurate information on growth and yield it is impossible to calculate and legislate for the allowable yield. In order to foster good forest management, GFC needs to adopt a proactive programme of publicising information which accurately displays the impacts of timber harvesting on the future potential of the forest.

2.1.8 On the basis of these conclusions, a key recommendation was made in the form of a briefing note to all GFC staff, i.e. that a multi-stakeholder working group is established on yield regulation just prior to the two planned case studies (one industrial and one community) so as to foster dialogue between relevant agencies. Such a group might have the following aims:

- Publicise the results regarding the allowable yield and the consequences of current harvesting practices on the future timber yields from the forest.
- Engage currently marginalised groups
- Provide a platform for advocacy and influencing public opinion
- Develop consensus and an association to foster appropriate yield regulation
- Provide a basis for stable and workable legislation

2.2. Forest Products Association stakeholder analysis and discussion of growth and yield

2.2.1 The Forest Products Association (FPA) was established in 1944 as a non-governmental trade organisation. It aims to promote common interest in the Guyanese forest sector, collect and circulate information, promote and support / oppose legislation, protect members rights, act as a representative body, promote training, marketing and finance opportunities and negotiate funding (FPA, 2001). The FPA currently has 62 members which together claim to account for 90% of the production in the formal (legal) forest sector. The smaller scale enterprises are under-represented within the FPA.

2.2.2 A further interactive session was held with FPA members also using the method of Mayers (2001). Growth and yield modelling was introduced as a tool which could assess the impact of current timber harvesting on future yield and therefore help to plan better forest operations.

2.2.3 An initial discussion was held to identify the constraints to sustainable and profitable forest management for the Guyanese commercial timber sector. The main issues are summarised in Table 1. An important conclusion was that the economic situation for the Guyana timber industry is deteriorating due to escalating costs and falling timber prices and sales. Adoption of any additional management burdens would be resisted unless accompanied by improved economic prospects.

Table 3. Major constraints to profitable and sustainable forest management in Guyana

Major constraint	Detail
1. High inflation	Fuel accounts for 30-35% of operational costs and recent fuel prices increases (30% tax), coupled with high interest rates covering loans for equipment etc. is putting the industry under pressure.
2. Falling markets	The remote location of Guyana (and high shipping costs) coupled with demands for certification mean that Guyana is losing market share.
3. Falling prices	Due to the global recession, the past S.E. Asian crisis and perceived product substitution for key timber species the price of timber has fallen in recent years
4. Instability	Recent political instability has disrupted shipping and resulted in loss of markets
5. Low forest quality	The large number of timber species in Guyana, low densities of valuable species and relatively slow growth rates raise extraction prices in comparison, say, with South East Asia.
6. Poor access	The lack of infrastructure development in Guyana (esp. Roads) raises extraction costs in comparison with competitors in Asia and Brazil.
7. Staff capacity	The lack of investment capital and fear of losing trained personnel mean that there are insufficient trained staff (particularly for the preparation and implementation of management plans)
8. Outdated equipment	High inflation rates and insufficient saving plans mean that plans to retool are often sidelined in the face of more pressing concerns. Poor processing efficiency increases the unit cost of production.
9. Environmental legislation	New EPA regulations regarding waste, water, air and noise pollution may raise costs for timber production.

2.2.4 A brainstorming session was held to identify the major stakeholder groups which directly or indirectly influenced how much timber was harvested (and in what way) from a typical TSA or WCL concession. These stakeholder groups were ranked in order of numerical size, then in terms of the current power which that group had in influencing what quantities of timber and styles of management were used. Finally, the groups were ranked in terms of the future potential that that group had to contribute to good forestry (sustainable yields and livelihoods).

2.2.5 A graph was prepared using the methodology described in 2.1.4 and 2.1.5 followed by a discussion session regarding what growth and yield modelling could contribute to the process of influence and empowerment that would be needed to ensure that all stakeholder groups contributed towards good forest management

Table 4. Stakeholder influence on extraction - FPA perspective

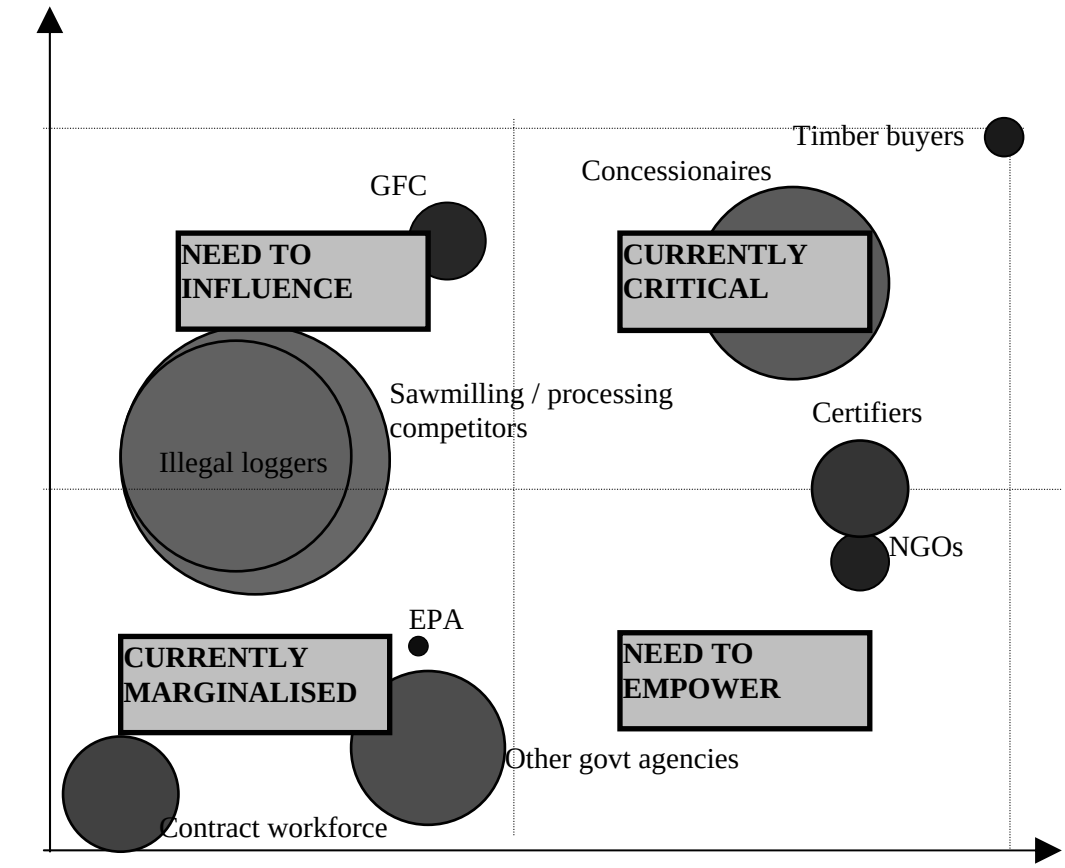
Stakeholder group	Numerical size rank	Current power to influence what is harvested	Future potential to influence good forestry
Environmental Protection agency	1	3 - monitoring	4 - legislation
Timber Buyers	2	10 - purchasing	10 - incentives / price
NGO environmental activists	3	4 - market pressure	8 - lobbying
GFC	4	8 - monitoring	4 - legislation
Certifiers	5	5 - market pressure	8 - incentives
Contract workers	6	1 - producing	1 - co-operation
Other government agencies (GGMC, Min. Agric.)	7	2 - land use control	4- - legislation
Concessionaires	8	8 - operational	7 - implementation
Illegal loggers	9	6 - feeding market	2- legalised activities
Sawmiller / processing competitors	10	6 - market prices	2 - improved organisation

2.2.6 The FPA discussed how a shared transparent set of data on growth and yield was fundamental to negotiations concerning optimal practice and legislation which reflects both the current and future needs of the industry. In order to promote a vibrant, profitable and sustainable forest industry, it was recommended that the FPA needed to engage with teams who are developing models of forest growth and yield for Guyana and ensure that the findings best serve individual companies and the timber sector in Guyana as a whole.

2.2.7 Given the FPA ranking of timber buyers as the most powerful stakeholder group with the most potential to promote a vibrant, profitable and sustainable industry, it will be important to make information from case studies available to that group. Such information should demonstrate how purchasing orders, species composition, prices, timing and conditions affect management in the field. It was recommended that briefing materials be made available to timber buyers regarding modifications to purchasing which would improve the short and long term interests of the industry.

2.2.8 The FPA identified two key groups with significant potential to assist the timber industry, but with little current power to achieve this. The key groups included the "Certifiers" about which there is currently a productive multi-sectoral working group in place and the "NGO environmental activists". It will be important to inform such groups of the results of case studies in growth and yield modelling so that standards appropriate to Guyana are set and 'campaigning' is limited to issues of fact.

Figure 8. Stakeholder influence on extraction -FPA perspective



2.2.9 It was interesting to note that a similar exercise with the GFC highlighted their perception of the FPA as a key stakeholder group. The FPA, on the other hand, recognised the influence of the GFC, but in comparison with the GFC's perception felt that its potential to assist the industry towards good forest management was less important than other stakeholders. There was particular concern that the GFC, EPA and other government agencies such as the Ministry of Agriculture and the GGMC should work together to provide a coherent and stable policy and land use environment in the interests of the industry. It will be necessary for the FPA to emphasise inter-sectoral coherence in policy and land use planning to the various government agencies.

2.2.10 Despite important similarities in perception, the GFC and FPA analyses differed in some other important respects in the ranking given to different stakeholder groups. For example, the FPA gave significantly more weight than the GFC to the power / influence of illegal loggers and small timber processing industries. If the negative effects of illegal logging / small-scale operators are insufficiently perceived by the GFC, it may be necessary to develop a dialogue between GFC and the FPA about how to resolve the problems caused by illegal logging.

2.2.11 Another important difference between the GFC and FPA analyses was that the GFC sees much more potential than the FPA for the contract workforce to significantly contribute to a more viable forest industry. If the potential of the contract workforce within the FPA is insufficiently perceived, it may be necessary to encourage a dialogue between both parties to assess this potential to improve efficiency and sustainability (through dialogue, training, incentives such as improved work conditions etc.)

Recommendations:

15. It is recommended, in the light of unanimous agreement across the sector of the importance of marketing and current marketing deficiencies, that the GFC reconstitute the previously abandoned marketing wing of its operations in order to improve prospects for a wider number of commercial timber species.

16. It is recommended that GFC conduct market chain analysis for timber products and implement structures to ensure more equitable distribution of benefits, particularly to producers in situations where low value works against SFM.

17. It is recommended that the GFC prepare and distribute information which clearly outlines to buyers the growth and yield of different species and the implications of timber purchase orders for economically viable SFM (e.g. higher species numbers, increased regularity, broader distribution across different producers etc.).

23. It is recommended that the FPA collate evidence on requirements for economic viability and the growth and yield of available forest resources in order to develop a position on future policy options for the industry.

3. Document the relationships and potential problems between stakeholder groups

(B) MULTINATIONAL COMPANIES WITH LARGE TSA CONCESSIONS AND SAWMILLS (examples include Barama and Demerara Timbers Ltd).

3.1 Barama

3.1.1 Barama is by some measure the largest forest operation in Guyana, starting its current extraction operations in 1991. The company operates a TSA concession encompassing 4,126,600 acres. The size of the company and its links to other Guyanese timber producers (both in terms of timber acquisition agreements and competition for markets) make it a very significant player in the Guyanese timber sector - a fact which should not be underestimated.

3.1.2 Barama's extraction activities have traditionally been focused in the north west of the concession around the village of Port Kaituma, but increasingly long extraction distance mean that it has become more cost efficient to shift some extraction teams to the eastern portion of the concession near the Essequibo and the concession of Guyana Sawmills Ltd. The company complains of poor markets since 1995 which have affected operations from the increasingly remote extraction sites at Port Kaituma (current open blocks are some 110-150km from the log pond).

3.1.3 Barama employs in the region of 1000 people across all operations. In 2000, there were 208 employees at the Port Kaituma site (14 of whom were women), but this has fallen from previous years in part due to the downsizing of the operation in favour of other areas, and in part due to attempts to increase company efficiency due to a downturn in markets. Since 1995 the company has slowly retrenched in Port Kaituma. This has been reflected in cost reductions including the transfer of responsibility of some of Barama's original commitments to community upkeep. In a participatory session with women married to Barama workers it was noted that upkeep of the community hospital and water systems was transferred to government authorities in 1999. The community electricity supply was withdrawn in early 2001. The company sawmill which supplied much of the local building material to the community was also closed more than a year ago. Some 262 community members had campaigned in August 2000 for improved community road surfacing, but their petition went unanswered.

3.1.4 In addition, the downturn in the international timber market has induced staff losses, cuts in pay (in 1996-97), and the introduction in 2000 of a contracting system where payment to extraction teams is made on an undisclosed payment by volume basis. The new system has undoubtedly increased efficiency. Interviews with extraction staff indicated that some were in favour of the new system (allowing them more earning potential). Other complain because the system allows no payments to be made when machines were under repair, or if a staff member became ill. Even the central pool of support staff who are on wage pay only receive two days pay at 70% for illness before NIS takes over payments at 30% of the daily salary (and many months before payments are received).

3.1.5 These difficult working conditions perhaps explain the high staff turnover at Port Kaituma as indicated in the 2000 figure for departures or dismissals (90), transfers (53) and recruitment (83). Such high turnover (almost 100% in the research team for example) might significantly undermine attempts to move towards planning and implementation of sustainable management based on growth and yield projections.

3.1.6 Until early in 2001, Barama was purchasing timber from a number of other concessionaires (including the CORTIM group on the Corentyne river, Willems Timber and Trading Co Ltd., A. Mazarally and Sons, Toolsie Persaud Ltd and Guyana Sawmills Ltd). The cessation of such purchases is in part a function of the increasing volumes of timber being extracted from Barama's own concession (and through new deals described in the next paragraph) but in part also due to the slow global market for plywood at present. The decision not to purchase logs from other concessionaires has had a major impact on the financial viability of these other companies.

3.1.7 The company has recently entered into a deal with Guyana Sawmills Ltd and is negotiating a similar deal with A. Mazarally and Sons. The aim of these deals is to allow access for Barama to the southern and eastern portions of its concession, while also allowing extraction from the partners own concessions at negotiated rates. In return, Barama builds a road which the partner companies can use and extracts timbers required for the partners sawmills, again at negotiated rates.

3.1.8 Production from the Port Kaituma extraction area alone is in the region of 4,800,000 to 5,100,000 cubic feet per year. Production is slowly being downsized at Port Kaituma and the expected volume of timber harvested in 2001 (4,860,000 cubic feet from 37,000 hectares) is down from 2000 (5,154,650 cubic feet from 33,500 hectares).

3.1.9 The main species harvested by Barama is Baromalli (*Catostemma spp.*) which makes up 68.3% of the harvest, solely (and uniquely) used for plywood manufacture. In addition the company harvests a variety of hardwoods for lumber production which include Mora (*Mora excelsa*) and Haiariballi (*Alexa spp.*) in undisclosed amounts. The main disclosed species and quantities include 4.1% Purpleheart (*Peltogyne spp.*), 4.1% Crabwood (*Carapa guianensis*), 5.2% Maho (*Sterculia spp.*) 2.1% Kabukalli (*Goupia glabra*), 1.3% Simarupa (*Simaruba amara*) and 0.6% Locust (*Hymenaea coubaril*).

3.1.10 While there is no competition on the market for Baromalli made into plywood, the companies harvesting of other hardwoods for lumber has a major impact on the local market for these species. Barama is able to sell 1,080,000 cubic feet of these hardwoods per year at G$ 45 per board foot, which substantially undercuts all but the smallest chainsaw logging companies. For example competitors from SFPs can sell at G$ 45-65 per board foot and medium sized companies such as Willem timber find it unprofitable to sell below G$ 55 per board foot.

3.1.11 Harvesting activities are carried out in 1km x 1km (100 Hectare) blocks. They are almost always preceded by some form of inventory and enumeration of blocks. Management level inventory involves between 10% and 50% of blocks enumerated at an intensity of 2.5% - e.g. between 0.25 and 1.25% sampling overall - see Nicol, 1999. This is accompanied by some use of aerial reconnaissance, but as yet, no use of vegetation maps.

3.1.12 The preharvest option of 100% enumeration with the production of stock maps was abandoned in 2000 due to high costs of enumerating low density species, where many of the individuals were below the specified diameter requirements for the company (55cm dbh for Baromalli and 60cm dbh for hardwood species). Another critical issue is the wide

variability between stocking of desired species in the blocks. For example in one block only 2 commercial trees were found (as opposed to the normal average of 170-200). This makes 100% inventory commercially unattractive.

3.1.13 Instead, 10% enumeration is carried out in all blocks to be logged (two 25 strips along the edge of the blocks and a 50m strip along the middle of the block). This gives an indication of expected stocking but cannot be used to produce stock maps or improve efficiency in tree location and planning of skid trails. Some post harvest monitoring is conducted by the research team based on the new requirements in he code of practice (e.g. numbers of tree per block less than 1000, 10m distances between felled trees, evidence of directional felling etc.) This is particularly important because the current incentives for extraction teams work against the maintenance of these guidelines.

3.1.14 The preharvest inventory work is carried out by the survey division which comprises 21 staff employed in blocking, inventory and road alignment. In 2000 a total of 220km of road was laid down (44km main road 12m wide, 38km secondary roads 10m wide and 138km of feeder roads 8m wide). In 2001 it was anticipated that a further 88km of road would be completed (30km of main road and 58km of feeder roads)

3.1.15 There are currently four extraction teams operating in the Port Kaituma area. Each includes 7 members: two chainsaw operators, one chain saw assistant, one skidder operator, one bulldozer operator, one bulldozer assistant and a cook. Each team is housed in a mobile skidded dormitory which can be pulled to new locations. The company provides water (brought by tanker) and pays each team member a food allowance which the cook uses to order and prepare food. The skidding equipment includes three Caterpillar 528 units bought in the last five years and an older Valmet F68. Four other Valmet F68 skidders have recently been transferred to the area bordering the Guyana Sawmills concession.

3.1.16 Since 2000, extraction teams have been contracted on a 6 month or annual basis with rights of immediate termination. Workers are paid on a per volume basis. Workers estimated that extraction of 20 logs per day was sufficient to cover their costs, and the average daily extraction was nearer to 30 logs (the record being 80!). One of the extraction teams is entirely managed by an outside contractor who has responsibility for the payment of NIS contributions. Problems had been reported with payments taking up to 2-3 months after work had been completed. Workers tend to work for 3-4 weeks before spending 2 days back at homes in Port Kaituma.

3.1.17 Clearly, speed is of the essence for such teams, and blocks with low stocking, machine downtime or illness pose serious threats to income. Observed primary skid trails had been cleared by bulldozer, this also being the case for some secondary skid trails (although extraction teams stated that this depended greatly on the terrain and that some skid trails were formed by the skidder itself). The bulldozer was also used to position logs ready for skidder extraction which caused a degree of disturbance in the forest. There was little evidence of winching logs to the primary skid trails, but the observed sample was small. Directional felling techniques were being used, and the logging operations were generally felt to fall within the acceptable limits set out by the GFC (whose monitoring team was present at the time of inspection).

3.1.18 Worker conditions were generally felt to be adequate with the important exception of health care. Safety equipment was provided by the company (albeit with some significant delays arising from the Georgetown end of operations). The workforce had a token union, with payments deducted from the salaries of the 90+ waged workers, although this

excluded the contracted workers. There had been no major confrontation between the company and the union.

3.1.19 Training had been provided from time to time by the GFC. No other company training was provided except for 'training-on-the-job'. Schooling was not provided by the company for children of contract workers..

