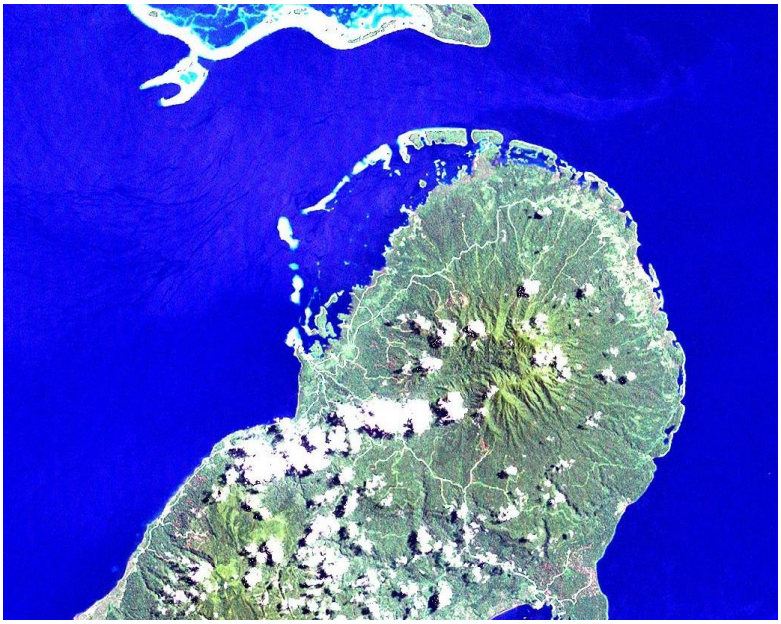
SOLOMON ISLANDS FORESTRY MANAGEMENT PROJECT

National Forest Resource Assessement

September 2003



LandSat satellite image of northern Rendova Island, Western Province, used to identify the extent of logging.

Prepared for

AusAID and Ministry of Forestry Environment and Conservation

October 2003

Prepared by

URS Sustainable Development
Project Managers and Consultants
Canberra Australia

DONOR AGENCY

AusAID
(Australian Agency for International Development)

62 Northbourne Avenue

Canberra ACT 2601

Ph: +61 2 6206 4589

AUSTRALIAN MANAGING CONTRACTOR

URS Sustainable Development

7-11 Barry Drive

Turner ACT 2612

Ph: (02) 6248 6900

Fx: (02) 6248 6999

CONTENTS

Limitations

URS Australia Pty Ltd (URS) has prepared this report for the use of Australian Agency for International Development (AusAID) in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and the standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared in 2003 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

Glossary

AIDAB	Australian International Development Assistance Bureau
AusAID	Australian Agency for International Development
dbh	Diameter measured at breast height (1.3m or above buttress)
FD	Forestry Division (of the Ministry of Forestry, Env. and Cons.)
SIFMP	Solomon Islands Forestry Management Project
Gross volume	The volume of the merchantable tree bole assessed as it stands in the forest.
Merchantable volume	The gross volume reduced to account for unsighted internal and external defects, felling damage and trees missed by harvesting operations.
GIS	Geographical Information System
ha	Hectare (10,000m^2)
SBD	Solomon Islands dollar
SI	Solomon Islands
SOLFRIP	Solomon Islands National Forest Resource Inventory Project
SOLFRIS	SI Forest Resource Information System
USD	US dollar

Acknowledgement

SIFMP wishes to acknowledge the efforts of the eleven contract field staff, mostly SICHE Forestry Diploma graduates, Poitete, who collected the post logging inventory data and assisted with the programs management:

Anderson Ifui	Team Leader, Team A (Apr-May)
Tony Rex Alu	Team Leader, Team A (June- August)
Catherine Doraania	
Casper Hutaiala	
Roni Aiwewe	
Arnold Keniherea	Team Leader, Group B
Moses Qaru	
Linford Jajo	
Ben Fafale	
Patson Taniveke	Project logistics and plantations assessment, Honiara
Evis Mumapio	Data entry, Honiara

SIFMP would also like to acknowledge the assistance of Forestry Division field officers based in:

Buala
Seghe
Munda
Gizo
Choiseul Bay
Kirakira

1 Executive Summary

Forests, both natural and planted, play an import part in the lives of all Solomon Islanders. Forests provide wood for cooking, timber for domestic housing, habitats for wildlife, a range of non-wood products such as foods and medicines, as well as protecting both land and marine water quality. Logging in natural forests also provides significant income for the Government through export duties and landowners through royalties. Plantations have the potential to provide significant incomes to landowners and economic benefits to the nation.

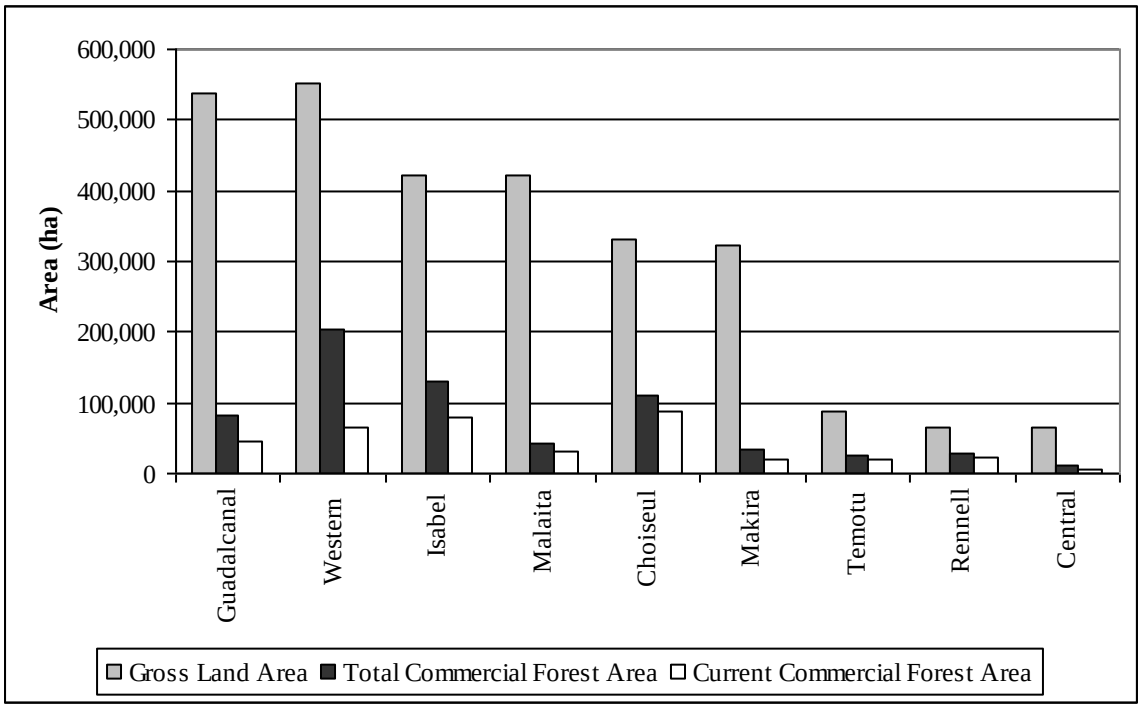
Because of the importance of forests, the Solomon Islands Forestry Management Project (SIFMP) carried out this study to produce a description of the current state of the Nation's forests and predict future wood and revenue flows. It includes an assessment of the implications associated with maintaining current export levels and managing for sustainability, where the annual log yield can be maintained into perpetuity.