3.1.20 An interactive session with local management revealed a range of stakeholders who have some impact on timber harvesting activities:

Table 5. Stakeholder influence on extraction - Barama Management Perspective

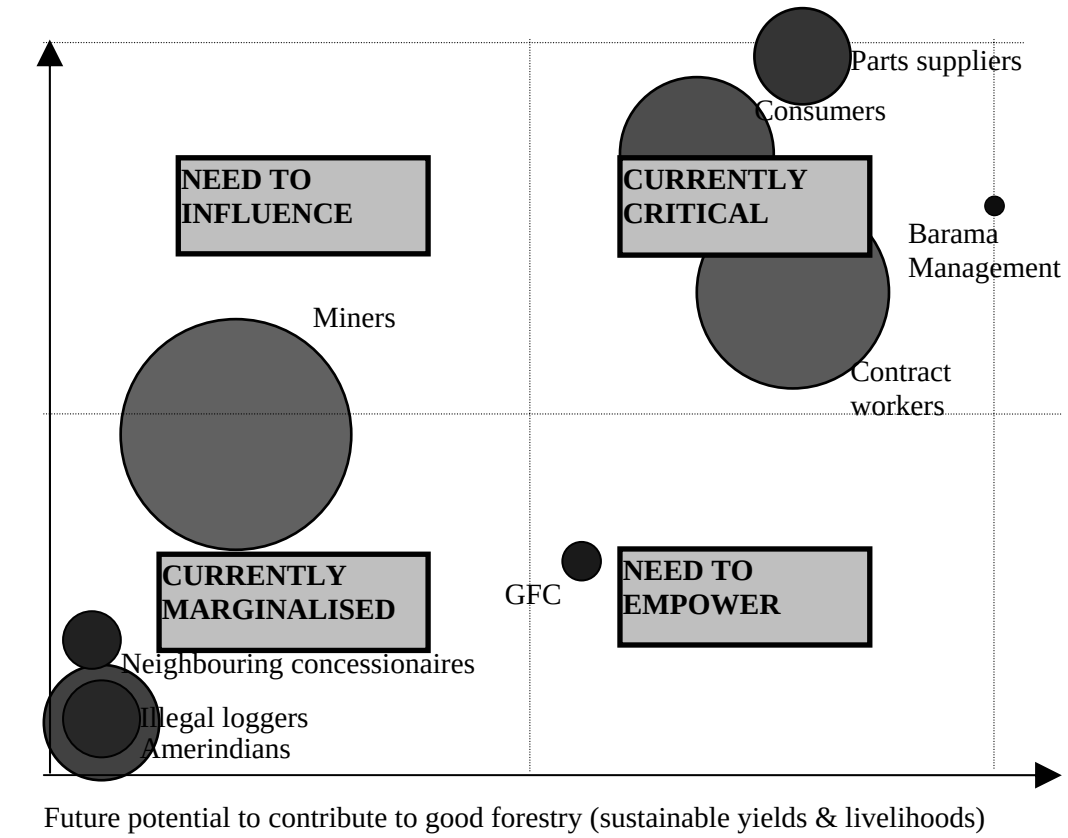
Stakeholder group	Numerical size rank	Current power to influence what is harvested	Future potential to influence good forestry
Barama management	1	7	9
GFC	2	3	5
Neighbouring concessionaires	3	2	1
Illegal loggers	4	1	1
Parts suppliers	5	9	7
Amerindians	6	1	1
Consumers	7	8	6
Contract workers	8	6	7
Miners	9	5	2

3.1.17 This management view of stakeholders is interesting primarily for the degree to which other stakeholder groups are not considered to have any major significance on timber harvesting activities. In contrast with some of the analyses which follow, Barama appears highly self sufficient. Difficulties with parts supply seems to be the most important constraint.

3.1.18 There was also some degree of interaction with gold miners (some 287 located in one area of the Port Kaituma region at the last count). The main concern was of increasing road traffic (more than 50 private vehicles) degrading roads and holding up log trucks. In some instances there had been complaints that miners entered areas made newly accessible by Barama's roads before logging had taken place. This rendered the blocks inoperable. Good mining sites were currently yielding 400 onze per month (at G$ 40,000 per onze). Making comparisons with a minimum forestry worker salary of G$ 15,400, it is perhaps easier to explain the high staff turnover at Barama.

3.1.19 The interaction with markets and consumers was more stable for Barama than for other Guyanese timber companies. This stability is largely a function of the primary interest in Baromalli for plywood, a species which comprises 68.3% of the current volume extracted from the forest. Management did state, however that finding markets for some of the lesser known species such as Mamariballi would improve the profitability of extraction in each block, especially as transport distances increase.

Figure 9. Stakeholder influence on extraction - Barama Management perspective



3.1.20 Barama has reconstituted a research team of 5 people following the dismissal of the team (and of ECTF) for cost reasons in 2000. The team is responsible for measurement of 54 Permanent Sample Plots (PSPs) and 24 experimental plots with three scales of harvesting (10%, 30% and 50%). The team was also carrying out some work on seedling dispersal for key species using strips orientated at the compass points from parent trees.

3.1.21 The large scale of Barama's operation means that it can afford to retain staff with the technical skills necessary to gather data relevant to growth and yield modelling. Permanent Sample Plots (PSPs) provide a good platform for the model SYMFOR. The company has some 100% inventory data and records of harvesting by block. The history of data acquisition by company staff has also developed interpretive capacity and provides a strong incentive to employ models to make use of the data that has been gathered.

3.1.22 Of all the companies within the Guyanese timber industry, Barama has perhaps the highest incentive to adopt growth and yield models. It operates at a scale which insulates them from some of the more sporadic changes in markets. The large concession area allows considerable volumes of timber to be harvested using existing blocking systems with a 25-30year cycle. It is conceivable that the "allowable" harvest per unit area might not be very different from current practice and might furnish profits which are acceptable to investors and the workforce alike. More likely, it is probable that there would need to be some reorganisation of, and capacity building within, the workforce. There is some interest in certification, which would be assisted by information of the type these models would

supply. Assuming the “allowable” harvest not to be acceptable to investors or the work force, there is still enough interest in calculations relating to likely future harvest volumes to make the adoption of growth and yield models likely.

3.1.23 Should model simulations show an acceptable “allowable” harvest, it is likely that major changes would be required to the current workforces. New skilled staff would have to be recruited. Unskilled labour might be lost. Retained staff might have to take on more work for no extra pay. More onerous harvesting requirements would penalize labour contracted on a pay-per-unit-volume basis (i.e. the poorest workers). Reduced profitability might result in the reduction of benefits for staff or the loss of staff. Lost or reduced incomes would impact on a family’s locational stability, housing (often provided by the company), nutrition, education and health. It is unlikely that long term employment benefits would accrue to existing workers since staff turnover in remote concession location is on average sufficiently high

3.1.24 The ultimate aim of growth and yield models is to guide sustainable planning and management. The likely environmental impacts of the adoption of growth and yield models is likely to be positive (assuming that the companies use the results to implement sustainable management regimes).

Recommendation:

3. It is recommended that a growth and yield modelling case study initially be developed with Barama (using SYMFOR) as an example a large scale company with perhaps the greatest potential to use and interpret the results from growth and yield models.

12. In the light of findings that the poorest employees within the forest industry bear the brunt of any “squeeze” through declining markets or new regulations, it is recommended that the GFC define standards and incentives to alleviate the negative livelihood impacts which result for marginalised workers and include such standards within a Guyanese approach to certification.

3.2 Demerara Timbers Ltd (DTL)

3.2.1 Demerara Timbers Ltd (DTL) traces its origins to the establishment in 1984 of a state owned company called Demerara Woods Ltd. In 1991, as a result of financial troubles, the company was sold to Lord Beaverbrook and Associates to be managed by the United Dutch Group. At that time, two company concessions (totalling 598,000 and 695,000 acres respectively) were renewed for 25 years. Sections of the concession which had been previously worked were reworked at this time. Further financial difficulties resulted in the sale of the company to the Prime Group of Singapore in 1995 and an Australian / Dutch management team attempted to turn the company around. In 1997, this management team was replaced by a Malaysian management team which is in place to this day. In August 2001, the company was put up for sale.

3.2.2 The company primarily produces Greenheart (*Chorocarium rodiei*) which comprises some 55% of the commercial volumes extracted. The majority of this timber is sold to a single British buyer, Aitkin and Howard. In addition, the company sells a range of hardwood species, primarily to the Caribbean market. Chief among these species are Purpleheart (*Peltogyne spp.*- 16%), Locust (*Hymenaea courbaril* - 5%), Limonaballi (*Achrouteria pomifera* - 3%), Kabukalli (*Goupia glabra* - 2%) and 11% other hardwood species. The company had also been selling peeler logs to Barama of Baromalli

(*Catostemma spp*. - 8%) but this stopped early in 2001. It is clear, that the financial profitability of the operation hinges primarily on Greenheart markets.

3.2.3 In 2000, the company extracted approximately 2,370,000 cubic feet of timber from a total area of 69,774 acres. In 2001 the intention was to extract approximately 2,160,000 cubic feet of timber from 31,242 acres. According to the company's 1997 five year management plan the available productive forest area in one of the two concessions was 136,944 acres. It is evident that not much productive area will remain unexploited by 2016 when the concession is up for renewal.

3.2.4 In 1995, at the time of the change in ownership team, the company employed approximately 500 staff with almost 100 employed in surveying, cartography, inventory, database management, post harvest inventory inspections etc. Following the 1997 change in management team, a significant cost-cutting exercise was performed resulting in staff losses and a more production-orientated approach. By 2000 only 386 employees remained (including 50 women). Three wage-worker extraction teams had been expanded and contracted out to 8 contractors (one with two extraction teams). Enumeration had initially been contracted out, but following serious errors in data, all enumeration had stopped. Most of the staff losses had been in the technical areas to do with inventory, research and post-harvest surveying. By 2001, further staff lay-offs had reduced the total employment to 326 (including 46 women).

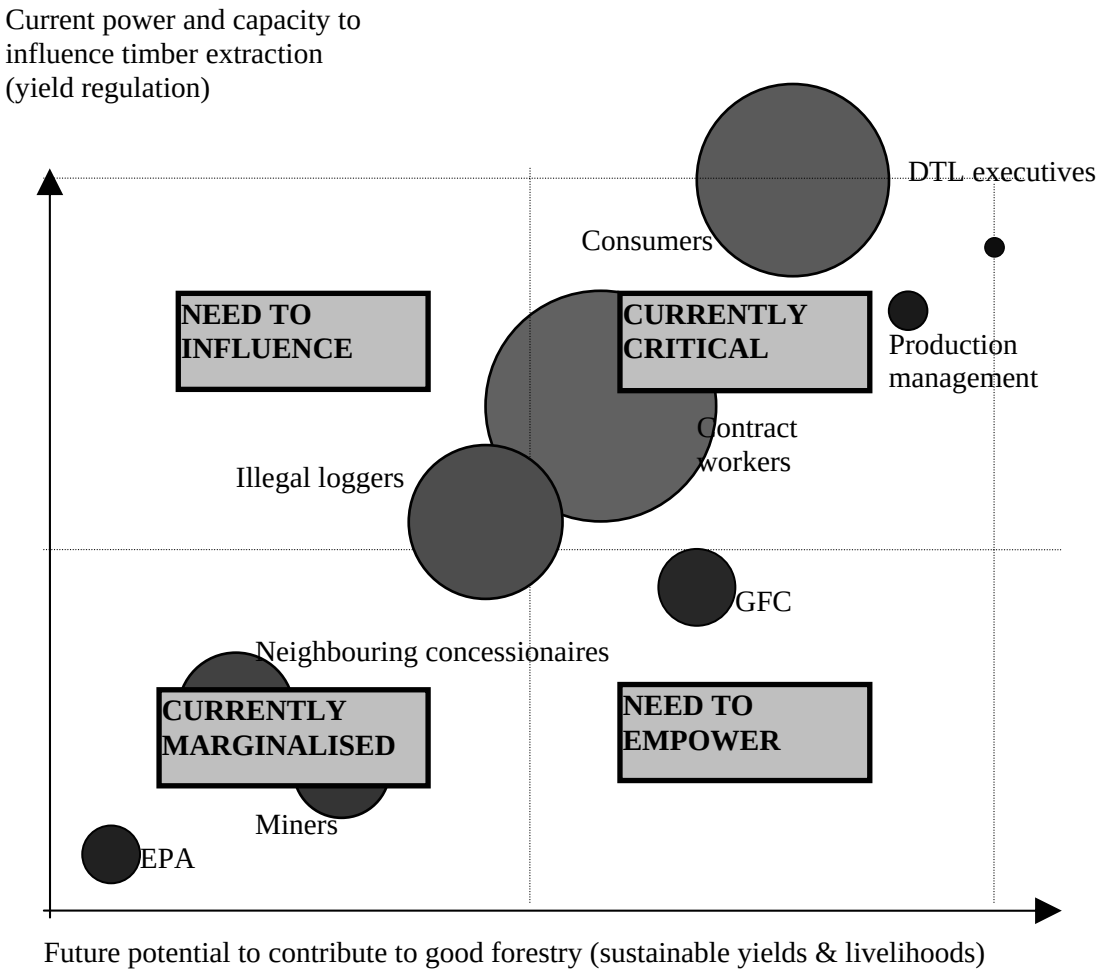
3.2.5 With its origins in the state sector, the company boasts exemplary worker facilities. Wage employees are provided with housing, 24 hour lighting, water, a medical centre, a primary school, a community centre, recreational facilities, a telephone service, a rations store (plus several other stores in Mabura), free transport to Linden, safety gear and meals allowances. Workers work 44 hours per week (up from 40 in 1997) and are paid overtime at 150% or 200% on Sundays. There has been little deterioration in these services despite the evident company financial difficulties. The only negative impacts of these hardships have been the heavy loss of staff and the loss of the pre-1997 management training school at Mabura.

3.2.6 The main constraints identified by management for the current difficulties at DTL were concerned markets for timber. Greenheart is simply not sufficiently versatile a timber to attract interest from divergent market sectors and is mainly used in marine defences. While some local house building and some overseas furniture manufacture makes use of Greenheart, the market is largely hostage to a few major export orders. A tabulated list of the most powerful influences over timber extraction and the stakeholder groupings with most potential to help promote good (sustainable) forest management bears this out (see Table 6 and Figure 10).

Table 6. Stakeholder influence on extraction - DTL management perspective

Stakeholder group	Numerical size rank	Current power to influence what is harvested	Future potential to influence good forestry
Company executives	1	8	9
Production management team	2	7	8
EPA	3	1	1
GFC	4	4	6
Miners	5	2	3
Competing concessionaires	6	3	2
Illegal loggers	7	5	4
Consumers	8	9	7
Contract workers	9	6	5

Figure 10. Stakeholder influence on extraction - DTL management perspective



3.2.7 Like Barama, DTL management perspective is that apart from the inevitable dependence on markets and consumers, there are few other powerful influences over extraction apart from the management team itself. Illegal loggers pose much more of a

threat to DTL's activities in comparison with Barama, which must in part be due to the accessibility of the DTL concessions.

3.2.8 In terms of actual harvesting, DTL is constrained by the available current orders. These orders usually comprise a demand for one or maybe as many as four species. With limited durability of stored timber, extraction teams usually focus on species currently in demand, leaving other potentially valuable species aside. Should a subsequent order for these sidelined species appear, the company has a strong incentive to re-enter blocks.

3.2.9 DTL's 9 extraction teams now operate using a conventional prospecting method. There is currently no enumeration since management feel the current state of orders (25% down in the last five years) make such a system untenable. A block inspector identifies and marks trees immediately prior to the entry of the extraction team. Extraction teams consist of 6-8 people (a bulldozer and skidder driver with a choker, two chain sawyers and a choker and a cook). Skidding equipment is relatively new (6 Clarke Ranger 68Fs bought in 1997 (one under repair), 2 Caterpillar 528B bought in 1995 an two older Caterpillar 528B bought in 1983). Capitalisation of the industry to this extent is one of the reasons why DTL must hit extraction targets of 180,000-210,000 cubic feet per month in order to remain financially viable. With so few species demanded per block and payment to contracted felling teams on a per volume basis, there is a strong incentive to remove all of the saleable trees irrespective of distance between them or proximity to water courses.

3.2.10 Another of the problems for DTL management is an inherited and poorly designed sawmilling operation. With a percentage recovery of only 28% (compared with in excess of 48% for Willems), it is clear that there is room for significant improvement in this sector, were further capitalisation possible. The current management view is that further investment would not pay for itself with such high interest rates.

3.2.11 Four years ago, when the company still had a full complement of well trained survey and enumeration staff, it might have been realistic to suggest the use and application of growth and yield modelling in longer term planning. The current situation, however, with no internal research capacity does not provide an adequate platform on which to build such sophisticated planning.

3.2.12 Indeed, the extremely short planning horizons (currently focusing on the attempted sale of the company) provide a powerful disincentive to make use of growth and yield models, particularly if it is anticipated that such models might show low commercial returns under the new management guidelines in the GFC code of practice, or long periods for recovery in over-harvested blocks (see GFC, 2000a and 2000b). This situation is understandable if discouraging, despite the abundant PSP data and RIL feasibility studies conducted in collaboration with Tropenbos, Iwokrama, GFC and IIED.

3.2.13 It is unlikely that model simulations will show a commercially acceptable "allowable" harvest. Even if this were to be possible it would require a significant shedding of capital equipment and staff. New skilled staff would have to be recruited to re-establish required management systems. More onerous harvesting requirements would worsen conditions for labour contracted on a pay-per-unit-volume basis (i.e. the poorest workers). Reduced profitability might result in the reduction of benefits for staff (since the inherited infrastructure is costly to maintain). Lost or reduced incomes would impact on a family's locational stability, housing (often provided by the company), nutrition, education and health.

3.2.14 Successful implementation of "allowable" yields would certainly have a positive environmental impact. The question is, at what social cost?

3.3 Willem Timber and Trading Company Ltd

3.3.1 Willem Timber Trading Company Ltd was established in 1933 and is the oldest timber company in Guyana. It is a family company, currently with John, Peter and Donald Willem among the company directors. The company has two concessions of 168,038 acres and 133,800 acres; both have which have been renewed until 2031. The smaller of the two concessions and part of the larger concession have been logged for *Chlorocardium rodiei* - Greenheart (the company's traditional marketable species). In 1997-1998 the trucking distance and age of equipment from the nearest workable Greenheart stands made further extraction not viable. The company currently buys and saws Greenheart logs from Guyana Sawmills, CRL (who have sawmills at Bartika) and from UNAMCO. It also logs *Catostemma spp*. (Baromalli), *Eperua falcata* (Wallaba), *Carapa guianensis* (Crabwood), *Manilkara bidentata* (Bulletwood, producing Balata) and *Trattinickia spp*. (Ulu) and a number of other hardwood species.

3.3.2 Export markets for Greenheart dried up in 1995 when Wiltshire, Aitkins (UK) and Ralph Sproog (USA) withdrew orders on account of prices and the NGO-based accusations that Greenheart was being explored in a non-sustainable manner. Recent Tropenbos studies have confirmed that heavily logged Greenheart stands do not display commercially viable stock levels after 30 years. The study refutes the suggestion that Greenheart has been made extinct and suggest that levels of biodiversity (including an abundant presence of Greenheart) are equivalent to unlogged stands.

3.3.3 The company currently employs some 230 staff (down from 400 over the last two years), including approximately thirty women, mainly as office or domestic staff. At the Kaow island sawmill approximately 120 staff remain (plus 15 supervised prison inmates), a fall of 80 from three years ago. On 5-8 occasions in 2001 the sawmill had closed for up to a week without pay for workers, due to a lack of orders. There is some voluntary turnover, but the workforce is loyal and half of the employees interviewed had been with the company all their lives.

3.3.4 Staff are recruited locally (often from within the families of company workers). Opportunities are given to young unskilled workers paid at roughly G$ 300 per day to learn the job. When vacancies open up, these recruits are offered full time work, usually as labourers on a minimal wage (G$ 700 per day). From there, workers gradually move up to the position of foreman, supervisor and finally into middle or top management (with salaries of between 45-100,000 per month). There is no formal training except through this system of apprenticeship on the job.

3.3.5 The workforce on Kaow island is provided with accommodation, water, electricity, free transport to shopping at Bartika, a small club, playing fields and monthly visits by local medical teams. The company provides a small nursery school and transport for older children to schools in Bartika. NIS payments are made partly by the company and partly deducted from salaries. Working hours are fixed and additional work is paid for at 1.5x normal rates or 2x normal rates on Sunday.

3.3.6 Separate interactive sessions with 13 male workers and 6 women highlighted some of the direct impacts of the company's current financial difficulties. In addition to occasional

unpaid periods due to lack of orders, recent financial difficulties have resulted in reductions in overtime, which are reported to have fallen from an average of 30-40 hours per week in 1991 to an average of 5 hours per week in 2001). Workloads have increased without additional pay as some staff have had to be let go (for example administrative staff taking on previously separate jobs). Electricity has been cut from the original 24 hour service to one which only runs until 11pm. In 1995 the company had been put up for sale but without securing a buyer and this had affected staff morale.

3.3.7 When questioned about their hopes and fears all of the male workers unanimously declared their hope that Willems would recover and continue to provide gainful employment. They greatly feared unemployment (many having worked in the company all their lives) and did not think that there were other neighbouring opportunities. The female workers who were carrying out administrative duties almost all expressed a hope that they would be able to move on to other employment, partly due to the low current wages and escalating workloads, but also because their skills were somewhat more transferable.

3.3.8 Production peaked between 1983 and 1992 at which time approximately 800,000 cubic feet per year were being extracted (90% of which was Greenheart selling at G$ 120 per board foot). Production is currently running at 200,000 cubic feet per year, some of which involves species such as Baromalli - *Catostemma spp*. (selling at G$ 55-56 per board foot).

3.3.9 The main constraints which have led to the decline in the industry include in rough order of importance:

- Declining markets for Greenheart due to price and cancellation of orders (based on claims of unsustainability and lack of certification). Both UK-based Wiltshire and Aitkins and USA based Ralph Sproog stopped importing from Guyana as long ago as 1995.
- High inflation rates (>18%) leading to delayed or non-economic equipment replacement
- Rising costs relative to prices. For example, between 1990 and 2000 fuel has increased from G$120 a gallon to G$300 while Greenheart sales have only risen from G$110 per board foot to G$140 per board foot. It was estimated that 60-75% of the ultimate price of timber is made up of freight costs.
- Increasing competition from small-scale and / or illegal loggers who can sell Greenheart at as little as G$80 per board foot. Some of this timber is being illegally taken from the Willem concessions. An example is a local “eco-tourism venture” which is extracting 20,000 board feet per month ostensibly for housing on an area in the Willems concession which allegedly has received land use rights. The issue is currently under investigation.
- Increasing competition from large producers. Barama, which extracts approximately 3,000,000 cubic feet per year primarily for plywood manufacture, can afford to off-load unsuitable timber onto the market at rates 15% below the traditional Guyanese companies.
- Limited scale of company in comparison with other Guyanese companies, but with fixed costs equivalent to theirs.