Natural Forests

To evaluate future management options for natural forests, the extent of commercial forest for each province was estimated (Figure 1-1). The total commercial forest area represents the total "land base" for commercial logging activities (virgin and logged forests) and the current commercial forest area represents areas that are commercial today (virgin forests only).

When forest sustainability was assessed in 1995, environmentally sensitive areas totalling 320,000ha were identified and set aside for possible future conservation (ACIL, 1995a). Since then none have been nominated for reservation and under the current land tenure system it seems unlikely that this will change in the short or medium term. In the meantime a number of the areas have already been logged. On this basis, SIFMP re-introduced these reserve proposals into its assessment of commercial area. This is a significant change because the area represents a "new" source of approximately 6 million m^3 of timber when assessing national timber resources, equivalent to 9 years of harvesting at current log export levels.

Figure 1-1: Commercial forest area summary



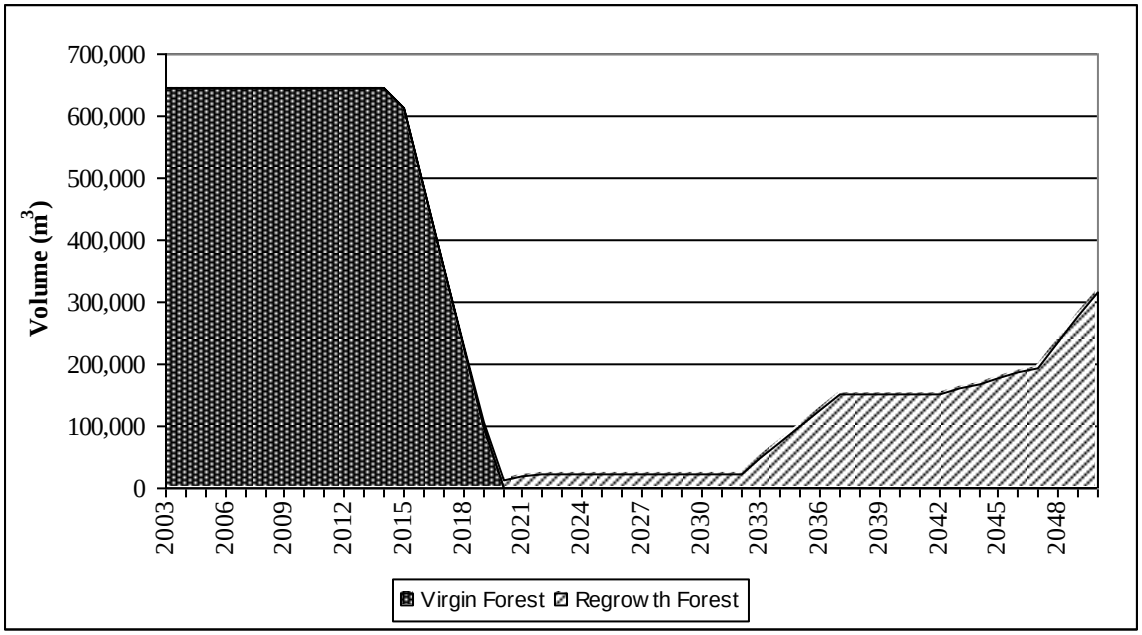
Source: SIFMP

Based on export records collated since 1994, logging operations yield an average 32m^3/ha, producing an average 645,000m^3/yr.

The impact of continuing harvesting at the average annual export rate was assessed by combining the commercial areas for the provinces with the greatest ongoing export potential, and treating this as a single resource. This assumes that as the availability of wood decreases in one province, logging companies will move to other provinces to maintain continuity of supply to their export markets.

The resulting woodflows (Figure 1-2) show that current harvest rates can be maintained until 2015 when virgin forest resources become exhausted. The sharp subsequent drop in available volumes is a direct consequence of harvesting forests quicker than they can regenerate.

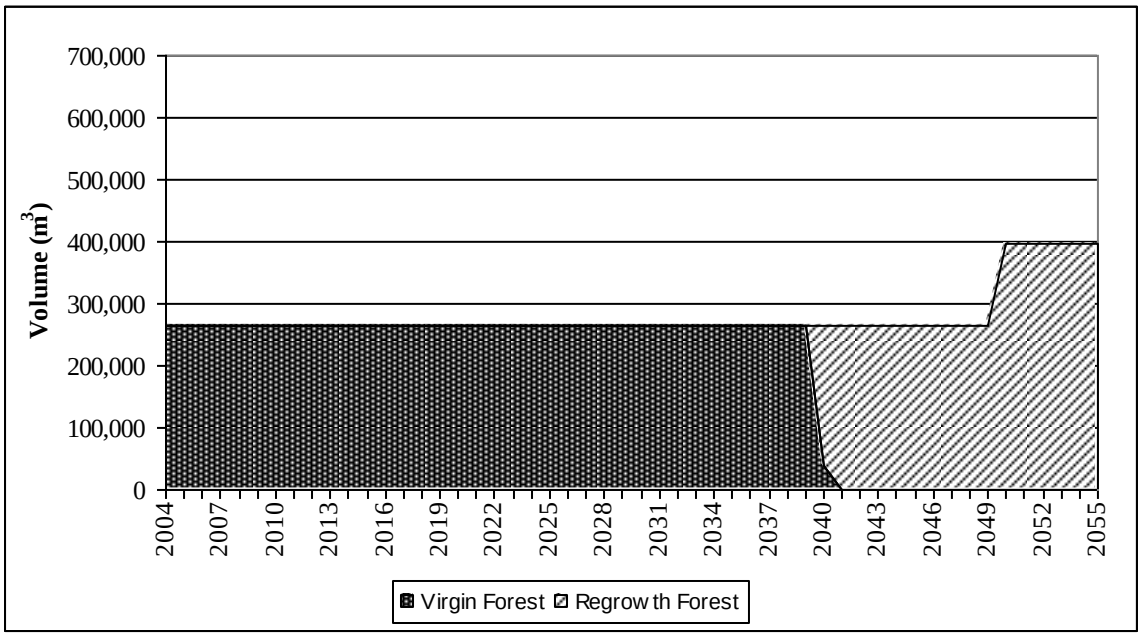
Figure 1-2: Predicted National woodflow for natural forests



Source: SIFMP

A full harvesting cycle must pass before the SI's can support an estimated long term sustainable export level of 398,000m^3/yr, sometime beyond 2050. To achieve this level without exhausting the land base in the interim, log exports would need to be capped at 263,000m^3/yr from 2004 to 2049. (Figure 1-3).

Figure 1-3: Sustainable National woodflow for natural forests



Source: SIFMP

Should Government implement a cap of 550,000m^3/yr, identified as a key strategy in the recently released National Forest Policy Statement (Solomon Islands Government, 2003), virgin forests would only support an additional three years of logging to 2018, by which time the land base would again become exhausted.