3.3.10 Willems Timber and Trading Co. Ltd does not currently carry out any inventory work. Extensive inventory maps had at one time been prepared in association with CIDA but the company did not have staff able to interpret and use the maps. Essentially it was not the cost of the inventory, but the waste of money on something that was unusable given current staffing. The company cannot afford to employ academically trained professionals with little or no practical experience.

3.3.11 The extraction process is carried out in several stages. Forest rangers hunt for trees using experience of the forest. They mark the trees and the skidder trails. The felling teams fell the timber and skidder operators then haul logs to a loading area. The company currently has 2 skidders more than 5 years old. Trucks carry the logs almost 60 km to the landing where they are loaded onto pontoons and taken to the sawmill at Kaow island. Since 60-75% of the final cost of production relates to transport costs, it is easy to see how timber industries which have initiated work in the closest harvestable areas face increasing financial difficulties as time and transport distances progress.

3.3.12 In conclusion, Willems Timber and Trading Co. Ltd does not have the capacity necessary to utilise growth and yield models. As noted above, the company does not currently employ inventory staff, nor does it currently conduct inventory work. Neither does it employ dedicated research staff with the ability to use or interpret results from growth and yield models. The managers site the cost of employing such staff as a major impediment. The scale of operation simply does not allow such luxury (i.e. the fixed costs are similar to much larger operations but the profits are much smaller). More important is the fact that investment in such inventory would not provide any benefits to the company.

3.3.13 There is little incentive For Willems to move towards the use of yield regulation planning. Given the current financial difficulties faced by the company results pertaining to the "allowable" yield would almost certainly be financially unacceptable or even unprofitable. In addition, the company does not have the technical capacity to implement the harvesting regimes needed to ensure sustainability. Only major conditional incentive (tax reductions, waivers of acreage fees, subsidies etc.) schemes or previously unheard of price premiums for certified products would be likely to change this situation.

3.3.14 Willems complains quite openly that even the recently introduced regulations (defined in the code of practice) will put this company out of business. Already there are examples of staff losses, temporary suspensions without pay, reduced overtime, increasing workloads without increases in pay and reduced benefits (e.g. electricity rationing). Calculation and implementation of "allowable" yield is unlikely to improve this situation. Enforcement of such "allowable" yields and subsequent reduced profitability might result in the reduction of benefits for staff or the loss of staff. Lost or reduced incomes would impact on a family's locational stability, housing (provided by the company), nutrition, education and health. Company closure would spread these negative impacts over the entire workforce.

3.3.15 The enforcement of "allowable" yields would almost certainly reduce Willems profits still further. The impact on the environment which ensuing changes, closure, company acquisition etc. would bring about are almost impossible to determine. It is likely that government policy in such a volatile situation would be the determining factor.

3.4 Toolsie Persaud Ltd

3.4.1 Toolsie Persaud Ltd is another Guyanese family-owned company with a single current concession covering an area of 299,012 acres called Manaca close to the Essequibo river. The concession was granted in 1985 and will be reassessed in 2015. The concession is currently accessed by a single road which links the Manaca log pond on the Essequibo river with the concession further inland. Timber is shipped to a sawmill locate close to Georgetown.

3.4.2 Toolsie Persaud Ltd employs 75 staff members in the Manaca site. New management in late 2000 brought about major changes to the workforce, company facilities and to the

system of managing timber extraction. It is relatively difficult to calculate exactly how much timber is being extracted at the Manaca site. The new log tagging system may shed some light on this, but the local GFC ranger had experienced some logistical / social problems and was applying for a transfer. Interviews with management suggested extraction figures of 180,000 cubic feet in 2000 and an anticipated 200,000 cubic feet in 2001. Nevertheless, 5000 log tags were supplied in May and had been exhausted by August. Assuming an average log volume of 50 cubic feet, one can multiply the three month average of 5000 logs by 4 to get an annual total of 1,000,000 cubic feet. Management estimates of the area worked through over a 15 year period were 35,000 acres.

3.4.3 The company extracts mainly Greenheart (*Chlorocardium rodiei*) which are then axe-hewn into squares by hand, Purpleheart (*Peltogyne spp.*) and a number of other hardwood species (none of which were being extracted at the time of the visit).

3.4.4 The 75 employees receive free accommodation at a logging camp. The accommodation had recently been renovated following the change in management last year. Some water was provided to houses but supplies do not reach all company employees. Electricity is supplied until 11pm. There are twice weekly boats to Parika for shopping etc, but residents are checked for supplies on their return (alcohol is strictly forbidden on site). Residents complained that they were discouraged from bringing back cheap provisions by the boat captain. All provisions are supplied by the company rations store. The management had made some efforts to find the cheapest supplies from legal wholesalers, but these were not as cheap as market stores in town. Expenditure on provisions is deducted from the salary. A major positive issue acknowledged on all sides was the prompt payment of salaries.

3.4.5 Management at the Manaca site drew attention to the recent downturn in the timber markets which were affecting company profits. The company had apparently only received 1 order from September 2000 to March 2001 and although the sawmill was stockpiling timber, new logging was being reduced. Workers and management alike noted that things were considerably more buoyant in 1988-1992 and that there was now a regular shortage of orders.

3.4.6 This downturn had made life increasingly hard on the workforce. Interactive sessions with 25 male workers and 7 female residents belonging to families whose husband worked at the logging camp revealed some evidence for increasingly harsh conditions. The workforce is not unionised. At least six employees had been let go in the previous week.

3.4.7 Workers are paid on a per volume basis. At the time of the visit, both skidders were down, and there were several other equipment problems so that little timber was being extracted. Management had assigned workers to other task in order to maintain a minimum wage. Working hours had increased to dramatic levels for no extra pay with some workers recording shifts from 4am in the morning to 12pm at night. Most were aware that such additional effort was required in the light of the lack of orders. The main issues raised by the male and female workers were as follows:

Table 7. Evidence of increasingly difficult circumstances for the industry and other issues of concern

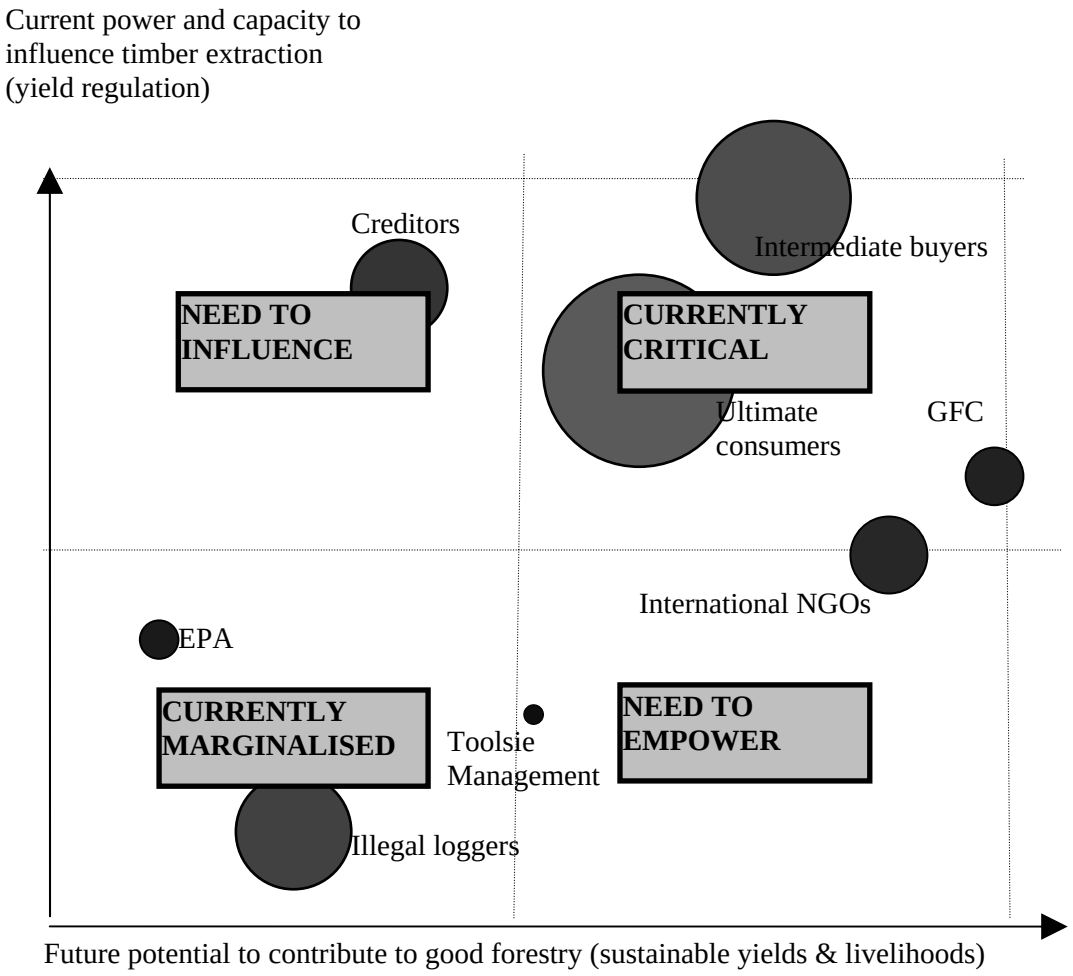
MALE	FEMALE
Increasingly expensive rations relative to pay	Increasingly expensive rations relative to pay
Increasing distances to harvesting area with no compensation through pay by volume system	Three years since the last major pay rise for some workers
Decreasing overtime payments	Duties increasingly erratic with call outs at any hour
Increasingly long working hours	No available work for women
Inadequate water supplies	Inadequate water supplies leading to difficult water carriage from the creek and diahorrea in the dry season
Lack of schooling and high cost of accommodation in places where schools are accessible	Lack of schooling for children and high expense / family disruption of schooling in the nearest large town
Poor road conditions which reduce salary rates on a per volume basis	Lack of medical care including routine vaccinations for children
Lack of entertainment in the logging camp	Single company boat which poses serious risk in the event of a medical emergency on shopping days
Lack of control in life due to inability to save and debts to ration stores	

3.4.8 The local management at Manaca were interviewed with regard to the main influences which they felt influenced profitable timber extraction and good forest management. The method follows that previously described in sections 2.1.1 to 2.1.6:

Table 8. Stakeholder influence on extraction - Toolsie Persaud Management perception

Stakeholder group	Numerical size rank	Current power to influence what is harvested	Future potential to influence good forestry
Toolsie Persaud Management / workers	1	2	4
EPA	2	3	1
GFC	3	5	8
International NGOs	4	4	7
Creditors	5	7	3
Illegal loggers	6	1	2
Intermediate buyers	7	8	6
Ultimate consumers	8	6	5

Figure 11. Evidence of increasingly difficult circumstances for the industry and other issues of concern



3.4.9 Toolsie Persaud Ltd does not have the capacity necessary to utilise growth and yield models. While Toolsie Persaud Ltd currently employed one university educated inventory person, no inventory had been carried out at the Manaca site since the previous year. The company does not employ dedicated research staff with the ability to use or interpret results from growth and yield models. Toolsie Persaud management cited the cost of employing such staff as a major impediment. The scale of operation simply does not allow such luxury (i.e. the fixed costs are similar to much larger operations but the profits are much smaller).

3.4.10 Given the current financial difficulties in this sector (described in the report) results pertaining to the "allowable" yield would almost certainly be financially unacceptable or even unprofitable. In addition, Toolsie Persaud Ltd would not have the technical capacity to implement the harvesting regimes needed to ensure sustainability. Only major conditional incentive (tax reductions, waivers of acreage fees, subsidies etc.) schemes or previously unheard of price premiums for certified products would be likely to change this situation.

3.4.11 Toolsie Persaud management stated that even the recently introduced regulations (defined in the code of practice) will put these companies out of business. Already there are examples of staff losses, reduced overtime payments, increasing workloads and work hours without increases in pay and reduced benefits (e.g. electricity rationing). Calculation

and implementation of “allowable” yield is unlikely to improve this situation. Enforcement of such “allowable” yields and subsequent reduced profitability might result in the reduction of benefits for staff or the loss of staff. Lost or reduced incomes would impact on a family’s locational stability, housing (provided by the company), nutrition, education and health. Company closure would spread these negative impacts over the entire workforce.

3.4.12 The enforcement of “allowable” yields would almost certainly reduce Toolsie Persaud’s profits below the threshold required by investors to remain in the industry. The impact on the environment which ensuing changes, closure, company acquisition etc would bring about are almost impossible to determine. It is likely that government policy in such a volatile situation would be the determining factor.

Recommendations:

21. It is recommended that the industry engage with and take advantage of research directed at calculations of future yields and incorporate such predictions in future planning (whether sustainable management is followed or not)

22. It is recommended that the industry reconsider the per volume incentive systems used for contracted extraction workers.

(D) GUYANESE-OWNED COMPANIES WITH SMALL SFP CONCESSIONS AND / OR SAWMILLS

3.5 Sadiek Juman

3.5.1 Sadiek Juman is a small company which has an SFP covering some 13,000 acres adjacent to Orealla Amerindian community and a sawmill which produces mixed hardwood timber. The sawmill was not operational on the day of the visit because of a lack of orders. The company owns 8-9 tractors which work both its own concession and hired for work in the Orealla reserve. The company was not currently buying logs from the reserve on account of the depressed state of the timber market.

3.5.2 The company is also a member of the CORTIM consortium of timber exporters. The timber exporters combine in order to overcome strict requirements with regard to permits, quality control, fumigation, shipping legislation etc. There are approximately two ships each year with China being the major export market. There is a premium on price for export logs as shown below in table 9. The members of the CORTIM consortium include:

- Sadiek Juman (SFP and sawmill)
- Rustum Rahamen (SFP only)
- Doodnauth Naraime (SFP only - applying for WCL)
- Garnesh Singh (SFP - applying for WCL - and sawmill)
- Imran Shaffeeullah (SFP - applying for WCL - and sawmill)

3.5.3 The sawmilling business which draws logs from so far upstream is marginally profitable. Sawmillers try to recoup costs in as many ways as possible to balance the books. It is clearly advantageous to sell logs as exports. It is also advantageous to recoup some of the costs of logging by hiring out tractors to the logging teams (if logging is

taking place on adjacent Amerindian lands). Combining the logging business with the supply of provisions is also one way of recouping some of the logging costs.

Table 9. Approximate monthly costs and revenues for Sadiek Juman

Item	Unit price (G$)	Typical monthly units	Monthly value (average based on management survey) (G$)
Log costs	160 per cubic foot	100 logs @ 100 cubic feet	-1,600,000
Cost recouped through tractor hire	?	100 logs @ 100 cubic feet	?
Cost recouped through supply of provisions			?
Measurement cost	10 per cubic foot	100 logs @ 100 cubic feet	-100,000
River transport	60 per cubic foot	100 logs @ 100 cubic feet	-600,000
Sawmill costs (labour/fuel etc)	100 per cubic foot	100 logs @ 100 cubic feet	-1,000,000
TOTAL AVERAGE MONTHLY COST			<-3,300,000
REVENUE if Sawn timber sales	49-65 (av 55) per board foot (5:1 ratio of board feet to cubic feet)	100 logs @ 100 cubic feet	+2,750,000
REVENUE if Export timber sales	360 per cubic foot	100 logs @ 100 cubic feet	+3,600,000
RANGE OF REVENUE			-550,000 to +300,000

3.5.4 Sadiek Jumal noted that the main constraint to the business was the poor infrastructure which raised transport costs both along the river to the sawmill and from the sawmill to internal markets. He also noted the difficulty in finding reliable labour due to the fluctuations in logging orders and sporadic operation of the mill.

3.6 Doodnauth Naraime

3.6.1 Doodnauth Naraime consists solely of three SFP concessions (12,500, 19,200 and 32,785 acres in size). The latter concession had been in dispute with Orealla Amerindian Reserve when a land survey led to a substantial portion being reallocated as within the Orealla reserve in 1995. The company acts as a supplier to other sawmills along the Corentyne river. The company owns a series of tractors and at present hires them to Orealla community loggers. Between 60-80% of the companies current logs are extracted from the Amerindian reserve. This is in part due to the availability of manpower in

Orealla and in part due to the tolls or insistence on purchasing imposed by the Orealla council because Doodnauth Naraime's own timber must pass through the reserve in order to be transported downriver.

3.6.2 Since most of the company's revenue comes from hiring tractors to the Orealla loggers, profits are small. An average of 3000-3500 cubic feet was being extracted from the reserve. Logs can be sold to sawmillers at G$ 160 per cubic foot (or 220-230 at the sawmill), but the logger is paid G$ 70 per cubic foot leaving G$90 for the tractor hire. The mean monthly income for Doodnauth Naraime from logging in Orealla was therefore G$ 270,000 before paying tractor operators, fuel and maintenance bills.

3.6.3 It was mentioned that the profitability of the logging and sawmill business had been steadily deteriorating over the last five years. Table 10 shows a rough comparison of costs and profits between 1996 and 2001 without taking into account the devaluation in currency over that period. The fall in conversion ratio during that period was due to the falling sizes of available timber and equipment ageing.

Table 10. Comparison of costs and revenues between 1996 and 2001

	1996	2001
COST of log at sawmill per cubic foot	G$ 140	G$ 220-230
Ratio of cubic feet to board feet	7-8:1	4.5-7:1
Sale price per board foot	G$ 45	G$ 55
PROFIT per cubic foot before subtracting sawmilling costs	G$ 175 to 220	G$ 17 to 165

3.7 R. Singh

3.7.1 R. Singh operates a small sawmill at Crabwood Creek on the banks of the river Corentyne. Equipment consists of one gang saw and one circular saw. The equipment is 40 years old, but interest rates are so high that unless new equipment can pay for itself in five years, such investments lose money. High interest rates are a powerful disincentive to retooling.

3.7.2 Timber is being sold as mixed hardwood to the Georgetown market. R. Singh noted that local buyers would not accept the quality of wood being sold, since the quality between species was variable, with several species displaying splitting or twisting upon drying. There was no market for individual hardwood species (there being no *Chlorocardium rodiei* - Greenheart in the extraction area).

3.7.3 Timber is sourced primarily from the Orealla Amerindian reserve. The company provides credit (in terms of provisions) to Orealla loggers. The company also hires out 5 tractors to help with timber extraction from the reserve. The company is currently purchasing 600 logs (40,000 cubic feet) for a total of G$2,300,000. Almost G$1,300,000 was forwarded to the community in provisions and spares for the extraction of this timber. Without such credit, the community would be unable to conduct logging and R. Singh stressed the symbiotic relationship between sawmills and community loggers.

3.7.4 The extension of credit was also important to attract buyers. It was noted that nobody currently paid in cash. Payment in arrears had begun in the previous year and was increasingly problematic for the company's cash flow. There had been a series of timber sales where payment was not received or where cheques had bounced. Despite efforts and threats of legal action, little of this lost revenue had been recaptured.

3.7.5 The rough economic assessment which follows in Table 11 demonstrates a much higher conversion rate (from cubic feet to board feet) than was claimed by Sadiek Juman. This is in part due to R. Singh's use and sale of reject wood and end cuts which improves the efficiency of use. It was stressed that the market for mixed hardwoods was extremely slow at present leading to price wars between the sawmillers. Timber could be sold well below G$50 per board foot which would not cover the costs of production. So few orders had been received at the time of interview that the sawmill was set to close temporarily later that week.

Table 11. Approximate monthly costs and revenues for R. Singh

Item	Unit price (G$)	Typical monthly units	Monthly value (average based on management survey) (G$)
Log costs	160 per cubic foot	200 logs @ 100 cubic feet	-3,200,000
Cost recouped through tractor hire	?	200 logs @ 100 cubic feet	?
Cost recouped through supply of provisions			Supplied at cost as a means of fostering loyalty
Measurement cost	10 per cubic foot	200 logs @ 100 cubic feet	-200,000
River transport	60 per cubic foot	200 logs @ 100 cubic feet	-1,200,000
Sawmill costs (labour/fuel etc)	100 per cubic foot	200 logs @ 100 cubic feet	-2,000,000
TOTAL AVERAGE MONTHLY COST			<-6,600,000
REVENUE if Sawn timber sales	55-65 (av 60) per board foot (6.5-7:1 ratio of board feet to cubic feet)	200 logs @ 100 cubic feet	+7,150,000 to 9,100,000
RANGE OF REVENUE			+550,000 to +2,500,000

3.8 Ituni Small Logger and Chainsaw Association

3.8.1 The Ituni Small Logger and Chainsaw Association was established in 2000 from the voluntary combination of 11 small SFPs into a combined area of 65,000 Acres. The Association currently has 40 members. The original concession holders have rights to harvesting but employ other members of the association in order to achieve the desired extraction targets. Individual members are responsible for finding markets and winning orders. The association only exports lumber (ripped by chainsaw) and deals in a number of hardwood species, mainly *Goupia glabra* - Kabukalli, Shibodan, Wallaba (for posts) and Tourneira, but also some Greenheart, Purpleheart, Locust, Uruballi, Keroki, Simaruba and Tatabu.

3.8.2 Once an order is received the management is approached for permission to move the lumber. The transportation permits from the GFC are allocated to this management group, and cover a quota of 200,000 board feet per month. If the person to whom the order is given cannot meet it himself, the work is offered to other members of the association. At present there is no restriction upon the area from which the timber is extracted.

3.8.3 The concession area has a number of main trails from which smaller extraction trails are developed. Trees are located, felled and ripped into planking in the forest before transport to truck loading areas. Most orders are received from Georgetown.

3.8.4 The Association has agreed with the GFC to implement a 100% inventory of the area as a precursor to the development of a management plan. The Association has asked the GFC for an additional 60,000 acres of land but are aware that its allocation is likely to be conditional on the development of this management plan.

3.8.5 At present there are no plans to move towards certification. The main objections to cerification are the way in which guidelines are prescribed for workers which are simply not possible to adhere to given the sporadic nature of the market and the consequent use of occasional labour. The variable nature of the forest was also a major impediment - productive forest and non-productive forest lie side by side and operation naturally wish to harvest most heavily in the productive forest, with little incursion into the non-productive types. Such harvesting is in breach of the new Code of Practice.

3.8.6 A main constraint was felt to be markets for other types of wood, in order to increase the value per unit area and thus reduce long distance extraction exercises for minimal returns. At present the Association is able to make small profits, but only through extensive rather than intensive extraction practices (see Table 12)

Table 12. Monthly costs and revenues for ISLCA

Item	Unit cost (G$)	Monthly total - quota of 200,000 board feet (Million G$)
INCOME THROUGH TIMBER SALES	50-55 (or 75 per board foot for Greenheart and Purpleheart)	10-11 (or 15)
Labour	12 per board foot (or 16 for Greenheart or Purpleheart)	2.4
Fuel	3-4 per board foot	0.6-0.8
Chain filer	1-2 per board foot	0.2-0.4
Equipment wear and tear	2 per board foot	0.4
Transport to Ituni	7 per board foot	1.4
Transport to Georgetown	7 per board foot	1.4
Loading and trucking	2 per board foot	0.4
Road maintenance	2 per board foot	0.4
GFC Royalty	3.34 per board foot (or 5.84 for Greenheart or Purpleheart)	0.668 (or 1.168)
TOTAL COST	39.34 - 41.34 (or 47.84 for Greenheart or Purpleheart)	7.9-8.3 (or 9.6 for Greenheart or Purpleheart)
RANGE OF REVENUE	8.66 - 15.66 (or 27.16)	1.7-3.1 (or 5.4 for Greenheart or Purpleheart)

3.8.7 An interactive session was held with 17 of the 40 members of the Association to determine key concerns for the future and the main stakeholder grouping they felt to influence their extraction activities. The main hopes and fears of the Association are recorded below in Table 13:

Table 13. Hopes and fears of Ituni Loggers

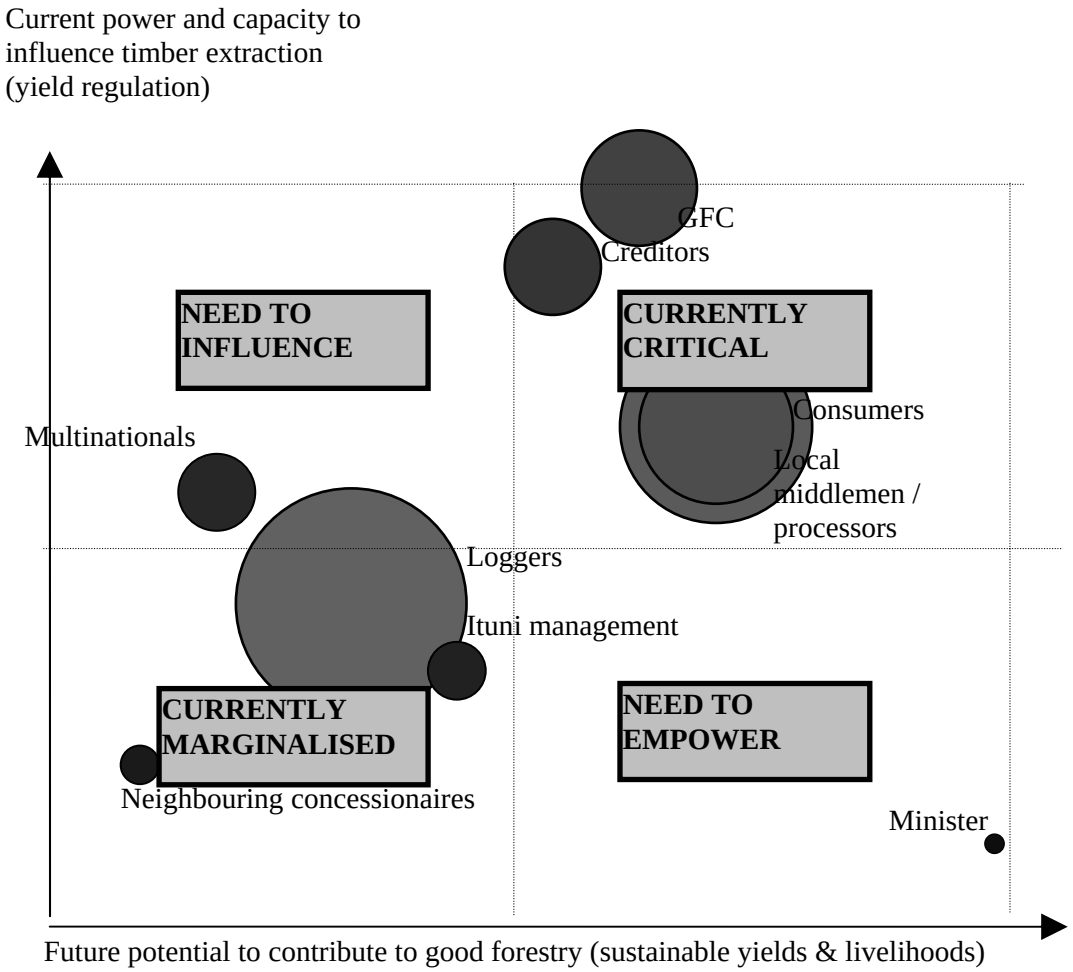
HOPES	FEARS
Better marketing of other species	Falling quotas after each annual inspection
Availability of concession area in perpetuity	Acreage fee will make management impossible with falling quotas
Loans available to purchase equipment, including purchasing equipment	Large companies such as Barama will undercut small producers
Training in Ituni in business skills (finance and administration) and environmental issues	
Improved quota system for Ituni area	

3.8.8 The Ituni loggers were then asked to list the main stakeholder groups who had current influence over their extraction activities. These groups were ranked in terms of numerical size, current power to influence good forestry and future potential. The results are shown in the Table 14 and Figure 12 below:

Table 14. Stakeholder influence on extraction - Ituni loggers perceptions

Stakeholder group	Numerical size rank	Current power to influence what is harvested	Future potential to influence good forestry
Minister	1	1	9
Small neighbouring concessionaires	2	2	1
Ituni Management	3	3	4
Multinationals	4	5	2
Creditors	5	8	5
GFC	6	9	6
Ultimate consumers	7	6	7
Local middlemen	8	6	7
Loggers	9	4	3

Figure 12. Stakeholder influence on extraction - Ituni loggers perceptions



3.8.9 There are interesting parallels and differences between the Ituni loggers and the Amerindian reserves. For both groups, the processing sector has significant power over extraction activities, but in contrast with the Amerindian reserves, the loggers themselves feel that they have little power over their extraction activities. The Amerindian loggers felt GFC to have little current power over activities but significant potential to improve the situation should they engage with the reserve. The Ituni loggers on the other hand felt the GFC already to have significant influence over activities (a function perhaps of the healthy relationship between the two sides), but less potential than the market to affect their activities in a positive way. They emphasized the need for some umbrella body (perhaps the GFC) to assist in marketing timber.

3.8.10 It was also striking that the Ituni loggers felt the Minister to have great potential (but little current influence) over extraction activities. In discussion it was stated that there was an important advocacy role which the Minister could have in championing associations of small producers, ensuring favourable allocations of land to such organised groups, promoting Guyanese timbers etc.

3.8.11 Holders of SFP concessions like the ISLCA are not required to “manage” the forest in the traditional sense of the word. Instead they abide by quotas developed by the GFC’s own interpretation of growth and yield (a strong justification for GFC’s further development and use of growth and yield modelling techniques). Without any

requirements for planning, blocking and enumeration, it is unreasonable to expect this sector to develop the capacity to use growth and yield models.

3.8.12 There are scarcely any incentives for the ISLCA to adopt growth and yield models, *unless* they wish to convert or expand their concessions to more secure WCLs. In this case management planning become an important priority and insights from growth and yield modelling become relevant to this process.

3.8.13 Further harvesting restrictions would have some negative consequences for the Ituni labour force. However, since the ISLCA is attempting to gain longer tenurial security or additional land by applying for a conversion to WCL, it is conceivable that reduced and more sustainable harvesting might be compensated for by a larger concession area. In this unique instance, the results from growth and yield modelling might be enforced in a way which has a positive impact on poverty.

3.8.14 In many instances the additional restrictions which might be applied to harvesting (through the quota system) would be compensated for by increasing harvests from adjacent Amerindian lands. However, this is unlikely in this particular instance because of the location. A conversion from SFP to WCL coupled with an increasing concession area might generate positive environmental impacts.

Recommendation:

4. It is recommended that a case study initially be developed with the Ituni Small Loggers and Chainsaw Association - ISLCA (using MYRLIN) which will provide the dual benefit of (1) raising awareness of cogent information in the process of management planning for the ISLCA in the proposed move from SFP to WCL; (2) provide data for the GFC on growth and yield on white sand sites as part of the existing national silvicultural survey process.

(E) INDIGENOUS AMERINDIAN RESERVES

3.9 Orealla Community Reserve and State Forest Permission

3.9.1 Orealla is a small community of some 1200-2000 Lokono/Arawak and Warran Amerindians situated 56 miles to the South of Corriverton on the west bank of the Corentyne River (Applewhite *et al.* 2000). Traditional culture within the village is not the subject of any major education programmes (although a range of activities, especially sporting, were planned for national heritage month and a planned Amerindian cultural event was to be hosted later in 2001). All except the oldest village members communicate entirely in English.

3.9.2 Most of the villagers engage in a number of activities, commonly involving logging, farming (including some pineapples), hunting or trapping, with some craft work and a small fruit preserve factory which employs five people. Logging is the principle form of income for some 80% of the community men (no women are involved in logging activities). The following account draws on five household surveys, one interactive session with 30 community loggers, a community meeting and a council meeting.

3.9.3 The Orealla Amerindian reserve is one of the largest reserves in Guyana. An additional SFP area of 22,675 acres was granted in the early 1990s but this has since been suspending owing to irregularities whereby timber from the SFP (for which there is a specific GFC tag and quota system) was being tagged as Amerindian reserve timber (for which there is a different GFC tag and no extraction limits). The GFC in Corriverton highlighted the difficulty in prosecuting Amerindian communities for infractions, since any legal action quickly attracts the attention of Amerindian representation and human rights groups.

3.9.4 The Amerindian reserve is titled land and as such attracts no acreage fee. The community SFP by way of contrast attracts an acreage fee of G$14 per acre payable annually to the GFC. Orealla has made unsuccessful representation to the Ministry of Amerindian Affairs to try and have the SFP converted into titled land. They had also applied to convert the SFP into a WCL, but this was never approved following the suspension of the SFP.

3.9.5 All villagers are invited voluntarily to contribute to 'village work' on two Monday mornings of every month. Approximately 70-100 attend to do essential village chores (e.g. weeding). Following this work there is an open meeting at which councillors present developments and answer questions regarding issues of particular importance to the villagers. Orealla is governed by a nine member Amerindian Council headed by the community Captain (Glenn Devere). These meeting form one of the major elements of accountability for the council, the other being the biennial elections. The council governs many aspects of community life as shown in the list below.

- Captain - Glenn Devere
- Treasurer / water - James Henry
- Secretary - Cline Coppin
- Project councillor - Vincent Alpin
- Senior logging councillor - Victor Henry
- Assistant logging councillor - George Peneux
- Land / house lots - Alan Henry
- Womens welfare - Ester Devere
- Assistant secretary - Ann Vanstrom

3.9.6 The community of Orealla has a farmers association, a logging lease committee, a tractor committee, a community teachers association, a sports club and 7 churches each of a different denomination. The community had not received any technical forestry assistance until June 2001 when two young GFC technical staff came to discuss management.

3.9.7 In the late 1980s, political reform following the death of the Guyanese political leader Burnham, led to a relaxation of political control in Orealla. This coincided with economic revival along the Corentyne river and a growing demand for logs (Henfrey, 1995). In order to maintain some semblance of order in the logging process the community ceded authority to the council which was responsible for negotiating log sales and issuing logging permits to community members. Local buyers often came on mass, perhaps to fix prices, but also measured and paid for logs almost immediately. In 1994, the traditional hardwood market managed by local sawmillers was supplemented by two new partners (one national and one Malaysian Korean) seeking low grade softwood for making plywood (Henfrey 1995). The rate of logging increased to 25,000 cubic feet per month (approximately 250 logs).

3.9.8 While the situation might have seemed ideal, Henfrey (1995) records that by 1995 low log prices, rising tractor haulage charges, significant credit taken in provision stores and

delayed or sporadic payments meant that community loggers were virtually operating as tied labour. This preoccupation with timber in turn led to gender conflicts at the community meetings because of the perceived council indifference to work traditionally carried out by women. The situation in 2001 bears close resemblance to that described five years ago except that there has been a steady deterioration of markets and rising costs as timber becomes scarce.

3.9.9 There are currently more than 200 'loggers' (a slightly misleading term since it disguises the multiple income generating activities carried out by these people). The community members own in excess of 30 chainsaws, and these can be hired between community members for G$800 per day. The bulk of the Amerindian reserve has been logged out and there is little 'A' class timber left which means that most logging operations now take place between 8-10 miles from the landing sites on the Corentyne river. Extraction costs are therefore high. The community owns one tractor for timber extraction, but loggers generally use the 12 tractors supplied by neighbouring SFP concessionaires or sawmillers who buy timber from the reserve.

3.9.10 There are five principle buyers who purchase from the Orealla reserve. Two of these belong to an exporters consortium called CORTIM. These two buyers sell timber on to third parties, particularly to China to where there is a twice yearly shipment. The five principle buyers include:

- Doodnauth Naraime (CORTIM) 12,500 + 19,200 + 32,875 acres
- Rabindranauth Prasad (MARY) 26,381 acres + mill in Corriverton
- Sadiek Juman (CORTIM) 13,000 acres + mill in Corriverton
- Seudath and Sons 18,675 + mill in Corriverton
- R. Singh - no SFP but mill in Corriverton

3.9.11 The logging process begins with a negotiated order for logs between the Orealla council and a timber buyer. The only buyers currently purchasing from Orealla were R. Singh and 'Mary'. Orders are rarely written in such a way that payment is guaranteed, if they are written at all. A major order from Doodnauth Naraime had been assembled at the log landing called Mango Creek, but the ultimate buyer cancelled the order at a late stage and logs had been left for three months - many of the hardwood logs were no longer saleable and the softwood logs were destroyed. Doodnauth Naraine and the Council were negotiating about sawing some of the logs, but at a greatly reduced price. In at least two other cases, logs had been taken by a third party and no payment had been received at all (e.g. by Paul Lewis and P&S Ltd of the USA).

3.9.12 Once an order is in place (specifying species, required diameters etc.) the Orealla Council divide up the order based on a log quota between the loggers. This is generally felt to be done in an equitable manner under the new Council, but this has not always been the case in former years.

3.9.13 The loggers then purchase provisions (usually financed by the same timber buyer who has placed the order). The purchase of provisions and equipment spares etc. may amount to a significant percentage of the total logging costs. For example, R. Singh recorded that in a recent extraction of 40,000 cubic feet of timber, amounting to a total of G$ 2.3 million, some G$ 1.3 million was forwarded in credit for provisions and spares.

3.9.14 Once adequately supplied, the loggers go out into the reserve in teams of 2-5 people and engage in what is termed 'prospecting' (finding suitable timber trees). There is no co-ordination between different teams, nor any attempt by the council to restrict the logging

to different portions of the reserve in different years. There is no inventory data collected at any stage of the logging operations. The process of prospecting can take up to one week.

3.9.15 Once a suitable number of logs is located the team claims ownership of the logs by cleaning a straight extraction trail between the logs and the log landing. While chainsaws are used, the process is often done manually, cutting all large stems at ground height so as not to snag tractor tyres. This process is perhaps the most laborious, taking a further week of work. There are no records of how many trees are damaged in this process, or of the degree to which old extraction trails are used during this process. Once complete the logs are felled and cleaned ready for extraction.

3.9.16 The extraction process is conducted using a tractor which drags the logs from the felling site to the landing. Wet weather is preferred because the logs are easier to skid in the wet. In certain areas, wet season flooding occurs and this is seen as even more advantageous, because the logs can then be floated out without need for the expensive hire of the extraction tractors. There is no recognition or quantification of, nor attempts to avoid, any additional damage to the forest which might occur from wet weather extraction.

3.9.17 Once assembled at the log landing, the timber buyer visits the site and measures the logs, rejecting any deemed unfit for that particular order. Recent years have seen an increasing number of rejected logs due to the poor quality of the residual stands in the reserve. The percentage of rejected logs is particularly high in orders destined for export, where strict quality criteria are checked by the GFC in Corriverton.

3.9.18 Historically, payment was made at the time of measurement. In the last two years however, payment has been made in arrears, especially for orders destined for export. It was claimed by the timber buyers that payments were made “within 5-6 days”, but community loggers in Orealla cite waiting times as long as several months, although this may be an artefact of recent order cancellations. A parallel social survey noted the lack of financial planning among community members such that logging profits are rarely reinvested in logging operations or in diversification into other livelihood options.

3.9.19 Timber is generally exported as roundwood. Nevertheless, mention should be made of a significant number of council and or private deals for ripped lumber originating along the Corentyne river. Orders for sawn timber are particularly lucrative. If an average 100 cubic feet mixed hardwood log makes the logger approximately G$5,700 (before expenses) a log ripped by chainsaw might make G$50,000 (*Eperua falcata* - Wallaba) or as much as G$80,000 (*Goupia glabra* - Kabukalli) before expenses. It is easy to see why such orders are often negotiated privately outside of council control.

3.9.20 At an interactive session with approximately 30 community loggers, an attempt was made to gage community perceptions about the future. Participants were invited to highlight their hopes and fears for their children. Table 15 shows the responses received. It is clear that there is an acute awareness of the diminishing resource base and a genuine desire to conserve the forest, even if such aspirations are currently set aside in the attempt to maintain viable livelihoods.

Table 15. Hopes and fears of Orealla Amerindian community

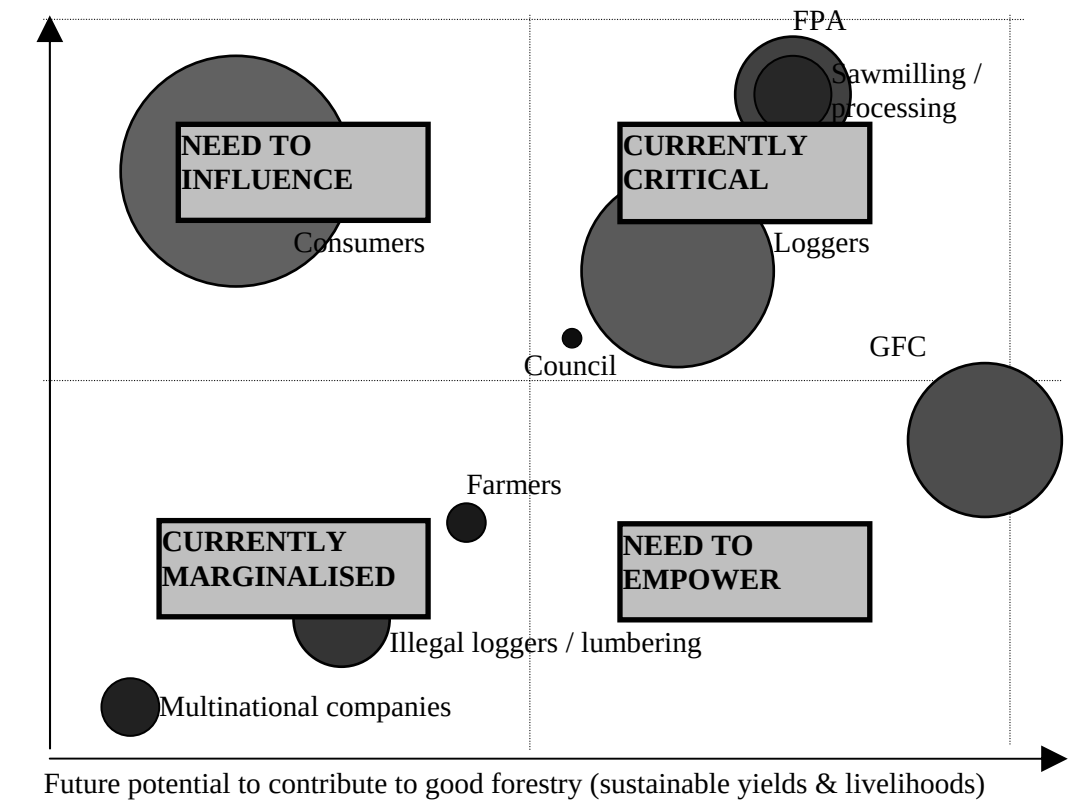
What are community hopes and fears for the children of loggers?	
HOPES	FEARS
That they will live in a similar environment	That there will be no more forest
That they will encounter less problems in the logging industry	That coastlanders will invade, overrunning culture and bringing violence
That they will have more control over making money from logging	That children will be exposed to drugs and cigarettes
That community leaders will be more constructive in defending community interests	That people will migrate away and leave the community a ghost town
That there will be alternative employment opportunities	That there will be no jobs

3.9.21 Following on from this exercise, the hopes and fears for logger's children were used as a background to pose the question about who was currently influencing the logging trade in a 'positive way', and who might have the potential to influence the logging trade in such a way that the end result met their aspirations for their children. The discussion sessions largely paralleled those described in 2.1.4 and 2.1.5 above. The results are shown in Table 16 and Figure 13 below.