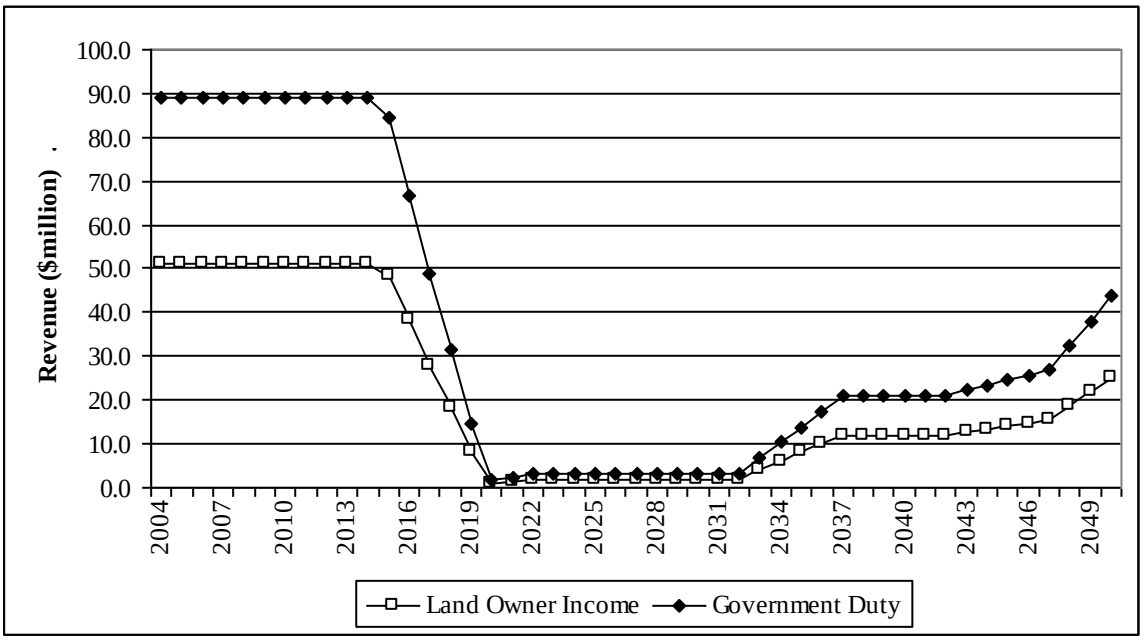
Natural forests contribute revenue to both the National Government and landowners. Government receives revenue through duties payable on log exports. The export value (in US dollars) on which the duty is payable (in SI dollars) is called the Determined Price. Its a value set by the Forestry Department (FD) on the basis of log sales of similar species in the Asia Pacific region, adjusted for differences in transportation costs. By using a fair market price to set the value on which duty is payable, the Government protects itself from transfer pricing, i.e. when the declared value of exported logs does not reflect their destinations landed price. The schedule for determined values was last reviewed in August 2003 and the average duty estimated to be SBD 138/m^3.

The amount of revenue received by landowners is negotiated with the logging company on a concession by concession basis, often including promises of infrastructure developments such as schools, sport fields and community halls. As a general rule, it is thought that landowners receive about 15% of the total log value, equivalent to an average of SBD 79/m^3.

The resulting predicted revenue flows in Figure 1-4 follow the sharp decline in virgin forests should current levels of harvesting continue.

Note that only direct revenues have been assessed and indirect revenues from company tax, income tax, GST and duties on imported equipment would boost the result. The multiplier effect of the forest industry on the wider economy was also not assessed.

Figure 1-4: National revenue prediction for log exports from natural forests



Source: SIFMP

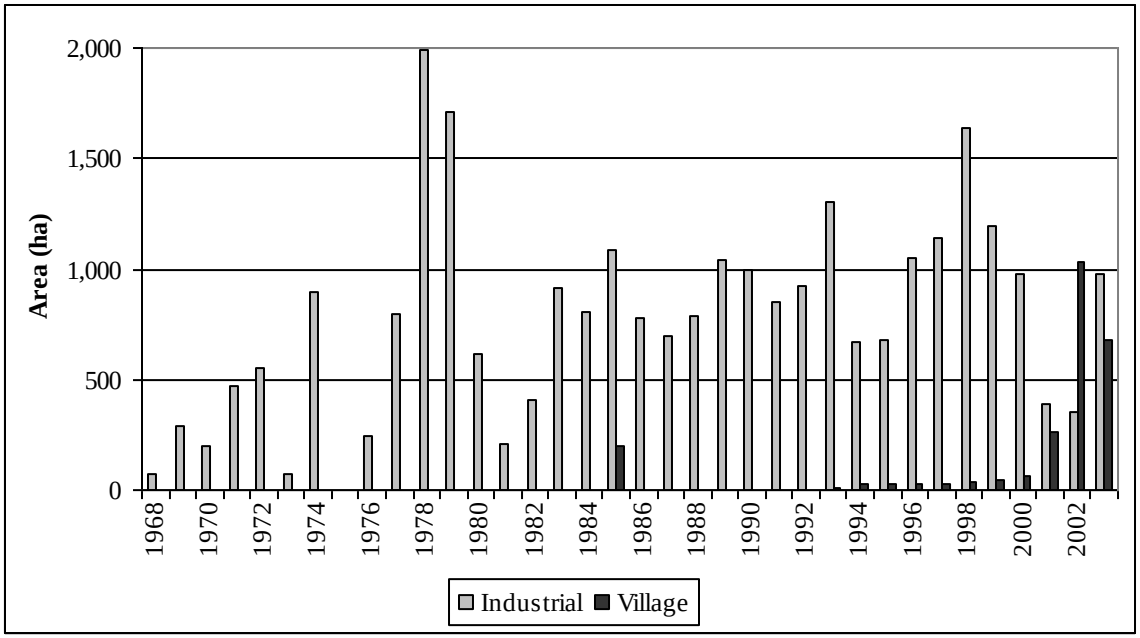
To achieve the long term sustainable export level of 398,000m^3/yr without exhausting the land base in the interim, log exports duties could generate SBD 36M/yr from 2004 to 2049.

Plantation Forests

Large scale, "industrial" plantations are located on Shortland, Gizo, Kolombangara, New Georgia, Isabel and Santa Cruz islands, and have an estimated commercial area of 28,000ha.

More recently, through a combination of better access to timber markets, high market prices and the gradual loss of their own natural resources due to logging, villagers are now establishing significant areas in their own right (Figure 1-5). These plantations, despite being individually small in size (on average 0.25-1ha), have the potential to become both a significant source of cash income and building materials. SIFMP has already compiled a database of 1,600 individual stands.

Figure 1-5: Age distribution of commercial industrial and village plantings

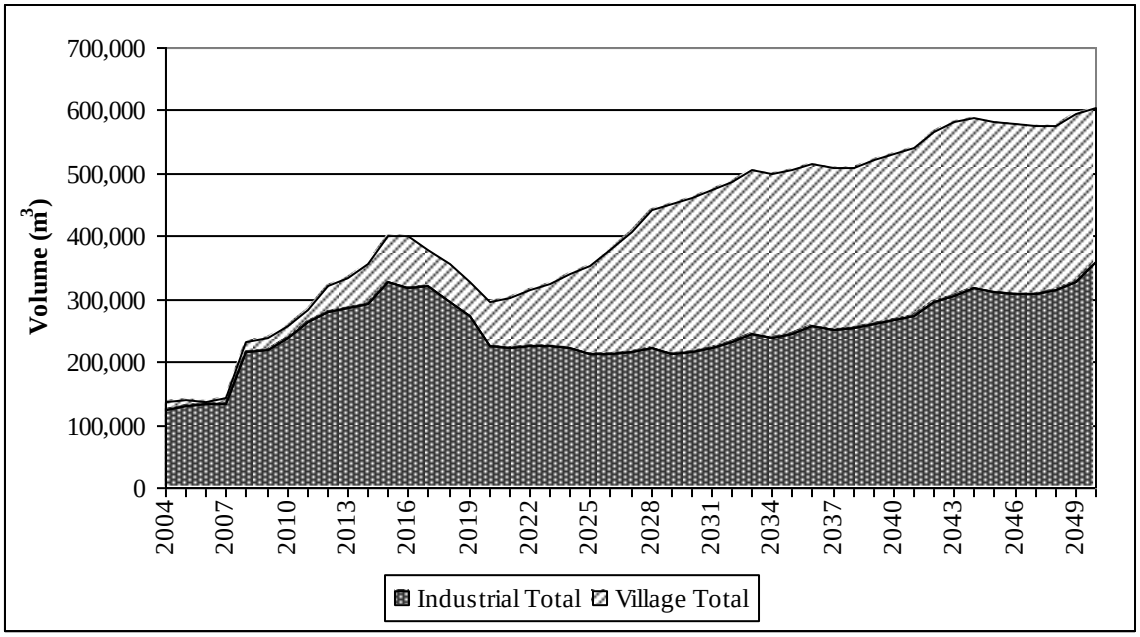


Source: SIFMP.

The opportunity to expand the industrial plantations is limited by the availability of land. At the village level the opportunity for plantation expansion is significant. The tradition of subsistence agriculture is ideally suited to small, family based plantation development where trees can be tended alongside food crops.

To assess the potential benefits of village level plantation development, the impact of a 1,000ha/yr national establishment program was assessed and compared to estimated yields from industrial plantations. The resulting woodflow (Figure 1-6) shows that industrial plantations are currently nearing the end of a maturing phase that could see production lift from 120,000m^3/yr to approximately 200,000m^3/yr by 2020. The more recent village plantation development will not begin to produce timber until 2008 when the first teak and mahogany thinning operations are scheduled, then building to a potentially significant 250,000m^3/yr by 2030 as the estate matures.

Figure 1-6: Potential woodflow by ownership

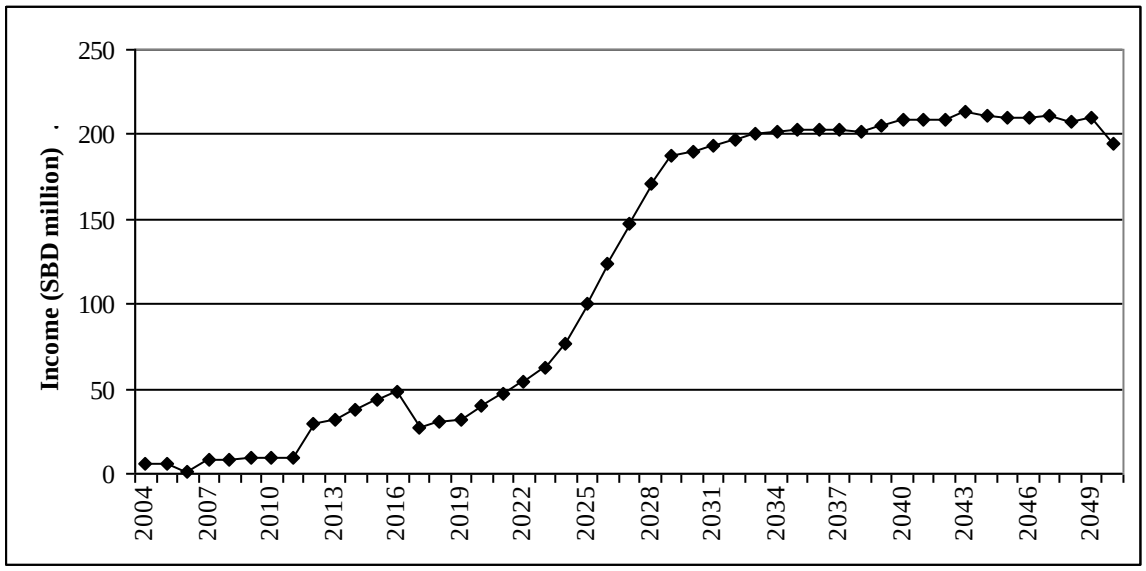


Source: SIFMP

There is no duty payable on the export of plantation grown logs so all proceeds, after deducting harvesting and transport costs, go directly to the forest owner.

For the village based plantations this translates into a potential direct income of SBD 200 million/yr (Figure 1-7) if current planting rates can be maintained.

Figure 1-7: Potential revenue generated by village plantations

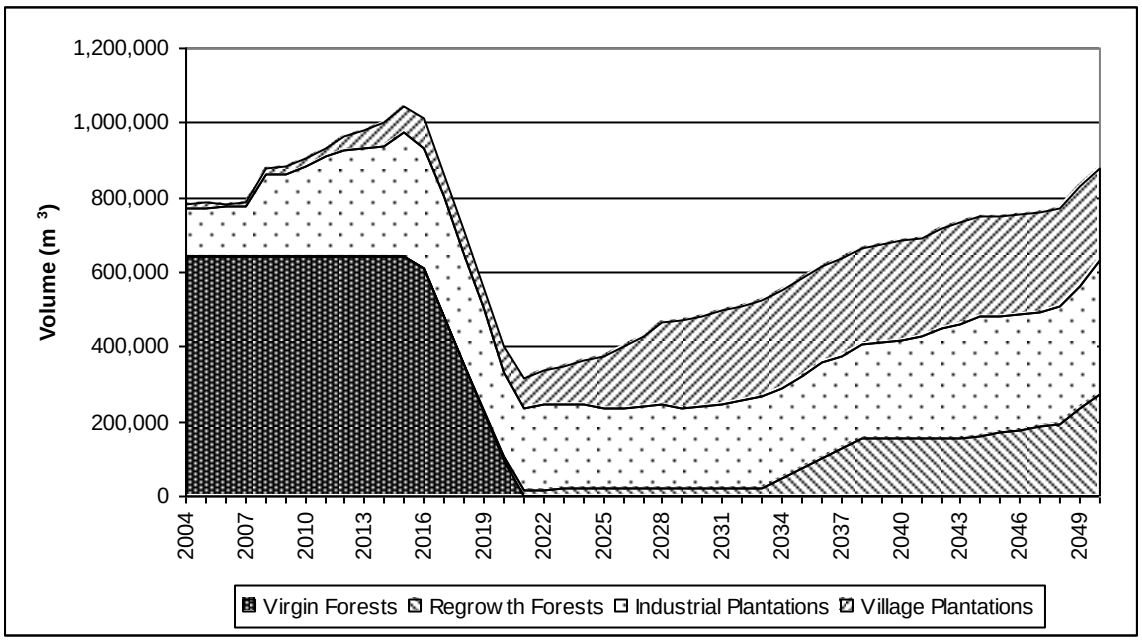


Source: SIFMP

National Forest Industry

The woodflows for natural forests and plantations were combined to produce a national forest industry perspective. Under the scenario of maintaining current logging rates, Figure 1-8 shows that virgin forests will be exhausted before regrowth forests and village plantations can make a significant export contribution.