Table 16. Stakeholder influence on extraction - Orealla logger perceptions

Stakeholder group	Numerical size rank	Current power to influence what is harvested	Future potential to influence good forestry
Council	1	5 - planning	5 - reforestation
Farmers	2	3 - destroy resource	4 - crop rotation
Multinational companies	3	1	1
Sawmillers / processing	4	8 - sales middle men	7 - invest in Orealla
Illegal loggers / lumbering	5	2 - competition	3 - organised
FPA	6	8 - empowering sawmillers	7
GFC	7	4 - control / land allocation	9 - guarantee future employment
Loggers	8	6 - diversify	6 - better organised
Consumers	9	7 - marketing	2- pay fair price

Figure 13. Stakeholder influence on extraction - Orealla logger perceptions



3.9.22 It is clear from this stakeholder power analysis that the community loggers feel they are hostage to the whims of the sawmillers, backed by the powerful FPA association. These stakeholders are viewed as much more powerful than the Orealla council, which was viewed as trying hard to represent community interests but with little real bargaining power.

3.9.23 GFC is seen as having significant potential to help, but little current power or interest. The ultimate timber consumers (which included consumers specifying sustainable timber) were viewed as an important driving force for forest extraction, but with little potential to influence sustainable livelihoods and logging in Orealla.

3.9.24 It is interesting to note that if one considers the contract workforce of the FPA analysis to equate to logging operations such as that in Orealla, that the industry itself recognises the powerlessness of contract workers. It is also interesting to note that the same sawmillers whom the GFC and the FPA consider to be relatively powerless in promoting good forest management are in fact critical players at the local level where a significant percentage of Guyana's timber is harvested.

3.9.25 A rapid financial assessment was made of logging related income and expenditure for mixed hardwood species from the five household surveys (see Table 17)

Table 17 - Approximate monthly incomes for Orealla loggers

Item	Unit price (G$)	Typical monthly units	Monthly value (average based on 5 household surveys) (G$)
Provisions	700-2000 per day	Depends on family size	- 20,000 to -50,000 (although some reports suggest -180,000)
Logging revenue	160 per cubic foot	20 logs @ 100 cubic foot per log	+320,000
Tractor hire	90 per cubic foot	20 logs @ 100 cubic foot per log	-180,000
Chain saw hire & fuel	12 per cubic foot (800 per day)	20 logs @ 100 cubic foot per log	-24,000
Council tax	1 per cubic foot	20 logs @ 100 cubic foot per log	-2,000
Residual income to logger before provisions	57 per cubic foot (but some stated as low as 48)	20 logs @ 100 cubic feet per log	+114,000
Residual income to loggers after provisions	-32 per cubic foot	As above	+64,000 to +99,000 (or in extreme cases -64,000)
Residual income to loggers after provisions assuming a 10% log rejection rate		As above	+34,000 to +67,000 (or in extreme cases -96,000)

3.9.26 It is clear from the financial analysis that logging can generate incomes of between G$1000-2000 per day if everything runs to plan. This is just above the Guyana minimum wage of G$700 per day. Longer than anticipated field work, unexpected extraction problems, high degrees of log rejection or order cancellation cause such meagre profits to evaporate. Increased regulation of logging would undoubtedly cause short term economic hardship.

3.9.27 Logging revenues are only possible if there is a market for the timber. Current global demand is low, and recent political instability has resulted in local markets also suffering. Of the 15 operational sawmills active along the Corentyne river five years ago, only nine are now operational and one would not expect to find more than 3 working on any one day. A brief survey was conducted of three of the neighbouring private SFPs and sawmills (Sadiek Juman, Doodnauth Naraime and R. Singh).

3.9.28 There was no evidence of forest management in the strict sense in the Orealla community, although systems of harvesting allocation existed. There was no capacity to use or interpret growth and yield model predictions.

3.9.29 Because there are no restrictions on timber harvesting in Amerindian reserves any incentives to determine and abide by harvesting restrictions in Orealla (derived from quotas perhaps set by the GFC based on growth and yield predictions) will have to come

from the Amerindian community itself. Since logging operations are among the only means of generating income in the reserve, the incentive to adopt harvesting restrictions will inevitably be determined by the perceived balance between short term financial imperatives and longer term concerns for sustainable employment. The exploitation of timber resources has already been such that future sustainability has been compromised - i.e. managing the remaining timber stocks in a sustainable manner would generate a very low rate of return. In short, the damage has already been done.

3.9.30 Orealla is not in a strong bargaining position. Without transport or advanced processing facilities they are forced to accept the terms and conditions of neighbouring concessionaires and processing facilities. Self-imposed restrictions on harvesting based on growth and yield predictions and the "allowable" yield would reduce current income still further, but would have benefits for future generations. Unless accompanied by a more thorough review of production and pricing within the Amerindian reserves (with negotiated agreements governing the same) it is unlikely that timber will provide reasonable returns in the short term, or any returns in the long term.

3.9.31 The current impact of the existing system on the environment in the Orealla reserve might already be termed catastrophic. Increased restrictions on regulated timber production elsewhere might exacerbate this situation. Internal adoption of self-regulation of harvesting might ameliorate the environmental situation, but may prove socially unacceptable in the short term.

3.10 Moraikobai

3.10.1 Moraikobai is an community of Arawak Amerindians on a tributary of Mahaicony River in region 5. The community was founded in 1932 by the protestant church under the name of the St-Francois mission (Boisvert, 1995).The community consists of 1036 people in a reserve area of 52,000 acres. The community is relatively isolated, accessible only by boat or by a 45 mile 2-3 hours drive from Linden, almost impassable in the wet season. The language of daily life is English with only the oldest people able to converse in their native tongue. This account draws on a single days visit which involved interviews with 6 village members (including two women), and a village meeting involving more than 20 participants, approximately one third (the more vocal third) were women.

3.10.2 Most of the villagers carry out a number of activities including subsistence agriculture, hunting, craft manufacture (mainly weaving craft by women) and logging. Almost all of the community men are involved in logging. Community members regarded this source of income as an absolute lifeline, and the reserve had several areas of commercially exploitable timber (unlike some of the neighbouring communities). The community did not have any additional concessional area which fell under SFP designation.

3.10.3 The community is well provisioned with a nursery (with 50 children) primary school (with 200 students), health centre, craft centre, guest house and some water services. A major impediment to future development was seen to be the inadequacy of transportation. There had been government promises of electricity provision but no evidence of work in progress. Apart from traditional craft, there were few outward signs of attempts to promote traditional culture, but an active programme of sporting events associated in part with National Heritage Month

3.10.4 The community is overseen by council headed by a Captain (Colin Andrews), a Vice Captain (Ricky Sutherland) and including a logging councillor. Unlike Orealla, the council

is not the sole go-between responsible for logging deals. Any timber extraction deals are arranged privately, but are subject to the council to the extent that the Captain distributes chainsaw logging permits, GFC logging tags and government transportation permits.

3.10.5 The community engages in logging of a variety of hardwood timber species including Greenheart (*Chlorocardium rodiei*), Kabukalli (*Goupia glabra*), Silverballi (*Licaria cannella*), Locust (*Hymenaea courbaril*), Shibidan (*Aspidosperma spp.*), Tatabu (*Diplotropis purpurea*), Dukali (*Parahancornia fasciculata*), Tauroniro (*Humiria balsamifera*) and Wallaba (*Eperua falcata*). Over the last few years, all timber has been ripped in the forest and extracted as sawn timber.

3.10.6 The community owns a total of some 172 chainsaws. There is no restriction on where the timber is extracted from. The prospecting team locates suitable trees to meet a current order, and felling operates on a first comes first served basis. Ripped timber is sold for G$30-38 per board foot, and tractor / chainsaw hire can account for G$12-14 from this total. Compared to Orealla, the current financial prospects for timber harvesting are much brighter.

3.10.7 While community members still speak of abundant volumes of timber within the reserve, it is readily acknowledged that extraction distances are increasing and that timber is harder to find. The main problem is the sporadic and unpredictable nature of the market which renders long term planning difficult.

3.10.8 A village meeting was held with more than 20 community loggers or their partners. The hopes and fears of the community members are recorded in Table 18.

Table 18. Hopes and fears of Moraikobai loggers

What are community hopes and fears for the children of loggers?	
HOPES	FEARS
Brighter income prospects	That the forest will be exhausted and there will be no alternative employment prospects
Better prices for timber	
Expanding markets for other lesser used species	
Potential investment in a community tractor and truck to reduce dependence on middlemen	
More access to development projects	

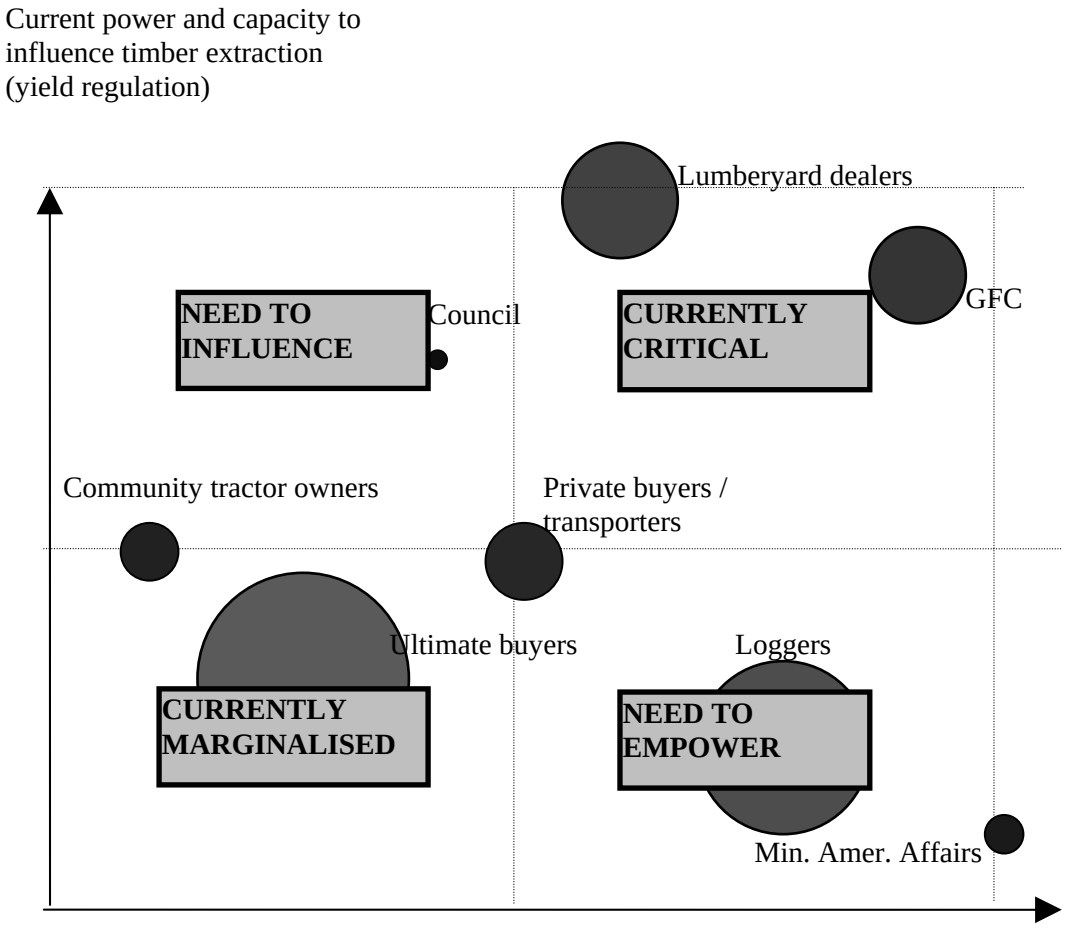
3.10.9 There then followed a discussion about who was currently influencing the logging trade in a ‘positive way’, and who might have the potential to influence the logging trade in such a way that the end result met their aspirations for their children. The discussion sessions largely paralleled those described in 2.1.4 and 2.1.5 above. The results are shown in Table 19 and Figure 14 below.

Table 19. Stakeholder influence on extraction - Moraikobai logger perceptions

Stakeholder group	Numerical size rank	Current power to influence what is harvested	Future potential to influence good forestry
Council	1	6	3
Ministry of Amerindian Affairs	2	1	8
Community tractor owners	3	4	1
Private buyers / transporters	4	4	4
GFC	5	7	7
Lumberyard dealers	6	8	5
Loggers	7	2	6
Ultimate buyers	8	3	2

3.10.10 It is interesting to note once again the importance of the intermediary buyers on the extraction activities in Amerindian reserves. Moraikobai felt that the role of outsiders (the GFC or Ministry of Amerindian Affairs) had much more potential to help them than their own council or logging association, in comparison with Orealla. They were particularly clear that the Ministry of Amerindian Affairs and the GFC should negotiate better timber pricing deals with the middlemen on whom the community depends.

Figure 14. Stakeholder influence on extraction - Moraikobai logger perceptions



3.10.11 In summary, there was no evidence of forest management in the strict sense in Moraikobai, despite the existence of systems of harvesting allocation existed. There was no capacity to use or interpret growth and yield model predictions.

3.10.12 Since logging operations are among the only means of generating income in Moraikobai, there may be an incentive to adopt harvesting restrictions based on predicted yields, but this will depend on the balance between short term financial imperatives and longer term concerns for sustainable employment.

3.10.13 Moraikobai. Like Orealla, is not in a strong bargaining position. Without transport or advanced processing facilities they are forced to accept the terms and conditions of neighbouring concessionaires and processing facilities. Self-imposed restrictions on harvesting based on growth and yield predictions and the "allowable" yield would reduce current income still further, but would have benefits for future generations. Unless accompanied by a more thorough review of production and pricing within the Amerindian reserves (with negotiated agreements governing the same) it is unlikely that timber will provide reasonable returns in the short term, or any returns in the long term.

3.10.14 The current impact of the existing system on the environment in the Moraikobai is likely to be severe (time did not permit extensive field visits). Increased restrictions on regulated timber production elsewhere might exacerbate this situation. Internal adoption of self-regulation of harvesting might ameliorate the environmental situation, but may prove socially unacceptable in the short term.

Recommendations:

14. It is recommended that a major programme of outreach and assistance be directed towards the Amerindian reserves in association with the Ministry of Amerindian Affairs in order to address current problems of exploitation and current / future problems of resource degradation.

18. It is recommended that the Ministry of Amerindian Affairs set up a unit dedicated towards the assistance of Amerindian logging operations (as these comprise the major source of employment and income for some communities).

19. It is recommended that this unit collaborate with the GFC in a major programme of outreach and assistance directed towards the Amerindian reserves in order to address current problems of exploitation and current / future problems of resource degradation.

20. It is recommended that the Ministry of Amerindian Affairs reanalyse together with the Amerindian communities, the costs and benefits associated with their exemption from logging restrictions.

24. It is recommended that the FPA make special efforts to incorporate smaller forest businesses and representatives from Amerindian reserves, in view of their perceived importance for the Guyana timber industry.

(F) ILLEGAL CHAINSAW LUMBERING

3.11.1 It was not possible to interview anybody involved in illegal logging activities for obvious reasons.

4. Certification

4.1 Certification

4.1.1 Certified markets might provide some incentive to bring timber harvesting in line with allowable yields. Nevertheless, there is abundant evidence from newly developing markets that increasing costs are usually borne by the producer, not consumer. As noted above, it is unlikely that sustainable yields will prove commercially profitable in the current context of the Guyanese timber industry.

4.1.2 A debate about certification is currently taking place through a series of working groups, established in July 2000, which cover four broad themes:

(1) Enabling conditions (Godfrey Marshall [GFC & group leader], Jowalla Somai [Guyana National Bureau of Standards], Rajdai Jagernauth [Ministry of Trade], Shiek Niamatalli [Variety woods and Greenheart Ltd])

(2) Entrepreneurial capacity (Mohabir Singh [Guyana Manufacturers Association & group leader], Mona Bynoe [FPA], Ravi Drepaul [GFC])

(3) Environment and management (Roderick Zagt [Tropenbos & group leader], Anil Chand [Parika Sawmills], Lloyd Andrews [Ministry of Amerindian affairs], Michelle Kellman [GFC] and Toni Williams [Guyana Shield Forestry Associates]).

(4) Rights and commitments (Janette Forte [Iwokrama & group leader], Ivor Marslow [Amerindian People's Association], Peter Persaud [The Amerindian Action Movement of Guyana], Luvindra Sukraj [GFC] and Simone Mangal {Iwokrama]).

4.1.3 In June 2001 the second National Stakeholder Workshop on Forest Certification drew together 70 people to discuss the critical issues put forward by the working groups (Forte *et al.* 2001). They also considered four alternatives for certification within Guyana:

(1) Forest Stewardship Council (FSC) without an endorsed national standard.
(2) International Standards Organisation (ISSO) 14001
(3) FSC endorsed national standard
(4) National Certification Scheme

4.1.4 Currently, there is a three month process whereby representatives of FSC, ISO and PEFC will put forward their criteria for endorsement of a nationally developed standard. At the end of that process (by September 2001) field testing of one alternative will be carried out and then consensus will be reached on whether to opt for a national standard endorsed by one of these agencies or a national standard after which international recognition will be sought.

4.1.5 Growth and yield models will be essential in defining the allowable yields which underpin any certification of sustainability. However, it may be that sustainability may need to be approached in a more innovative way - for example combining periods of non-sustainable harvesting with enforced concession fallows. Information from growth and yield models must continue to inform this debate.

5. Discussion of draft Memorandum of Understandings with GFC and Tropenbos

5.1 MoU with GFC

5.1.1 The MoU was submitted to GFC and the Commissioner solicited comments from senior staff and coordinated a joint response which made the following points which were dealt with by the Universities of Oxford and Edinburgh as noted in brackets:

- Page 1, Background - the first sentence should read “Guyana, with an area of approximately 214,000 square km” rather than 215,000 km (CHANGED)
- Page 1, second paragraph, third sentence - Amerindian lands, Iwokrama and mining leases are not excised from State Forest Lands. The sentence needs to be restructured or deleted (DELETED)
- Page 3, Purpose of this Agreement, first sentence, fourth line - should insert “second contract” before the phrase “project R7278 managed by the..” (DONE)
- Page 3, Purpose of this Agreement, item 2 - should be restructured to capture “restriction of Guyana’s (Barama and Tropenbos) data” (DONE)
- Page 3, Purpose of this Agreement, item 4 - this sentence should read “assist the GFC to develop and conduct appropriate...” (DONE)
- Page 3, The Agreement, item 4 - the team would like to have a copy of “Schedule 4” (TO BE PROVIDED)
- Page 4, item 6 - delete the terms “non-assignable and revocable”. GFC should have the right to use the tool since we are in partnership. (DONE)
- Page 4, item 7 - delete the second sentence. GFC feels since they may have the right to develop local versions of training materials, it should not be compulsory for them to get further approval from the University of Oxford before publication and distribution. GFC would inform the University of Oxford and the University would be given recognition if a local version were to be developed. (CHANGED but the issue here that anything that has been developed from FRP materials is really a "joint" output and hence the project leader needs to see this, to check that DFID (& JRP) and not going to object).
- Page 4, item 10, first sentence - delete “non-assignable and revocable” (DONE)
- Page 4, item 11 - delete the second sentence. The reason is as in point 8 (DONE).
- Page 4, item 13, second sentence - “...from such work will be submitted to University of Edinburgh”. GFC feels that since they may have the right to develop local versions, it should not be compulsory for them to submit to the University of Edinburgh any output for review. GFC would inform the University for possible comments, and the University would be given recognition were a local version to be developed. (UNDER CONSIDERATION BY GFC - The point here is one of

approach. IF GFC develops anything in isolation, this clause does not apply. The key thing here is that UoE staff have been involved in the work and have assisted the process. Hence once again, since this work has been partly funded by FRP, Universities of Oxford and Edinburgh must check with DFID/NRIL before releasing anything).