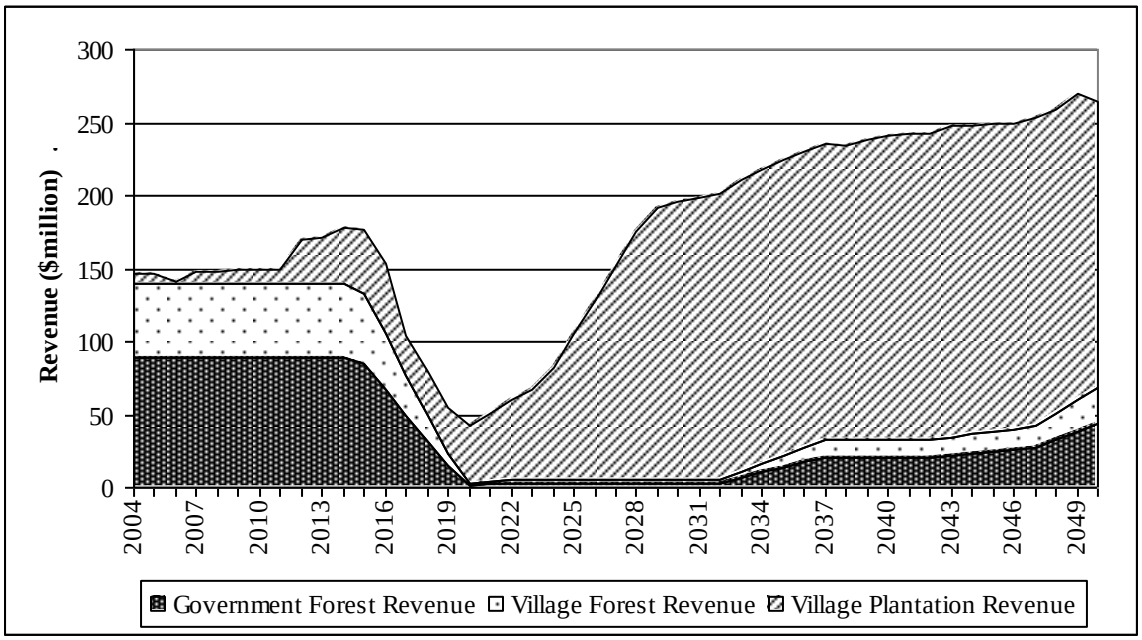
Figure 1-8: Natural forest and plantation woodflow summary



Source: SIFMP

Potential direct government and village revenues follow woodflow trends, with a significant dip in revenue for the period 2017 to 2025 (Figure 1-9).

Figure 1-9: Natural forest and village plantation, direct revenue summary



Source: SIFMP

Smoothing to some extent the revenue transition, from harvesting in virgin forests to harvesting plantation and regrowth forests, could promote a more economically sustainable climate for forest industry development.

To smooth the revenue transition, the SBD 1,953 million generated from virgin forests between 2004 and 2025 could support annual direct revenues of SBD 93 million for the same period. This is equivalent to capping harvesting levels in virgin forests at 430,000m^3/yr.

The national overview also highlights that, while woodflows for village plantations, industrial plantations and regrowth forests are projected to eventually contribute one third of the national log harvest each, village plantations have the potential to generate 80% of the total revenue.

2 Introduction

Forests, both natural and planted, play an import part in the lives of all Solomon Islanders. Forests provide wood for cooking, timber for domestic housing, habitats for wildlife, a range of non-wood products such as foods and medicines, as well as protecting both land and marine water quality. Logging in natural forests also provides significant income for the Government through export duties and landowners through royalties. Plantations have the potential to provide significant incomes to landowners and economic benefits to the nation.

Because of the importance of forests, the Solomon Islands Forestry Management Project (SIFMP) carried out this study to produce a description of the current state of the Nation's forests. To meet this goal, new information was combined with that collected by the 1995 Solomon Islands Forest Resource Inventory Project (SOLFRIP).

SOLFRIP concentrated on unlogged (or virgin) natural forests, which at that time was the dominant resource for the timber industry. Now the unlogged natural forests are very much diminished and logged-over (or regrowth) forest and plantations are becoming increasingly important. This study has produced a National Forest Estate Model made up of the following components:

1. The unlogged (or virgin) natural forest;
2. The logged-over (or regrowth) forest;
3. Large-scale, commercial plantations; and
4. Small-scale, landowner plantations.

This model is used to estimate the current state of natural and plantation forests and to predict their future wood and direct revenue flows. It includes an assessment of the implications associated with maintaining current export levels and managing for sustainability, where the annual log yield can be maintained into perpetuity.

3 Background

The principal forest resource data used to date for forestry planning purposes in the Solomon Islands (SI) was collected between 1992 and 1995 as part of the Solomon Islands National Forest Resource Inventory Project (SOLFRIP). The project was funded by the Australian International Development Assistance Bureau (AIDAB) and carried out by ACIL Australia, International Forest Environment Research and Management, and ERSIS Australia assisted by the SI Ministry of Natural Resources.

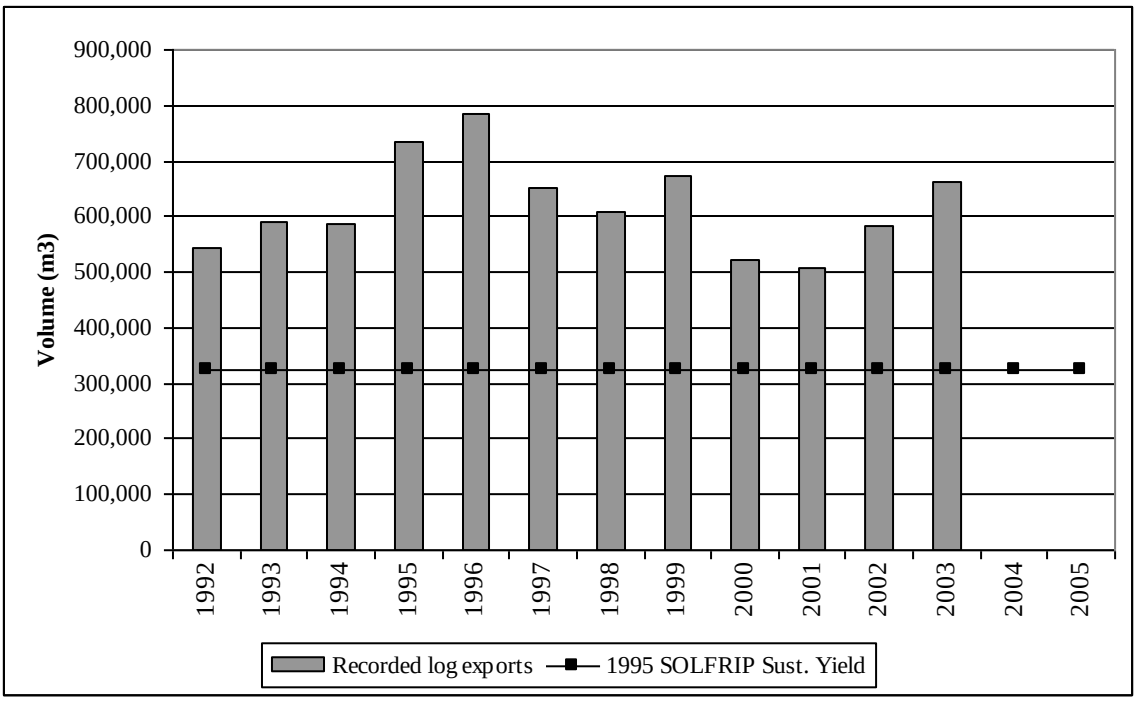
The goal of SOLFRIP was to establish a computerised system that would improve the capacity of the SI Government to develop strategies for forest resource use (ACIL, 1995a). To achieve the goal the project had six components:

1. Establishing a computerised database (SI Forest Resource Information System or SOLFRIS);
2. Estimating timber values;
3. Estimating environmental and community forest values;
4. Deriving a preliminary resource plan;
5. Training staff in forest inventory techniques; and
6. Project management and reporting.

The project developed a computer mapping system (MapInfo GIS) of forest types and land use and a text based database of forest inventory results. The information stored in these systems was subsequently summarised for each of the eight SI provinces and used to estimate a nationally sustainable commercial forest yield of around 320,000 m^3/yr.

Since 1992, annual logging volumes have been well in excess of the SOLFRIP estimate of sustainable forest yield (Figure 3-1).

Figure 3-1: Comparison of SOLFRIP predicted sustainable log harvest levels and official logging yields



Source: FD log export database & ACIL (1995a)

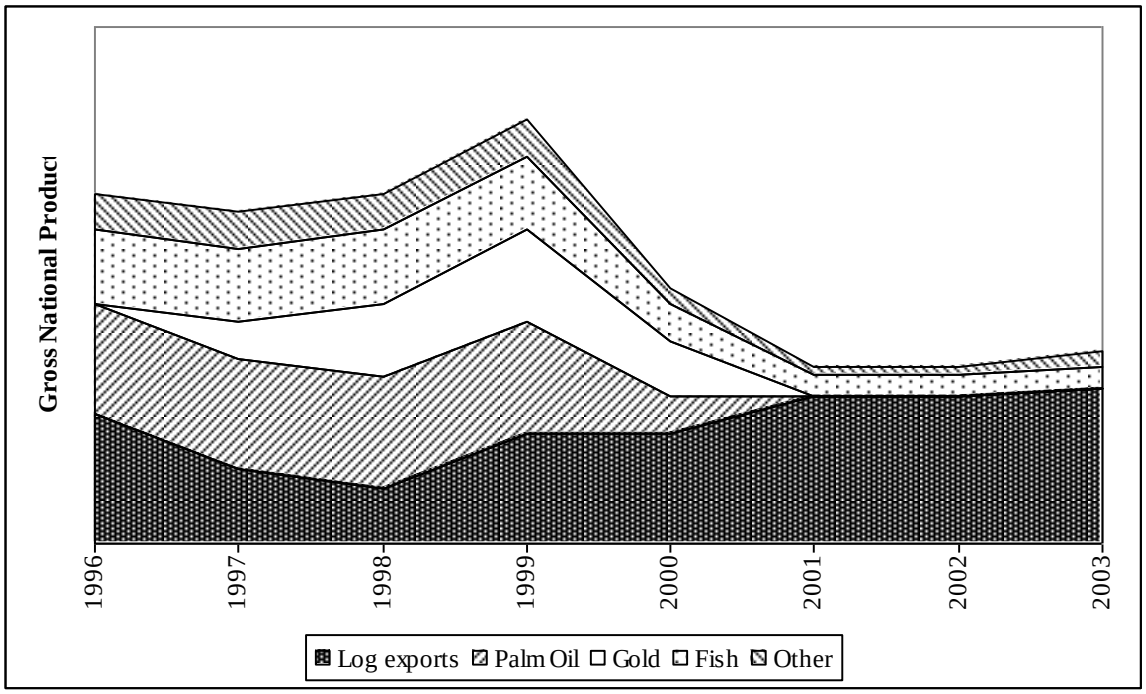
In 1999, following consultations with the SI Government, AusAID initiated the Solomon Island Forestry Management Project (SIFMP) with one of the objectives being the promotion of sustainable forest development.

SOLFRIS was still seen as the primary tool for determining potential forest uses and estimating sustainable forest yields. However it was found that SOLFRIS was no longer useful because it had not been maintained by entering licence areas as licences were issued and indicating which areas had been logged.

In 2000 an attempt was made to estimate the sustainable level of cut by subtracting the total volume harvested since 1995 from the 1994 SOLFRIP estimate of standing volume (FORTECH, 2000). While there were substantial reservations about the reliability of the data used, the method was able to produce a rough estimate of the sustainable level of cut. It was found that as a result of unsustainable harvesting the national sustainable yield had fallen from around 320,000 m^3/yr in 1995 to around 200,000 m^3/yr in 1999.

In June 2000, widespread civil unrest broke out and a number of private industries were abandoned. When civil order returned, forestry and fishing activities became almost the sole income source for the SI Government. Consequently, pressure on forests has increased (Figure 3-2).

Figure 3-2: Changes in the SI economy as a result of the "ethnic tension"



Source: SIFMP

Under these circumstances SIFMP judged it unlikely that logging would reduce to sustainable levels. To identify the remaining resource and to estimate the future impact of current logging levels, SIFMP have carried out a national forest resource update, which is the subject of this report.

This update has used a combination of field assessment and the analysis of satellite photographs to update SOLFRIS. The model developed to analyse the forest resource has been designed such that it can look at a wide variety of scenarios.