- Page 5, item 14, first sentence - delete “will” and replace with “may”. GFC staff may... (DONE).

- Page 5, items 16 to 18 - delete. GFC agreement with local partners will include local training, data processing and analysis, and written permission (reference to items 16-18). (UNDER CONSIDERATION BY GFC -This is the only one which was difficult to understand for the Universities of Oxford and Edinburgh. The purpose of these three points is to state that the FRP projects do not have the primary responsibility for training and data analysis for other stakeholders. It may be possible for UoE and Oxford to assist, but this would have to be agreed in advance. Hence the wording. Point 18 is important for us, so that there are no misunderstandings when we help GFC on any data analysis issue (as opposed to modeling).

- Page 5, item 20 to end paragraph at joint authorship, deleting “whenever this is possible and appropriate”. GFC would also like this paragraph to be restructured to include the restriction of Guyana’s data as stated in point 3. (DONE).

- Page 5, item 21 - replace “principal author” with “joint author” (UNDER SONSIDERATION BY GFC - Universities of Oxford and Edinburgh unable to agree to this. The reason is we are talking about the development of the model. This work would be strongly led by UoE staff (i.e. Paul Phillips) and is based on our previous work. This point only relates to the development of the model, not its application.)

- Page 6 item 26 - delete because it is stated already at item 22. (NOT DONE - UNDER CONSIDERATION BY GFC)

- Schedule 1, Terms of reference, item 3 - GFC would like part of the agreement to include protection of data. (DONE).

5.2 MoU with Tropenbos, Utrecht University

5.2.1 There was some confusion over the aims of the Memorandum of Understanding on account of the ready accessibility of the Tropenbos Pibiri data, but general support for the MoU as a means of formalising the relationship between the various parties of University of Edinburgh, the University of Oxford, Tropenbos Guyana Programme and Utrecht University.

5.2.2 Tropenbos staff wished it to be noted that there should be a clear distinction between the availability of data from PSPs in the Pibiri experiment and access to other inventory and economic data associated with the feasibility study for Reduced Impact Logging (RIL) prior to its publication. There was also a clear distinction between the case studies contemplated under R7278, R6915 and the RIL feasibility study being conducted with TGP / DTL.

5.2.3 Tropenbos staff wished there to be a written commitment to the publication of an article describing a Guyana version of the SYMFOR yield regulation model. This was important in order to avoid lengthy descriptions of the model in subsequent analyses or case studies.

5.2.4 Three major questions were raised regarding the MoU as currently expressed:

(1) How does MYRLIN produced by the University of Oxford relate to the consultancies of Denis Alder for Iwokrama and the GFC?

(2) What will the case studies entail and will there be any requirements for further Tropenbos inputs or data?

(3) What does MYRLIN have to do with Tropenbos, and what will Tropenbos inputs involve?

5.2.5 It was made clear that Tropenbos were interested in the comparative use of SYMFOR and the Denis Alder GFC models, but were unclear how MYRLIN fitted into the equation.

5.2.6 There were a number of specific changes requested to the MoU:

(i) Terms of this Agreement - Change the first sentence to "This agreement shall be deemed to have taken effect as at .....and the physical collaborative assistance will remain valid until 30 June 2002 unless....". Then add the sentence "The agreement regarding publication arrangements will remain valid until the time of their publication and the agreement will remain valid for the use of materials in analyses and simulations required to produce these publications."

(ii) The Agreement - para 5. Add the words "non-exclusive rights and access" before "to data from the TGP pibiri experiment".

(iii) The Agreement - para 5. Add a final sentence which says "TGP and Utrecht University provide this data without any warranty on its accuracy"

(iv) The Agreement - para 9. After the word "develop" in the first sentence add "and assist in the applications"

(v) The Agreement - para 13. Insert at the start a firm commitment to the publication of a Guyana model based on the SYMFOR platform e.g. "This partnership has as an important aim, the publication of outputs from any collaborative work. The University of Edinburgh is committed to publishing a technical description of a Guyana model, prior to any publication of the applications of that model."

(vi) Terms of Reference - para 5. This appears redundant since the data has already been supplied to Paul Phillips and Denis Alder.

5.2.7 In a meeting with Denis Alder, the situation with regard to MYRLIN and the GFC / Iwokrama consultancies was clarified. The history of involvement is as follows. In 2000, Denis Alder was commissioned by the GFC to develop tools for yield regulation based on the standard post-harvest stock survey. Tropenbos and Barama PSP data was used in the development of these tools.

5.2.8 A second Denis Alder consultancy will take place later in 2001 to develop similar tools which use other forms of data (e.g. pre-harvest inventory data).

5.2.9 Denis Alder was currently working at Iwokrama (July 2001) in order to develop a range of tools for yield regulation of both timber and non-timber forest products - including economic elements (referred to as Iwoplan). The aim was to provide best-bet solutions, but more importantly to highlight areas where further information was required in order to improve yield regulation. Neither of these consultancies had anything to do with R7278 or MYRLIN, although Denis Alder conceded that there were many elements in common with some of the tools.

5.2.10 MYRLIN is a series of simple Excel spreadsheets with some visual basic code. The intention is to show how much can be calculated with such spreadsheets and code. MYRLIN was therefore more about basic concepts which could be tailored to meet needs in different contexts. The underlying theories were not conceptually innovative and as such there were no issues of intellectual property at stake. The intention was to develop a package of entirely open, accessible and easy to use Excel spreadsheet which could be used with minimal data. Denis Alder stressed that the Tropenbos data was not a necessary element for the development of this MYRLIN toolbox. Indeed the data which had been put into the spreadsheets to make them relevant to Guyana had been taken from already published growth rates for different species (NOT from raw PSP data).

5.2.11 In September 2001, Denis Alder will participate in the Oxford training workshop in the use of MYRLIN run under R7278. He expected Guyana representatives to be present at that workshop. In preparation for that workshop, Denis Alder was to produce a manual. He anticipated that this would be sufficient to allow any of the participants to use the MYRLIN spreadsheets and code.

5.2.12 Since the case studies will use MYRLIN at two sites after this training workshop co-ordinated by GFC and Gavin Nicol, Denis Alder anticipated no difficulty in the completion of these case studies *provided* the relevant Guyana staff attended the workshop.

5.2.13 Denis Alder felt that the only way of encouraging use of yield regulation techniques was if either (a) they were part of the legal framework (but this would pose many capacity building and monitoring difficulties) or (b) they became part of a certification standard (although this might only affect larger producers). But were the certification committee members aware of yield regulation techniques, and did politicians understand the issues? These groups would be particularly important in terms of policy briefing notes.

6. Timescale and workplan for the case studies and collaborations between GFC, Gavin Nicol and R7278 and R6915.

6.1Timescale and workplan for the case studies.

6.1.1 Since the two GFC counterparts, Jagdesh Singh and Mohammed Khan will be in the UK at the growth and yield modelling training courses until late September, it was decided to start the case studies in mid-late October. Annex 3 contains the details of the process co-ordinated by the GFC which will pave the way towards these case studies.

6.1.2 The first case study will use SYMFOR to evaluate selected Barama blocks. The case study has been agreed by Barama Port Kaituma, but confirmation is needed from Barama headquarters (see Annex 3).

6.1.3 The second case study will use MYRLIN to evaluate a 100ha block in the Ituni Small Loggers and Chainsaw Association concession. Logistic preparations are required, and final planning dependent on the availability of the national silvicultural survey team.

6.1.4 The case studies will require one week of logistic preparation and four weeks each for the implementation of the case studies (54 consultancy days). This length of time is in line with the length of time required for the post-harvest national silvicultural surveys which will be carried out in association with the case studies.

7. Agree protocols for case studies with stakeholders

7.1 Explanation

7.1.1 It was not possible to agree the case study logistics and timeframe with the stakeholders. Allocated time did not allow for such work, as explained in the email sent to OFI in early August.

7.1.2 It is clear that there are many different stakeholders which affect management decisions at the concession level. It will be necessary to treat the case studies in a much more holistic manner than was perhaps anticipated - taking the time to explain to the different stakeholder groups the opportunities and potentially harmful impacts afforded by growth and yield modelling. An inclusive approach is advised, for which the backbone might be a multi-stakeholder forum on growth and yield. The new research group at GFC, which includes Peter van der Hout, might form the core of such a forum.

7.1.3 In discussion with Rene van Dongen (DFID consultant for the GFC Social Development Programme) it was clear that many elements of formal participatory techniques are not yet embedded within the GFC, hence the support for the programme. It will be necessary to work in tandem with training in social science techniques if the case studies are to maximise their impact. Similarly, it may be necessary to feed back particularly difficult issues which arise in the case studies to the social development programme.

8. Investigate the availability, nature and extent of economic data and models

8.1 Introduction

8.1.1 In order to make a more thorough assessment, not just of the allowable yield, but also of the financial implications of that allowable yield, it will be necessary to link growth and yield models with economic models calibrated in Guyana.

8.1.2 A thorough treatment of how to link growth and yield models with a financial model for forest concessions is given in McLeish and Van Gardingen (2001). In Chapter 8 on a generic approach to linking growth and yield models with financial models the authors highlight the need for financial models to express costs on the basis of units of activity (for example the extraction of individual logs, or the construction of a unit length of road) rather than on the basis of extracted timber volume (in cost per m^3 of timber extracted).

8.1.3 In the brief survey which follows, attention was paid to the type of data collected, the location of data collection and how representative this was for Guyana, and the form in which the data had been stored.

8.2 DTL - Tropenbos - IIED data

8.2.1 Maryanne Grieg Gran and Peter van der Hout were consulted about the financial data being collected for the RIL feasibility study in the DTL concession.. The aim of collecting this data was to compare the costs of conventional logging with those of Reduced Impact Logging (RIL). In particular the emphasis is on discerning what percentage of differences in costs are due to differing logging intensity under the two regimes, and what percentage of difference in costs is due to differing logging techniques. Data includes time and motion studies for different forest activities (including conversion values from DTL to allow machine and labour time to be turned into costs).

8.2.2 Data was being collected from activities in 34 plots of 100ha at Mabura Hill. The DTL concession is the nearest large TSA with road access from Georgetown. It is among the more representative sites for timber extraction within northern Guyana.

8.2.3 The data collection will be completed by the end of the calendar year 2001. It will be accessible in published form at some future date, but published costs will be expressed on the basis of extracted timber. The raw data which is being collected on the basis of units of activity will only be available through negotiation with the relevant parties (DTL, Tropenbos and IIED).

8.3 Other Economic data

8.3.1 There are a number of other studies which deal with the cost of timber operations. None of these is likely to be as useful as the data described above. Landell-Mills (1997) described in general terms the stumpage values for 8 Guyana forest industries. The raw

data may still be available, but is not published, and is viewed as confidential information by GFC.

8.3.2 There have been other studies of the production costs at DTL by Bernard de Souza, a copy of which resides at IIED, but the level of details is much lower than the current DTL / Tropenbos / IIED / Iwokrama study.

8.3.3 Peter van der Hout's doctoral thesis looks at DTL production costs over 4-6há blocks, but the current research at DTL in many ways supersedes this information. There is also some information available at GFC on market trends for the most important species, but these data are also incorporated within the new DTL research. In short, if up to date, reliable figures are required in a format that deals with forest activities rather than on a per volume basis, the best source is likely to be Maryanne Grieg-Gran's current work.

9. Examine the opportunities for providing the University of Guyana with teaching materials.

9.1 Introduction

9.1.1 This year (2001) marks the beginning of a new curriculum for the 2yr Diploma in Forestry and 3-4 yr BSc Forestry degree course. These interconnected courses based at the University of Guyana (UG) are specifically structured to cope with the relatively low academic level of entrants, many of whom arrive at University with only GCSEs.

9.1.2 Growth and yield modelling is perceived by the University lecturers as an important component of management planning for forest operations. There is less emphasis on the important links between yield prediction and policy formation. Nevertheless, there are a number of course modules which offer an opportunity to train UG students in the theory and practice of yield calculation.

9.2 UG course modules within which growth and yield modelling might be taught

9.2.1 In year one, during the first semester, the introductory forestry course includes a component on inventory and mensuration. While not dealing with growth and yield modelling per se, this element of the course could be used to introduce such models, and the importance of enumeration and permanent sample plots in furnishing appropriate data.

9.2.2 Also in year one, in the second semester, there is a further introductory course on surveying and mapping, which again will make mention of growth and yield modelling without specifically dealing with that topic.

9.2.3 In year two the course moves from general introduction to forestry specifics. There is a component on forest mensuration and inventory which includes three one-hour teaching modules on growth and yield, plus a one-hour practical course.

9.2.4 Also in year two, there is a component on forest management and planning which contains a further 1-2 hour taught session on yield regulation and control, including the theory of the allowable cut.

9.2.5 A further element of the course in year two is a component on information technology in forestry. It would be possible to draw attention to the practical manual on MYRLIN during the taught elements of this particular course.

9.2.6 The full Forestry degree course deals with growth and yield modelling only in year four. During the major component on forest concessions and resource management plans there is a practical exercise to develop a management plan. It was suggested that this practical exercise could involve the hands-on use of either MYRLIN or SYMFOR in order to calculate the allowable yield and develop appropriate management plans.

9.2.7 Also in year four, there is scope for students to undertake specific research projects. The UG is constantly seeking useful student projects, some of which might involve growth and yield modelling. Any suggestions should be sent to Gary Clarke before December 2001.

9.2.8 In order to make best use of the UG diploma and degree courses, it will be necessary to produce a basic manual for each module for use by the course lecturer (currently Bruce Thompson - Tel 222 6574). This should not be a technical manual, but rather cover the theory and practical use of the respective models. It will also be necessary to supply copies of the models calibrated for Guyana.

9.2.9 One of the major constraints to the use of growth and yield models is the availability of computers. While a new building is contemplated during the last phase of the DFID bilateral project in Guyana, consideration should be given by donors to equipping the building with adequate computers.

9.3 Other training alternatives

9.3.1 There are currently discussions about the possibility of constructing an ITTO / TFF vocational training centre in forest management. The idea is to train people in the practical operation of reduced impact logging (RIL). One option is that the DFID bilateral project may co-fund the construction of this training centre. For further information readers should refer to Chris Turnbull.

Recommendations:

5. It is recommended that University of Guyana lecturers in growth and yield accompany the case studies (funded by the FRP) in order to equip them with teaching examples for the relevant modules in the new curriculum and institutionalise growth and yield models within forestry education.

6. It is recommended that simple practical manuals on the growth and yield models MYRLIN and SYMFOR be submitted to the University of Guyana (and to any successful bid by the International Tropical Timber Organisation (ITTO) / Tropical Forest Foundation (TFF) to establish a vocational training centre in Guyana).

7. It is recommended that student projects at the University of Guyana be considered as a means of supporting the case studies or any follow-up activities.

10. Needs for the yield regulation of NTFPs in Guyana

10.1 Introduction

10.1.1 The production of NTFPs occurs both for subsistence (fruits, bushmeat, basketry etc.) and for commercial profit (cane furniture, palm hearts, balata artefacts, tree-based oils, mangrove bark etc). A good general introduction is that of Fanshawe (1950) which has since been updated by the work of Van Andel (2000). Other general studies include that of Christie Allen (in press) who has been studying resource use in the Makushi village of Surama. Iwokrama have produced an overview guide to the key NTFP species in the Iwokrama reserve (Thomas & Hammond, 2000). There are numerous works on palm species and a good introduction is that of Balick (1986).

10.1.2 In the discussion which follows, examples are given of NTFPs for which there is local and governmental concern over yield regulation (expressed in some cases by the commissioning of harvesting codes of practice). The examples do not encompass by any means the total number of NTFPs under local or national threat. Examples are largely restricted to commercialised species where there is some technical information and where there are strong market forces at work, rather than the diverse localised subsistence species for which there is little or no information.

10.1.3 *Well established stable markets under threat* - For some products such as Manicole Palm (*Euterpe oleracea*) production has been reasonably stable over recent years, with 5,947,000 stems harvested in 1994 and 6,625,749 stems harvested in 1997 (Government of Guyana 2000). The stability of production may, however, be threatened by unsustainable harvesting. Such is the concern that the GFC has commissioned a consultancy to draw up a code of practice for harvesting. Another species which has significant local importance but less national or international economic importance is the thatching palm Koterite (*Attalea maripa*) whose fruits are also used in jewellery and to make flour used in bread making. There is some speculation that the species is under threat near Amerindian settlements, but this has not had any quantified impact on the use of the species.

10.1.4 *Declining and / or changing markets* - For other products, there has been a marked decline in the market. For example, mangrove bark production fell from 73,400lbs in 1993 to nothing in 1997. The Balata trade (latex from *Manilkara bidentata*) has also suffered a marked decline due to product replacement, but with some recent new craft markets being developed (for example, craftwork animals produced in association with Conservation International). Since 1998 there had been a moratorium on harvesting *M. bidentata* for timber, pending a review of species abundance and the Balata trade, but this restriction has now been lifted.

10.1.5 *Expanding markets under immediate threat* - In some other cases, there are expanding markets, but with serious concerns over the over-exploitation of the resource base. The harvested roots of the hemi-epiphytes Kufa (*Clusia grandiflora*) and Nibi (*Heteropsis flexuosa*) for cane furniture and basketry are two examples. For Kufa in particular, traditional harvesting areas in the Pomeroon areas of northwestern Guyana have been exhausted. In addition, there has been an steady trend towards the harvesting of decreasing root diameters which may reflect either changing end uses (increasing basketry) or a depletion in the desired size classes. The issue is again being addressed through a GFC consultancy which will prepare a code of conduct for harvesting of the species.

10.1.6 *Expanding markets under longer term threats* - A final category of NTFP might be that which currently only enjoys very limited potential, but for which longer term economic prospects raise concern over the natural resource. One example is that of Crabwood Oil harvested from *Carapa guianensis*. Rapidly expanding markets in neighbouring Brazil have raised the prospect of expanded production in Guyana. Since the oil is processed from the seed, there is less immediate threat to the plant populations, but some longer term considerations regarding the natural regeneration of the species.

10.2 Palm heart

10.2.1 Palm hearts (or palm cabbage) are harvested particularly in the north west of the country and, after wildlife, comprise the most commercially important NTFP in Guyana. Production peaked in 1997 (with a total revenue of US$2,338,431 in exports). In 1997 production was running at 23-30,000 palm hearts per day resulting in an annual total of between 1400 and 1700 tons of canned palm hearts (Van Andel, 2000). The latter author reports a significant decline in 1999 due to reduced demand.

10.2.2 In Guyana there are five 'types' of palm heart probably belonging to two species, a most widely used clump-forming species *Euterpe oleracea* and the single stemmed *E. precatoria* (Van Andel, 2000). The former species is known in Brazil as Acai, where the fruit are a very popular staple food (see Anderson, 1986). Use of the fruit in Guyana is restricted to some Amerindian groups (e.g. the Arawaks). Van Andel gives a thorough treatment of the available information on recruitment, growth and mortality and the social and economic issues relating to harvesting.. Guidelines exist from Brazil on sustainable harvesting practice and similar recommendations have been made in Guyana (e.g. Johnson, 1995). There is scope to develop a growth model of the species, but it would necessarily be a stand alone model, since the interaction with rain forest growth and yield is minimal.

10.3. Thatching palms

10.3.1 Koterite palms (*Attallea maripa*) are widely used as a source of thatching material for roofs. A recent study by the University of the West of England has shed some light on the density of the species, with some data about the harvesting methods (one of which is to chop the tree down) (Butler *et al.* 1999). Significant further research would be needed to assess the growth of the species and the sustainable yields of leaves that could be extracted using different harvesting techniques.

10.3.2 Other palms of importance for thatching within Guyana include Dhalebana (*Geonoma baculifera*) which occurs in the interior under riverine Mora forest and Toolie (*Manicaria saccifera*) which occurs in the coastal wetlands (Van Andel, 2000).The limited interaction with rain forest growth and yield, and the paucity of available data suggests that modelling such species within the MYRLIN or SYMFOR frameworks is of marginal importance at the present time.

10.4 Balata

10.4.1 There is little threat to Balata through harvesting of the latex, but considerable threat from logging now that the moratorium on logging has been lifted. *Manilkara bidentata* is currently much used in bridge building. The high latex content in the timber makes for a

fine finish. The tree mast fruits roughly every once in four years and is an important fruiting species for a variety of wildlife species. There is therefore some justification for yield modelling, particularly where economic predictions can be added, since this would enable comparisons of the alternative values of the species for timber and NTFPs.

10.4.2 Launa Hall (prawn@apexmail.com) is completing a thesis (in association with Iwokrama) on the quantification of the effects of latex harvesting on the regeneration ecology of the species (see Hall, 1999). She has considerable data on the production of latex across different individuals (from a sample of more than 300 trees) and some tree growth data, although this is available elsewhere from PSPs. Denis Alder has been involved in the production of models for NTFP yield regulation in Guyana based at Iwokrama and is contemplating adding Balata to this list. Hans ter Steege (ex-Tropenbos) has published a paper on the phenology of Guyanese trees which includes *M. bidentata*.

10.4.3 It should be noted that Iwokrama paid for three consultants to conduct a review of the market potential of Balata in Guyana during late 2001. The extent to which information on production rates was compiled is unknown.

10.5 Nibbi

10.5.1 Nibbi (*Heteropsis flexuosa* and *H. jemanii*) is an aroid hemi-epiphyte which grows from the ground using roots attached to a neighbouring tree for support. Upon reaching the canopy free hanging roots develop which eventually reach the ground and thicken. It is only on reaching the ground that the roots are harvested for fine basketry or woven furniture material. Traditionally the roots were split before weaving, but fine roots are now used in weaving as a single strand. This practice allows finer roots to be used. There is an expanding market for cane furniture, the biggest manufacturer of which is Liana Cane. Single furniture items sell for as much as US$2000 in the USA and to a lesser extent in the Caribbean where the main export markets lie. The trend to use finer material may be a function of changing fashion or of scarcity of larger diameter resources. There are reports of diminishing supplies in the Pomeroon collecting areas in the north west of the country. GFC has commissioned Launa Hall to prepare a harvesting code of practice for the species. There is clearly demand for yield regulation of the species using best available data.

10.5.2 Bruce Hoffman from the University of Miami has published a Master's thesis which details the growth of Nibbi plants and assesses the impact and recovery of plants when different intensities of roots are harvested from within one plant (Hoffman 1997). The average growth rate from start of growth to first production of usable roots is estimated to be 61 years (assuming an average attachment height of 15m). The time between harvesting and the production of the next usable root is approximately 6 years.

10.5.3 Launa Hall in her doctoral thesis has demonstrated that less than 5% of the roots in any area are harvestable. She has data from 50m x 50m plots which colonisation to host species and size. Experimental treatments were conducted with harvesting treatments which include complete removal of all plants, removal of all roots from 25% of the plants, from 50% of the plants and from 75% of the plants.

10.5.4 A team from the University of the West of England have produced some data on tree characteristics which affect host specificity for *Heteropsis flexuosa* but recommend further research, since the data is based on a single site and a limited number of variables (Butler *et al.*, 1999).

10.5.5 Denis Alder has produced a model for Nibbi harvesting with an economic component. This forms part of Iwokrama's work on NTFPs. Iwokrama also paid for three consultants to review the market potential of Nibbi and Kufa in late 2001. The content of the report had not been finalised during this consultancy visit.

10.6 Kufa

10.6.1 Kufa (*Clusia grandiflora* and *C. palmicida*) forms the main structural cane for furniture manufacture in the region. There is some doubt over how many species are used, and there are certainly both tree and vine forms. Also a hemi-epiphyte this plant germinates in the canopy and roots are normally harvested between ¾ inch and 2 inch diameters when well established in the ground. Reports of harvesting much smaller diameter materials may be attributed either to tribal differences among collecting communities or might indicate scarcity of larger diameter classes. There are reports of scarcity in the Pomeroon collecting areas and increasing transport distances. The GFC has commissioned Launa Hall to develop a harvesting code of practice for the species. There is therefore some evidence of the need for yield regulation modelling.

10.6.2 Much less information on Kufa growth and ecology compared with Nibbi. Bruce Hoffman established a plot with 40 plants tagged and measured but after collecting initial data was unable to return to complete measurements. Launa Hall will attempt to locate and measure the plants as part of her research leading to a GFC harvesting code of practice. Denis Alder is also incorporating a yield regulation tool for Kufa into the model applications for Iwokrama.

10.7 Crabwood Oil

10.7.1 The Crabwood tree (*Carapa guianensis* Aubl.) is currently the fifth most important timber species in Guyana (Thomas, & Hammond, 2000). In addition, an oil is produced from the seed which is used as a repellent, medicine or in candles, shampoos and soaps. The oil sells for G$1000 per litre in Georgetown. There are evident potential conflicts between the use of the species for timber and for the production of crab oil.

10.7.2 Recent work in the Iwokrama rainforest has generated useful data on the distribution, population structure and seed production of the species (Payne, 2001) which could provide data for the development of a model. There is also a current FRP project working in association with Iwokrama which will provide data on the economics and social issues relating to the crab oil trade (Contact Caroline Sullivan).

11. Travel diary and summary of topics discussed

20/7/01 Friday

Godfrey Marshall, GFC - Work plan
Julian Evans, GFC- Work plan
Gary Nicol, DFID/GFC - Monitoring and work plan
Chris Turnbull, DFID/GFC - Institutional arrangements and work plan

21/7/01 Saturday

Launa Hall, independent - NTFP harvesting (especially Nibi, Kufa and Balata)
Christie Allen, independent - (briefly - resource use by the Makushi)
Roderick Zagt, Tropenbos - MoU, Case studies, influences on yield regulation
Peter van der Hout, Tropenbos - MoU, Case studies, influences on yield regulation
Eric Arets, Utrecht University - MoU, Case studies, influences on yield regulation

22/7/01 Sunday

Caroline Sullivan, CEH - Crabwood oil
Denis Alder, independent - MYRLIN and its relation to GFC.

23/7/01 - Monday

Godfrey Marshall, GFC - administrative details
Katherine Monk, Iwokrama - community forest activities - Iwokrama link
Janette Forte - Iwokrama - community forestry activities
David Hammond, Iwokrama - NTFPs and decision making models
Simone Mangal, Iwokrama - wildlife trade
Denis Alder - Iwokrama models

24/7/01 Tuesday

Godfrey Marshall, GFC - work plan
Mona Bynoe, FPA - planning meeting with timber producers
Ms Mohobyar, Office of the president - permission to enter Amerindian lands
Preparation and presentation at GFC session

25/7/01 Wednesday

Godfrey Marshal, GFC - Workplan
Luvindra Sukraj, GFC - Workplan
Julian Evans, GFC - Workplan
Jagdesh Singh, GFC - Workplan
Gavin Nicol, GFC - Workplan
Lloyd Andrews - Ministry of Amerindian Affairs - Amerindian issues
12 GFC staff members - interactive training session on power/potential (James Singh, Luvindra Sukhraj, Julian Evans, Godfrey Marshall, Christopher Raghunauth, Jagdesh Singh, Taryn de Mendonca, Sumedha Mahadeo, Padmattie Haripersaud, Gavin Nicol, Owen Bovell).

26/7/01 Thursday

Glenn Devere, Captain Orealla community - permission to enter community
Victor Henry, Orealla delegation - permission to enter community
Julian Evans, GFC - Finalising workplan
Rene van Dongen, DFID consultant - Social Development Programme training needs
Padmattie Haripersaud, UNDP/PROFOR - certification working group

27/7/01 Friday

Glenn Devere, James and Sing - Accompany Amerindian delegation to Orealla

28/7/01 Saturday

George Peneux and 3 Orealla loggers - household interviews about logging
Elvis Devere and 15 Orealla hunter/loggers - PLA on links between logging and wildlife

29/7/01 Sunday

Winston Peneux and family - household interview about logging
Mary logging crew - interview about current logging activities
Glenn Devere and Orealla council - explanation of forest mapping, planning and growth and yield modelling

30/7/01 Monday

Meeting with 25 Orealla loggers - interactive session on power / potential to influence forest management practices
Travel to Corentyne

31/7/01 Tuesday

GFC Corriverton - Concession allocation and logging markets
Sadiek Juman, Corriverton - CORTIM exporters and timber extraction and marketing
Doodnauth Naraim, Corriverton - Links with Orealla / other company SFP concessions
Robert Singh, Corriverton - Sawmilling using mixed hardwoods from Orealla

1/8/01 Wednesday

DAY OFF

2/8/01 Thursday

Return to Georgetown
Mona Bynoe, FPA - Current issues in the timber industry
Imtiaz Mohammed, A. Mazaharally and Sons - Concession practice
FPA staff members - interactive session on critical issues in the timber sector and a stakeholder analysis.

3/8/01 Friday

Anne Pitamber, EPA - discussion of MoU between EPA and GFC and the new environmental legislation on pollution.
Eliza Florendo, EPA
Logistic organisation.

4/8/01 Saturday

Report Writing

5/8/01 Sunday

Report writing

6/8/01 Monday

Julian Evans, GFC - Logistics
Luvindra Sukrak, GFC - Logistics
Peter Willems, Willems Timber and Trading Co. Ltd - Growth and yield issues

7/8/01 Tuesday

Alester Aulicio, GFC Bartika - Discussion and logistics
Jerry Kassim, Manager, Willems Timber and Trading Co. Ltd - Kaow Island
Separate interactive session with 14 male and 6 female employees of Willem Timber and Trading Co. Ltd

8/8/01 Wednesday

Alan Sarin, Manager, Toolsie Persaud Ltd - Logging inspection with inventory team
Interactive session with 7 logging and skidder operators

9/8/01 Thursday

Toolsie Persaud, Manaca logging camp - interactive sessions with 23 male employees and 8 housewives regarding the state of the company.
Toolsie Persaud, Manaca landing - interactive session with 4 loading staff and Greenheart squarers.
Chesterfield Simon, GFC Rangers Office, Manaca - implementing the tagging system.

10/8/01 Friday

Vinod Persaud, Director, Toolsie Persaud Ltd - growth and yield case study
Julian Evans, GFC - Progress report
Gavin Nicol, GFCSP - logistics of case studies

11/8/01 Saturday

DAY OFF

12/8/01 Sunday

DAY OFF

13/8/01 Monday

William D'Aguiar, Chairman - Ituni Small Logging Association
Meeting with 17 of the 40 members of the Ituni Small Loggers and Chainsaw Association (William D'Aguiar, Tony Murphy, Murthland Wilson, Cecil Percival, Cecil Dryden, Henry

Merchant, Rodulph Mars, Mr Mars, Wayne Brotton, Troy, Jewnu La Rose, Donald Souers, Pratie Jackson, Michael Kench, Irving Payne, Daniel Hope, Nick Reid, Hillary Gomes).

14/8/01 Tuesday

Travel to Port Kaituma
Mr Loh, Operations Manager - Barama Timber Industry
Mr Lall, Planning and Research Manager - Barama Timber Industry
Mr Jantai, Administrative Manager - Barama Timber Industry

15/8/01 Wednesday

Mr Wong, Assistant Production Manager - Main issues facing industry
Mr Rijonan, Skidding Superintendant - Main issues facing industry
John Harrison, Research Team - Inventory and PSPs
Freddie Rodrigues, Research Team - Inventory and PSPs
Visit to Port Kaituma Community to discuss issues facing community

16/8/01 Thursday

Field visit 110 SE of Port Kaituma to observe extraction team number 12
Meeting with 7 members of extraction team number 12 to discuss operational procedures and issues

17/8/01 Friday

Report writing
Meeting in Port Kaituma with women of Barama logger families to discuss social issues and the state of the industry.

18/8/01 Saturday

Travel to Georgetown
Report Writing

19/8/01 Sunday

Proposal background for GFC case studies at Barama and Ituni
Report writing

20/8/01 Monday - 24/8/01 Friday

Brasil on independent consultancy

25/8/01 Saturday

Report writing
Logistic preparation for visits to DTL and Morokobai

26/8/01 Sunday

DAY OFF

27/8/01 Monday

Travel to Moraikobai
Ricky Sutherland, Vice Captain and colleagues - logging practices in Moraikobai

28/8/01 Tuesday

Interactive session with 21 community loggers from Moraikobai
Return to Georgetown

29/8/01 Wednesday

Neil Bird, TCO - Briefing on growth and yield modelling progress
Julian Evans, GFC - preparations for DTL Meeting

30/8/01 Thursday

DTL, Current extraction activities
Field visit to laterite national silvicultural survey site

31/8/01 Friday

Field visit to extraction teams involved in current logging
Field visit to brown sand national silvicultural survey site

1/9/01 Saturday

Julian Evans, GFC - Discussions of proposed case studies
Mr, DTL - employment and projected timber exhaustion

2/9/01 Sunday

DAY OFF

3/9/01 Monday

Report writing
Godfrey Marshall, GFC - Debriefing and preparation for closing seminar
Neil Bird, GFCSP - Development of growth and yield modelling in Guyana
Gary Clarke, UG - Possibilities for inclusion of SYMFOR / MYRLIN in new national curriculum for Forestry Degree.

4/9/01 Tuesday

5/9/01 Wednesday

6/9/01 Thursday

Flight to Barbados

7/9/01 Friday

Graham Chaplin, DFID - Discussion of findings

8/9/01 Saturday

Flight to UK

References

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ANNEX 1 - Listing of TSAs and WCLs

TYPE	YEAR	CODE	OWNER	ACREAGE
TSA	1990	1 / 1990	Amazon Caribbean Guyana Ltd.	118,400
TSA	1991	4 / 1991	Barama Company Ltd.	4,126,600
TSA	1990	2 / 1990	A. Mazarally & Sons	214,125
TSA	1985	6 / 1985	A. Mazarally & Sons	160,006
TSA	1985	4 / 1985	Toolsie Persaud Ltd.	299,012
TSA	1985	7 / 1985	Guyana Sawmills (SS Rahaman)	279,787
TSA	1991	1 / 1991	Willems Timber Trading Ltd.	168,038
TSA	1985	2 / 1985	Nagasar Sawh Ltd	76,953
TSA	1985	10 / 1985	Willems Timber Trading Ltd.	133,800
TSA	1985	9 / 1985	A. Mazarally & Sons	180,122
TSA	1989	4 / 1989	Caribbean Resources Ltd. (CRL)	911,772
TSA	1985	3 / 1985	Interior Forest Industries	364,022
TSA	1985	11 / 1985	Interior Forest Industries	170,094
TSA	1985	8 / 1985	Mondeen Industries Ltd.	360,525
TSA	1990	4 / 1990	Nagasar Sawh Ltd	70,500
TSA	1991	2 / 1991	Demerara Timbers Ltd.	548,000
TSA	1991	3 / 1991	Demerara Timbers Ltd.	695,000
TSA	1997	1 / 1997	Case Timbers Ltd (Cancelled)	156,632
TSA	2000		JILIN	
TSA	1997	1 / 1997	Plywood industries (Cancelled)	95,000
TSA	1999	1 / 1999	W.A.I.C.O.	64,070
TSA	1991	5 / 1991	UNAMCO (Case/Berjaya)	237,000
TYPE	YEAR	CODE	OWNER	
WCL	1993	6 / 1993	Silva Timber Ltd	38,688
WCL	1999	1 / 1999	Guyana Int. Timbers	27,630
WCL	1988	1 / 1988	Quan/Vergenoegen Sawmill Ltd.	70,990
WCL	1993	4 / 1993	Makapa Woods Ltd	355,200
WCL	1993	5 / 1993	N. Sukhl & Sons	67,216
WCL	1993	1 / 1993	Tony Parsram (Cancelled)	44,800
WCL	1992	1 / 1992	Alan Glasgow Ltd (ALGLAS)	300,700
WCL			Conservation International	

ANNEX 2 - Listing of SFPs

Demerara Division					
Applicant's Name	Folio #	Acres	Tags	Hectares	Quota for year 2000 (m^3)
Abdool Shakur	Dem 35/94	878	32	355.32	95.94
Abdul Rahim	Dem 48/92	2500	91	1011.74	273.17
Almond Mohamed	Dem 62/98	2800	102	1133.14	305.95
Alton Fleming	Dem 62/93	2368	86	958.32	258.75
Amos Reid	Dem 61/91	1456	53	589.24	159.09
Aravina Woods Ltd.	Dem 29/87	15000	546	6070.42	1639.01
Aravina Woods Ltd.	Dem 74/89	11750	428	4755.16	1283.89
Associated Timber Dealers Inc.	Dem 22/96	7000	255	2832.86	764.87
Bertie Moralis	Dem 42/91	950	35	384.46	103.80
Bradley Federicks	Dem 22/00	1904	69	770.54	208.05
Brendon Parris	Dem 15/95	4875	178	1972.89	532.68
Carl Powers	Dem 14/95	1152	42	466.21	125.88
Carlton Hopkinson	Dem 40/94	3280	119	1327.40	358.40
Chandramma Ram Rambarran	Dem 19/00	13425	489	5433.02	1466.92
Colin Clarke	Dem 17/97	3136	114	1269.12	342.66
Courtney Handy	Dem 30/95	2625	96	1062.32	286.83
Cyril Downer	Dem 133/86	4300	157	1740.19	469.85
Dalip Trading	Dem 02/01	2100	76	849.86	229.46
Delbert Brummel	Dem 79/90	1808	66	731.69	197.56
Deokinandan Timber Co.	Dem 07/95	9050	330	3662.48	988.87
Devanand Dookie	Dem 50/97	3150	115	1274.79	344.19
Dhanraj Roopnarine	Dem 34/97	7500	273	3035.21	819.51
Digamber Basdeo	Dem 55/88	3350	122	1355.73	366.05
Elbert Fiedtkou	Dem 67/88	1075	39	435.05	117.46
Fadia Kadir	Dem 03/01	3825	139	1547.96	417.95
Federick Camacho	Dem 28/98	6200	226	2509.11	677.46
Franklyn Manbodh	Dem 50/93	2200	80	890.33	240.39
George Famey	Dem 56/92	1440	52	582.76	157.35
Guyana Marine Services Ltd	Dem 17/01	5570	203	2254.15	608.62
Grawan Parboodyal Singh	Dem 06/01	2810	102	1137.19	307.04
Herman Ramtahal	Dem 26/91	1850	67	748.68	202.14
James Park	Dem 36/86	3500	127	1416.43	382.44
James Samaroo	Dem 31/96	725	26	293.40	79.22
Jeneive Reberio	Dem 36/95	1520	55	615.14	166.09
Joan Angel	Dem 02/92	2124	77	859.57	232.08
John Wallerson	Dem 61/88	640	23	259.00	69.93
Joseph Playter	Dem 38/00	3024	110	1223.80	330.42

Lakeram Ragnauth	Dem 45/88	7925	289	3207.20	865.94
Lambert Lewis	Dem 51/93	4125	150	1669.36	450.73
Lana Alexander	Dem 43/87	2840	103	1149.33	310.32
Leaveil Skinner	Dem 36/00	4512	164	1826.00	493.02
Lena Clarke	Dem 06/95	2560	93	1036.02	279.72
Leonard Wilson	Dem 43/97	2500	91	1011.74	273.17
Linden Couchman	Dem 06/00	2597	95	1051.00	283.77
Linden Utility Co-op	Dem 04/95	7950	290	3217.32	868.68
Mabroc Junction (Mustapha Bacchus)Dem 26816	Dem 82/86	28816	1050	11661.68	3148.65
Mahase Rambarran	Dem 84/88	7075	258	2863.21	773.07
Magaret Seeram	Dem 12/98	1008	37	407.93	110.14
Mariabo Timbers	Dem 60/86				
Martin Leitch	Dem 13/95	3872	141	1566.98	423.08
Matta Dudhnauth	Dem 02/99	5459	199	2209.23	596.49
Mayjoy Agri. Co-op Society	Dem 91/85	1675	61	677.86	183.02
Mervin Mandboh	Dem 16/94	1250	46	505.87	136.58
Misri Persaud	Dem 32/00	4200	153	1699.72	458.92
Mohamed Khan	Dem 25/00	3875	141	1568.19	423.41
Mohan Singh	Dem 49/95	900	33	364.23	98.34
Muneshwar Sitaram	Dem 04/92	17370	633	7029.54	1897.98
Nandkumar Deodharry	Dem 52/94	9605	350	3887.09	1049.51
Oscar Chin	Dem 03/00	4977	181	2014.00	543.78
Oshar Ramgolam	Dem 31/92	3275	119	1325.37	357.85
Oswald Hayes	Dem14/96	10576	385	4280.05	1155.61
Owen Foo (Ideal Limber)	Dem 15/94	5110	186	2067.99	558.36
Patrewta Sawmilling & Timber Co.	Dem 04/00	11163	407	4518.00	1219.86
Patrick Lowden	Dem 05/85	6000	219	2428.17	655.61
Permeshwar Singh	Dem 34/92	5355	195	2167.14	585.13
Pritipaul Singh	Dem 26/95	15746	574	6372.32	1720.53
Rabindranauth Roopnarine	Dem 100/90	2875	105	1163.50	314.14
Ramesh Singh	Dem 42/93	10600	386	4289.76	1158.24
Ramnarine Jettoo	Dem 39/00	2800	102	1133.14	305.95
Rawleston Sumner	Dem 30/93	7025	256	2842.98	767.60
Rawlroy Enterprise	Dem 65/95	3900	142	1578.31	426.14
Raymond DeAbreu	Dem 08/01	2800	102	1133.14	305.95
Reagan Glen	Dem 17/95	3575	130	1446.78	390.63
Region # 10 Forest Procucers Association	Dem 23/01	23360	851	9453.66	2552.49
Rheuben	Dem 11/90	3700	135	1497.37	404.29
Richard Allicock	Dem 04/98	3216	117	1301.50	351.40
Richard Persaud	Dem 39/91	3616	132	1463.38	395.11
Rohan Singh	Dem 25/95	4500	164	1821.13	491.70
Safiran Mohamed	Dem 51/89	6425	234	2600.16	702.04
Seeranie Ramdhanny	Dem 34/94	4000	146	1618.78	437.07