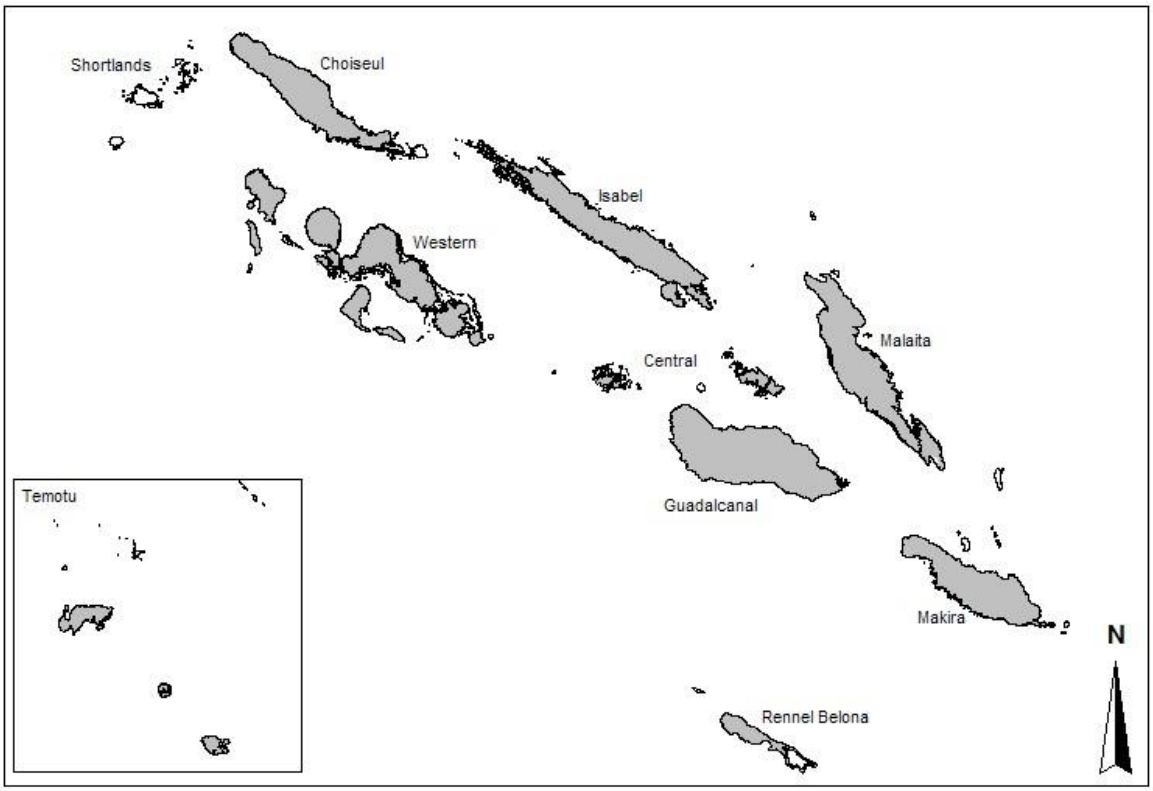
4 Natural Forests

4.1 Current commercial forest area

FD does not have a system in place to record changes to commercial forest areas following logging, village activities or natural disturbances over time since they were last collated by ACIL (1995a). To evaluate future management options it was therefore necessary for SIFMP to make new area estimates.

SIFMP used forest condition information, collated through air photo analysis by SOLFRIP, as the basis for the review (Figure 4-1). By identifying commercial forest type, canopy density and crown size classifications, areas of low or nil commercial value were separated from those that have a high value (see Appendix B for details).

Figure 4-1: Extent of SOLFRIS forest type information available (shaded areas)



Source: SIFMP

The SIFMP classifications for commercial forests were generally the same as those adopted by SOLFRIP and crosschecked by overlaying Landsat satellite images (which show past logging activities) with forest type data.

Having identified commercial forest types, factors which limited logging access were taken into account and areas removed where :

- Slope was greater than 30 degrees (Code of Practice exclusion);
- Elevation was greater than 400m (Code of Practice exclusion);
- Forests were located within a one kilometre radius of a village (to account for agricultural activities); and

- Conventional logging is unlikely because of stand size or poor access due to isolation[1].

The remaining commercial forest areas were then tagged with their location inside or outside known harvest licence boundaries (logging status), and their slope (0-15 or 15-30 degrees).

Using this information, areas were further adjusted for:

- Semi-commercial forests, which were assumed to produce 40% of the volumes harvested from fully commercial areas;
- Forests on steep slopes, where areas of 15-30 degrees slope were assumed to produce 50% of the volumes harvested from 0-15 degree slopes, due to the difficulty of access;
- Forests within current licence areas, which were assumed to still contain 50% of their original volume on the basis that harvesting may be anywhere from just beginning to nearing completion;
- Stream and river buffers, which are estimated to occupy 7% of a concession area; and
- Land access, where 2% of the current (but not future) commercial area is deemed inaccessible after becoming isolated by current licence boundaries.

When forest sustainability was assessed in 1995, environmentally sensitive areas totalling 320,000ha were identified and set aside for possible future conservation (ACIL, 1995a). Since then none have been nominated for reservation and under the current land tenure system it seems unlikely that this will change in the short or medium term. In the meantime a number of the areas have already been logged. On this basis, SIFMP re-introduced these reserve proposals into its assessment of commercial area. This is a significant change because the area represents a "new" source of approximately 6 million m^3 of timber when assessing national timber resources, equivalent to 9 years of harvesting at current log export levels.

Taking into account the adjustments, Table 4-1 summarises the final net commercial areas by Province. Maps of their location are provided as part of the Provincial summaries in Appendix A.

When comparing the SOLFRIP and SIFMP data, the large commercial area reductions for Guadalcanal, Western and Choiseul Provinces highlight the impact of intensive logging activities. In contrast, the commercial area for Isabel Province has increased due to the reintroduction of areas previously set aside for reservation, despite the presence of ongoing logging operations.

[1] Subjective assessment based on local experience of logging practices, potential road and ship access.

Table 4-1: Current net commercial area summary (ha)

Province	Gross Land Area	SOLFRIP[1] Loggable	SIFMP - 2003 Commercial	SIFMP - 2003 Semi-commercial	SIFMP - 2003 Total
Guadalcanal	538,700	71,800	43,500	1,000	44,500
Western	551,500	182,100	63,300	900	64,200
Isabel	422,800	71,600	76,800	1,300	78,100
Malaita	422,000	54,000	29,300	500	29,800
Choiseul	330,200	115,300	88,700	400	89,100
Makira	321,900	31,900	19,300	1,700	21,000
Temotu	87,700	23,700	19,600	300	19,900
Rennell	65,900	33,900	22,000	2,000	24,000
Central	64,500	14,400	6,600	100	6,700
National	*2,805,200*	*598,700*	*369,100*	*8,200*	*377,300*

Source: 1 ACIL (1995a). Loggable area does not include environmental exclusions, also reported by ACIL (1995a) as the "Safe" area.

4.2 Future commercial forest area

Future commercial timber areas will be different from those that are commercial today, and are important for determining the future flow of wood from forests. For example, an area harvested five years ago could not sustain a commercial operation today but over a period of time it will regenerate and harvesting could again become viable.

The period, or rotation length, over which this is likely to occur in the Solomon Islands was assessed by ACIL (1992). Data from the Kolombangara Ecological Study was used to predict a 40-45 year rotation length for logged forests, and a 30 year rotation length for forests recovering from natural disturbances such as cyclones. No new data have been collected in the Solomon Islands since this study was carried out that could verify this work, however the rotation lengths are similar to those for comparable South East Asian forests.

The main sources of land for commercial logging operations in the future are likely to come from:

- Land harvested in the mid 1970's and 1980's, when the first large scale commercial logging commenced in Western and Isabel Provinces, potentially coming back into production from 2020 onwards;
- Land logged using modern methods, between the early 1990's and 2003, potentially coming back into production from 2035 onwards;
- Land supporting a current harvest operation, potentially coming back into production from 2045; and
- Land likely to support a new harvesting operation in the next five to ten years, potentially coming back into production from 2050.

To estimate the future net commercial area the definition used for current commercial forest types was broadened. For example, it was assumed that most forests classified by SOLFRIP as being moderately disturbed would develop into relatively undisturbed forests over time. Semi-commercial forests were reclassified as commercial for the same reason.

Areas were also divided into those that have or don't have export potential. The assumption is that Guadalcanal, Western, Isabel, Choiseul and Makira Provinces can support export operations because they have infrastructure in place, economies of scale and relatively low population bases

that rely on forest products. Provinces such as Malaita, Temotu, Rennell and Central have low economies of scale and high population densities relying on local forest products.

The resulting net commercial areas indicate that the total SI land base for commercial export logging operations is 560,000ha (Table 4-2).