Shelley De Ridder	Dem 32/96	16550	603	6697.69	1808.38
Tajpaul Narain	Dem 31/98	5625	205	2276.41	614.63
Tasleen Drepaul	Dem 01/98	2000	73	809.39	218.54
Trade Guyana Ltd.	Dem 25/89	4045	147	1636.99	441.99
Tyson Shaddock	Dem 12/95	1664	61	673.41	181.82
Vallen Bowen	Dem 08/86	3500	127	1416.43	382.44
Vernon Parmanad	Dem 12/01	7725	281	3126.26	844.09
Wallace Fleming	Dem 37/94	11000	401	4451.64	1201.94
Walter Reece	Dem 05/95	1376	50	556.86	150.35
Wilbert Hall	Dem 26/98	2935	107	1187.78	320.70
Willet Flemming	Dem 12/93	1605	58	649.53	175.37
William Ramlall	Dem 33/96	2440	89	987.45	266.61
Youth Development Muritaro	Dem 14/00	3403	124	1377.00	371.79
Essequibo Division					
Applicant's Name	Folio #	Acreage	Tags	Hectares	Quota for Yr 2000 (m3)
Abdul Kayum	Ess 11/95	2150	78	870.09	234.93
Allan Patrick	Ess 09/98	2300	84	930.80	251.32
Asween Bacchus	Ess 34/86	6128	223	2479.97	669.59
Blake Sawmills	Ess 39/86	15925	580	6444.76	1740.08
David Williams	Ess 07/98	200	7	80.94	21.85
Deonarine Ramadhin	Ess 07/00	2882	105	1166.00	314.82
Enos Zephania	Ess 32/85	3964	144	1604.00	433.08
Fitzroy Benjamin	Ess 49/85	10575	385	4279.64	1155.50
Gerald Joseph	Ess 17/93	1200	44	485.63	131.12
Gladwin Gill	Ess 11/98	2400	87	971.27	262.24
Guyana United Apostolic Mystical Council	Ess 13/90	350	13	141.64	38.24
Jerome Van Lange	Ess 18/96	7936	289	3211.66	867.15
Kissoon Doolal	Ess 02/95	18620	678	7535.41	2034.56
Krishna Mangal	Ess 06/96	2464	90	997.17	269.24
Lakeram Singh Haridat	Ess 03/98	4550	166	1841.36	497.17
Lancelot Douglas	Ess 08/98	5290	193	2140.83	578.03
Leon Mc Andrew	Ess 05/95	160	6	64.75	17.48
Lionel John	Ess 34/85	2600	95	1052.21	284.10
Maurice Balgobin	Ess 05/98	2385	87	965.20	260.60
Mohamed Alli	Ess 08/88	17175	626	6950.63	1876.67
Nandalall Maye	Ess 20/90	2550	93	1031.97	278.63
Narine Persaud	Ess 01/95	5340	194	2161.07	583.49
Patrick Changa - Rajahram	Ess 04/92	975	36	394.58	106.54
Ralph Williams	Ess 45/88	1225	45	495.75	133.85
River View Amerindian Council	Ess 05/85	3180	116	1286.93	347.47
Rockcliffe Parris	Ess 06/98	4210	153	1703.76	460.02

Sookraj Maye	Ess 27/91	1500	55	607.04	163.90
T Balkissoon	Ess 35/88	6725	245	2721.57	734.82

Annex 3 - Suggestions to GFC on case studies and their management

GROWTH AND YIELD CASE STUDY 1

Proposal to Barama to conduct case study on growth and yield using the SYMFOR model

Introduction

Considerable demand was expressed by Barama Port Kaituma management (Mr Loh, Operational Manager and Mr Lall, Head of Planning and Research) for growth and yield predictions using the existing PSP data. They agreed that a case study would be useful **conditional** upon the approval of Mr K.W. Chan at the Land Of Canaan Headquarters. The need for a growth and yield study should take account of the following important issues:

- The case study should address the primary issue of practical economic importance to the company: optimising future economic gains from harvesting. It will therefore be essential to link any modelling efforts to the availability and qualification of vegetation types in a map to be left with Barama (i.e. they wish to know where the most productive forest types are and how productive they are in order to plan future infrastructure development and harvesting).
- The case study should assess a second issue of economic importance: the likely recovery period of harvested blocks in different forest types. Barama wish to know WHEN previously harvested closed blocks should be reopened (e.g. they wish to know in the light of escalating current transport costs to increasingly distant harvesting sites, when will the yield in old blocks be sufficiently great that it is economically more viable to reopen them than continue to explore new blocks).
- The case study should also assess the likely differences in costs in the short and long term between current harvesting practice and certifiable practices.
- The case study should train the Barama research team in growth and yield modelling so that future assessments are independent of external assistance.
- The case study could compare the SYMFOR model with the current GFC national inventory model prepared by the GFC and Denis Alder
- Results from different projections should be written in a report, the style of which should be accessible to non-specialists (i.e. Barama do not want to have to employ a consultant to interpret he findings - noting their dissatisfaction with past consultancy efforts).
- The costs of accommodation, food and transport to and from Port Kaituma should be borne by the case study team. Barama would contribute through the staff time of the research team.
- Any additional inventory work necessary to answer these questions would be carried out by a GFC study team, perhaps in association with the national silvicultural survey (i.e. it should not impede the current operational inventory surveys necessary to maintain current company profits). Any additional costs would need to be negotiated between GFC and FRP.

Next steps:

1. Planning for the case study could begin, anticipating a 3-4 week period in late October and involving Julian Evans, Jagdesh Singh, Mohamed Khan and Gavin Nicol.

2. A short proposal must be written and submitted to Mr W.C.Chan at Barama Headquarters before the end of September which **justifies** why the case study would be in Baramas interests (see points 1-4 above), **asks permission** for an allocation of Barama research staff in late October, **suggests logistical details** (including a statement about the commitment of the team to cover costs using DFID Forestry Research Programme funding), and **summarises the intended outputs** (see points 1-4). A GFC staff member should be nominated to oversee this process and perhaps discuss the issues in person with Mr Chan.

3. An email should be sent by the end of September to all parties notifying them of the outcome of discussions with Barama Headquarters and including a timetable for the case study. Recipients should include James Singh, Julian Evans, Jagdesh Singh, Mohamed Khan, Howard Wright (howard.wright@plants.ox.ac.uk), Paul Van Gardingen (pvangardingen@ed.ac.uk), Gavin Nicol (gavin@networksgy.com) and Duncan Macqueen (duncan.macqueen@iied.org).

GROWTH AND YIELD CASE STUDY 2

Proposal to The Ituni Small Logger and Chainsaw Association to conduct a case study on growth and yield using the MYRLIN model

Introduction

There was considerable interest expressed by the Ituni Small Logger and Chainsaw Association (ISLCA) in a growth and yield case study using the MYRLIN model (which is designed to cope with situations where inventory data is lacking). MYRLIN would be appropriate because the concession area is partly on white sands where PSP backstopping GFC's current national inventory growth and yield model might be inaccurate.

William D'Aguiar, Chairman of the ISLCA and other available councillors agreed that a case study in late October or November would be desirable because it would furnish them with information which could be used in preparing their management plan. They solicited whatever help GFC could provide them with in this regard. They asked that the case study take note of the following important issues:

- The case study should be linked to the planned GFC national inventory study of the ISLCA concession.
- The case study, while not specifically set up for this aim, could provide some information for the proposed management plan for the existing ISLCA concession and the proposed additional 60,000 hectare concession area.
- The case study should assess the impact of current harvesting practice on the future yields of timber in the concession area.
- The case study should calculate the allowable yield on an annual basis for sustainable production.
- The case study could provide information which might lead to a suitable blocking and management structure under which sustainable management might take place. This structure could be incorporated into the ISLCA management plan.
- The case study could incorporate inventory data from a planned GFC national silvicultural survey to be done in the area and could calculate and improve upon current quota allocations for concessions on white sand areas. The quotas should be calculated in such a way that they do not change from year to year. These quota allocations should be modified for similar areas elsewhere.
- The case study should be used to train members of the ISLCA in growth and yield predictions, forest management issues and the organisation of cooperative logger associations. It could also seek to develop generic guidelines for this type of association. These generic guidelines could form the basis for GFC-mediated establishment of and support to similar associations elsewhere.
- The case study should be written up in a report accessible to the non-specialist, 40 copies of which should be produced and sent to Ituni (one for each member of the ISLCA).
- The case study team should cover costs of accommodation, food and transport to and from Ituni.

Next steps:

1. Planning for the case study could begin, anticipating a 3-4 week period in late October or November and involving Julian Evans, Jagdesh Singh, Mohamed Khan and Gavin Nicol.

2. A short proposal should be written and submitted to Mr William D'Aguiar at the ISLCA before the end of September which **justifies** why the case study would be in ISLCA's interests (see points 1-7 above), **asks permission** for the case study and an assignment of loggers to who will be responsible for the development of the management plan, **suggests logistical details** (including a statement about the commitment of the team to cover costs using DFID Forestry Research Programme funding), and **summarises the intended outputs** (see points 1-7). A GFC staff member should be nominated to oversee this process and perhaps discuss the issues in person with Mr William D'Aguiar.

3. An email/letter should be sent by the end of September to all parties notifying them of the outcome of discussions with ISLCA and including a timetable for the case study. Recipients should include James Singh, Julian Evans, Jagdesh Singh, Mohamed Khan, Howard Wright (howard.wright@plants.ox.ac.uk), Paul Van Gardingen (pvangardingen@ed.ac.uk), Gavin Nicol (gavin@networksgy.com) and Duncan Macqueen (duncan.macqueen@iied.org).

Annex 4 - list of species from DTL/Tropenbos PSPs with utility group classifications

The attached table puts each of the Guyana species into a utility group. The Key is as follows:

1a: non-commercial
1b: commercial
1b1: sawn lumber, logs
1b2: piles, revetment
1b3: poles, posts, shingles, staves
1b4: furniture, pallets, boxes, farm boards, doors, wooden craft
1b5: firewood, charcoal
1b6: protected / keystone

* high value
** medium value
*** low value

Specnr	Vernacular	Speciesgrp	Utilgrp
101	greenheart	5	1b1, 1b2, *
202	wallaba, so	5	1b1, 1b3, *
307	crabwood	10	1b1, 1b4, *
310	dukali	3	1b1, ***
312	kabukalli	9	1b1, *
315	kurokai	2	1b1, **
316	mora	2	1b1, *
317	purpleheart	8	1b1, 1b4, *
318	silverballi	7	1b1, 1b4, *
319	silverballi	6	1b1, 1b4, *
320	silverballi	3	1b1, 1b4, *
322	simarupa	8	1b1, 1b4, *
323	suya	2	1b1, **
324	tatabu	7	1b1, **
326	wamara	2	1b1, *
327	monkey pot	2	1b1, **
328	moraballi	3	1a
329	silverballi	10	1b1, 1b4, *
331	gale, ginger	4	1b1, 1b4, *
333	silverballi, s	10	1b1, 1b4, *
339	silverballi, “	10	1b1, 1b4, *
343	gale, greenheart	2	1b1, 1b4, *
346	gale, almond	3	1b1, 1b4, *
440	aromata	3	1b1, **
442	duka	1	1b1, ***
443	dukaliballi	1	1b1, ***
445	inyak	3	1a
448	tibokushi	4	1b1, ***
449	locust	7	1b1, 1b4, *
452	morabukea	7	1b1, **

455	suradan	1	1b1, **
456	fukadi	9	1b1, 1b4, **
467	paripiballi	3	1b1, ***
468	ubudi	6	1b1, **
469	iteballi	10	1b1, **
470	trulie	1	1a
471	shibadan, “	2	1b1, 1b4, **
472	shibadan, s	7	1b1, 1b4, **
501	baromalli, s	7	1b1, *
503	baromalli, s	2	1b1, *
504	maho, smo	7	1b1, **
505	maho, roug	5	1b1, **
507	asepoko	4	1a
511	itikiboroballi	5	1b1, **
519	kakaralli, bl	2	1b2, **
521	wina	1	1a
523	kakaralli, s	2	1a
525	kakaralli, th	4	1a
526	wirimiri	2	1b2, ***
532	kautaballi, f	4	1b5, ***
533	kokoritiballi	3	1a
537	marishiballi	6	1b5, ***
544	yuriballi	4	1a
569	burada	7	1b1, **
570	dukuria	10	1b1, ***
571	futui	6	1b1, 1b4, **
573	haudan	4	1a
574	huruasa	8	1b1, **
577	kauta	3	1b5, ***
578	kautaballi	2	1b5, ***
579	kokoritiballi	6	1a REPEAT
580	kararoballi	10	1b4, **
581	korokororo	5	1b1, 1b4, **
584	kudibiushi	2	1b1, 1b4, ***
586	maporokon	3	1b1, ***
587	marishiballi	4	1b5, *** REPEAT
589	moraballi	6	1a REPEAT
591	wadara	9	1b1, **
594	manariballi	8	1b1, 1b5, ***
596	hipanai	9	1b1, ***
597	ibibanaro	3	1a
600	hiwaradan	4	1a
601	itikiboroballi	3	1b1, ** REPEAT
602	ituri-ishi-lokodo	4	1a
604	komaramara	4	1a
605	unknown	3	
606	makarasali	3	1a
607	muniridan	4	1b1, **
608	shiballidan	1	1a
609	unknown	3	
610	devil “gran	3	1a

613	hikuribianda	3	1a
614	kanoaballi	10	1a
615	darina	5	1b1, 1b4, ***
618	waraia, pu	4	1a
619	kamadan, y	8	1a
620	fire tree	3	1a
623	kulishiri, w	3	1a
624	kamahora,	3	1a
625	kamahora,	2	1a REPEAT
626	“konoko sh	3	1a
627	kulishiri, bl	4	1a
630	okokoshi	1	1a
634	unidentified	4	
635	unidentified	8	
636	unidentified	10	
637	unidentified	1	
638	unidentified	1	
700	arara, broa	4	1a
702	parakusan	8	1a
703	awasokule	4	1a
707	trysil	1	1a
708	waiaballi	4	1a
709	sawari	9	1b6
712	duru	3	1a
713	kurihikoyoko	3	1a
715	kairiballi	4	1a
717	yari yari	3	1b4, **
718	kamahora	3	1a REPEAT
719	arara, smo	4	1a
722	kulishiri, ha	4	1a
723	aruadan	4	1a
725	komaramara	3	1a
727	kuyama, w	8	1b1, ***
728	akarako	3	1a
729	yaruru	7	1b4, 1b5, ***
730	warakosa	1	1a
733	manobodin	7	1b5, ***
737	wanania	3	1a
739	mabababalli	4	1a
740	haiawaballi	1	1a
741	kuyama, re	4	1b1, 1b5, ***
742	yawaredan	1	1a
743	hachiballi	2	1b1, 1b4, ***
744	mamuriballi	6	1b1, 1b5, ***
745	asepokoballi	4	1a
748	uya	10	1b1, **
751	hishirudan	4	1a
752	buruburuli	2	1a
753	adebero	3	1a
754	asashi	4	1a
756	sada	3	1a

758	manariballi	8	1b1, 1b5, ***
759	konoko	2	1a REPEAT
760	kibihidan	4	1a
761	dalli, like	6	1b1, 1b4, **
768	serebedan	2	1a
770	ruri	4	1a
777	kaditiri	10	1b1, ***
778	yeroko	3	1a
783	unikiakia	1	1a
785	congo pump	10	1a
786	shirada	1	1a
787	wakaradan	10	1a
788	kaiarima	2	1a
789	sarebebeballi	2	1b1, ***
790	okokonshi	4	1a REPEAT
798	warua	10	1a
801	aiomorakus	1	1a
802	arikadako	6	1a
803	ulu, smoot	1	1b1, **
804	ulu, rough	4	1b1, **
805	haiawa	1	1b1, ***
808	mamudan	4	1a
809	purpleheart	1	1b1, 1b4, * REPEAT
814	table tree	4	1a
902	barataballi	10	1a
904	huruererok	3	1a
905	karishiri	4	1a
907	mabwa	3	1b1, ***
908	tonka bean	7	1b1, ***
911	barakaro	5	1b1, ***
914	manyokina	9	1a
915	kakirio	3	1a
916	silverballi	10	1b1, 1b4, ** REPEAT
918	bobokotokon	1	1a
919	mahoballi	3	1a
921	buruma	10	1b1, ***
924	silverballi, s	7	1b1, 1b4, **
927	hichu	1	1a
929	muneridan	9	1b1, **
930	devil’s ear	7	1a
932	pasture tree	3	1a
940	lu palm	3	1a
941	devildoer tree	9	1a
942	arara, fine l	3	1a
944	makoriro	1	1a
947	monkey syrup	1	1a
948	pero-ishi-lokodo	3	1a
951	kakotaro	1	1a
999	unidentified	4	

Annex 5 - Copy of the MoU between GFC and EPA

MEMORANDUM OF UNDERSTANDING
BETWEEN THE ENVIRONMENTAL PROTECTION AGENCY
AND THE GUYANA FORESTRY COMMISSION

This MEMORANDUM OF UNDERSTANDING is made on October 13, 1997 BY AND BETWEEN the Environmental Protection Agency, a body corporate established under the provisions of the Environmental Act 1996 (Act No.11 of 1996 hereafter referred to as "The Act") of the Cooperative Republic of Guyana and having its place of business at IAST Building, University Campus, Turkeyen, Greater Georgetown (hereafter referred to as "EPA") of the One part AND the Guyana Forestry Commission, a body corporate established by the Guyana Forestry Act 1979 (hereafter referred to as "GFC") of the other part and both of which Parties are hereafter collectively referred to as "the Parties".

WHEREAS:

I. The parties are signatories to the Concordat on the Management of the Environment between the EPA and Ministries, Agencies and Statutory Authorities of the Government of the Cooperative Republic of Guyana;

II. Pursuant to the provisions of the said Concordat on Management of the Environment the Parties are desirous of formulating a Supplement Agreement between the Parties;

III. In the interest if implementing environmentally sound practices for the conservation management and sustainable development of forest resources.

The EPA AGREES TO:

(a) delegate in writing some of its responsibilities under the Environmental Protection Act,
in so far as they relate to forestry projects to the GFC;

I. review annual environmental reports prepared by the GFC;

II. develop and implement procedures for Environmental Impact Assessment ("EIA"), for issuance of Environmental Authorisation and for environmental monitoring;

III. receive EIAs from GFC (together with GFC recommendations) to approve or reject
EIAs and issue Environmental Authorisations for approved forestry projects;

IV. support institutional strengthening of the GFC, including human resources development, in the areas of environmental management, monitoring and conservation;

V. develop and implement appropriate Inter-Agency co-ordination mechanisms;

VI. review and act upon reports of non-compliance with Environmental Authorisation received from the GFC;

VII. finance the salaries and expenses of GFC's designated Environmental Officer and two field inspectors as identified in Annex A of the Non-Reimbursable technical Cooperation Agreement between the Cooperation Republic of Guyana and the Inter-American Development Bank, dated 06 February 1997.

THE GFC AGREES TO:

I. develop and share with the EPA, an environmental database of forestry projects;

II. review EIAs for forestry projects and recommend the EPA whether and Environmental Authorisation should or should not be issued;

III. ensure compliance with the requirements of the Environmental Protection Act before issuing contracts, permits or licences to loggers and saw millers;

IV. prepare an annual report on its environmental activities;

V. make investigations and report to the EPA incidents of non-compliance with Environmental Authorisation for forestry projects;

VI. follow the procedure established by the EPA for regulating research and prospecting on biodiversity;

VII. collaborate with the EPA in identifying areas for conservation and protection

VIII. give technical support to the Environmental Assessment Board and the Environmental Appeals Tribunal proceedings.

THE PARTIES AGREED TO:

I. establish Inter-Agency administrative procedure for the application for and issuance of Environmental Authorisations;

II. review environmental reports of forestry projects;

III. establish joint working groups for assessing applications for Environmental Authorisation;

IV. identify topics for environmental research in forestry and support such research endeavours;

V. work out procedures for delegating aspects of responsibility under the Environmental Protection Act, 1996;

VI. develop and implement environmental standards, monitoring protocols, regulations and guidelines;

VII. promote activities to safeguard the environment;

VIII. develop and implement programmes to promote and improve environmental standards and practices;

IX. develop and implement programmes to promote public awareness of environmental management and protection in forestry;

X. develop, support and implement programmes to acquire and upgrade logistical and scientific equipment and facilities required by the GFC for environmental monitoring;

XI. establish and implement environmental monitoring and enforcement procedures;

XII. develop and implement training programmes for GFC personnel in environmental monitoring and management;

XIII. make available to each other their respective libraries, laboratories and field facilities;

XIV. develop procedures for issuance of Environmental Authorisation;

XV. establish and implement compliance monitoring policies;

XVI. collaborate in resolving issues of mutual concern to the parties in the area of conservation, management and sustainable development of the forest resources of Guyana.

This Memorandum may be amended from time to time in writing as agreed between the Parties.

Signed for and on behalf of

The Environmental Protection Agency

Signed for and on behalf of

The Guyana Forestry Commission