Table 4-2: Future net commercial area summary (ha)

Province	Gross Area	Logging history and likely recruitment period in ()				
		Logged 70's & 80's[1]	Logged 90's to 2003[2]	Current operations[2]	New operations[2]	Total
		(2020 +)	(2035 +)	(2045 +)	(2050 +)	(2010 +)
Export potential						
Guadalcanal	538,700	7,400	26,800	0	47,100	81,300
Western[3]	551,500	22,700	96,900	27,600	55,700	202,900
Isabel	422,800	1,000	34,500	24,800	69,500	129,800
Choiseul	330,200	0	17,600	2,300	91,700	111,600
Makira	321,900	100	6,700	3,400	23,400	33,600
Total	*2,165,100*	*31,190*	*182,500*	*58,100*	*287,400*	*559,200*
Domestic use						
Malaita	422,000	0	9,700	900	30,800	41,400
Temotu	87,700	1,200	300	0	22,700	24,200
Rennell	65,900	0	0	0	29,500	29,500
Central	64,500	0	2,500	1,700	7,000	11,200
Total	*640,100*	*1,240*	*12,500*	*2,600*	*90,000*	*106,300*
National	*2,805,200*	*32,430*	*195,000*	*60,700*	*377,400*	*665,500*

Source: 1 SOLFRIP air photo interpretation.
2 SIFMP

4.3 Volume assessment of logged areas

Since ACIL (1995a) no systematic assessments of the health of stands have been undertaken in logged areas. A program was therefore implemented to map logged concession areas by Province and to assess their recovery rates and standing volumes through field data collection.

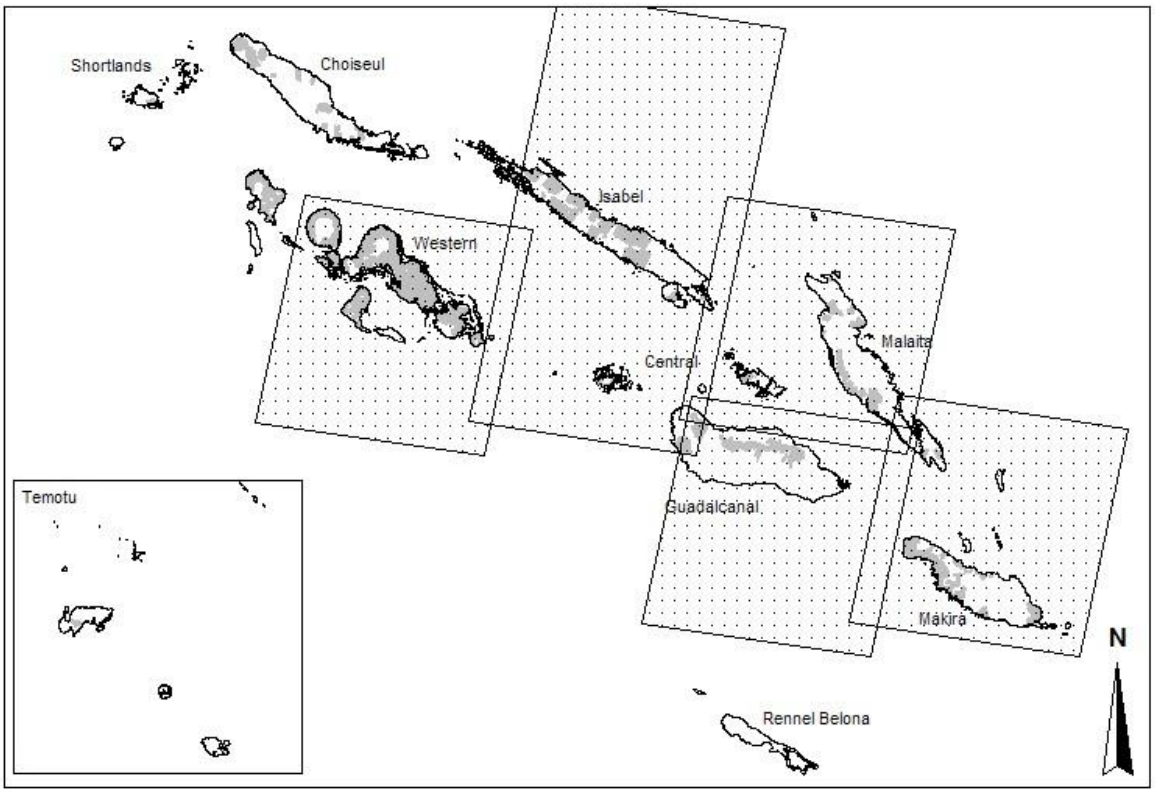
4.3.1 Identification of logged areas

To date the FD stores only paper copies of logging concession applications and approvals. This makes it difficult to assess the overall impact of ever increasing logging concession areas in the Provinces.

To centrally record all known logging concession boundaries, SIFMP held a workshop with Provincial FD representatives to identify concession areas on large scale 1:150,000 maps. These were used as a reference to locate the original concession logging plans. Each logging plan was then entered into a computer mapping database (see Appendix D for a data dictionary).

The workshops identified several logged areas for which logging plans could not be found. LandSat satellite images were subsequently bought to identify the extent of these areas (Figure 4-2).

Figure 4-2: Extent of LandSat coverage and logging concessions



Source: SIFMP

Details on the status of each operation (complete, current, not started, converted to plantation or identified through LandSat as being logged), logging company, logging licence identifier and year of completion were recorded for each concession.

The extent of logging concessions identified is based on the best available data known to exist at the time of producing this report (Table 4-3). A number of judgements were made to alter boundaries where incidences of concession overlap occurred. In these instances the most recent data were applied.

Table 4-3: Logging concession details by Province

Province	Concession Numbers				
	Completed	LandSat*	Current	Not started	Total
Guadalcanal	11	4	0	0	15
Western	48	8	13	9	78
Isabel	11	3	13	1	28
Malaita	24	5	1	1	31
Choiseul	3	0	6	5	14
Makira	7	4	2	6	19
Temotu	0	0	0	0	0
Rennell	0	0	0	0	0
Central	2	0	1	0	3
National	*106*	*24*	*36*	*22*	*188*

* Using satellite photos, areas identified as being logged for which a logging licence was not found.
Source: SIFMP

Western Province has by far the greatest concentration of logging activities and while they seem to cover to most of the Province, the high number of current concessions and concessions yet to commence indicates there are still large volumes of timber available.

4.3.2 Field inventory

The assessment of post logging standing volumes was broadly based on the project time scale (eight months) and budget. It was judged that two inventory crews of four people each could be supported for five months, with the remaining project time divided between the initial planning phase and subsequent data analysis.

Field time was allocated to the provinces on the basis of staff safety considerations, general access and the number of provincial logging concessions completed or still in progress.

An emphasis was also placed on concessions where logging was completed for these will return to commercial status before those concessions where logging is still underway. Therefore the current concessions were sampled less intensively.

A total of 42 concessions were subsequently assessed across Western, Isabel, Choiseul, Makira and Central Provinces, representing 31% of all known concessions. The assessment focused on currently commercial trees whose diameter were greater than 60cm and trees between 20 and 60cm diameter which are likely to produce the next crop (see Appendix C for details).

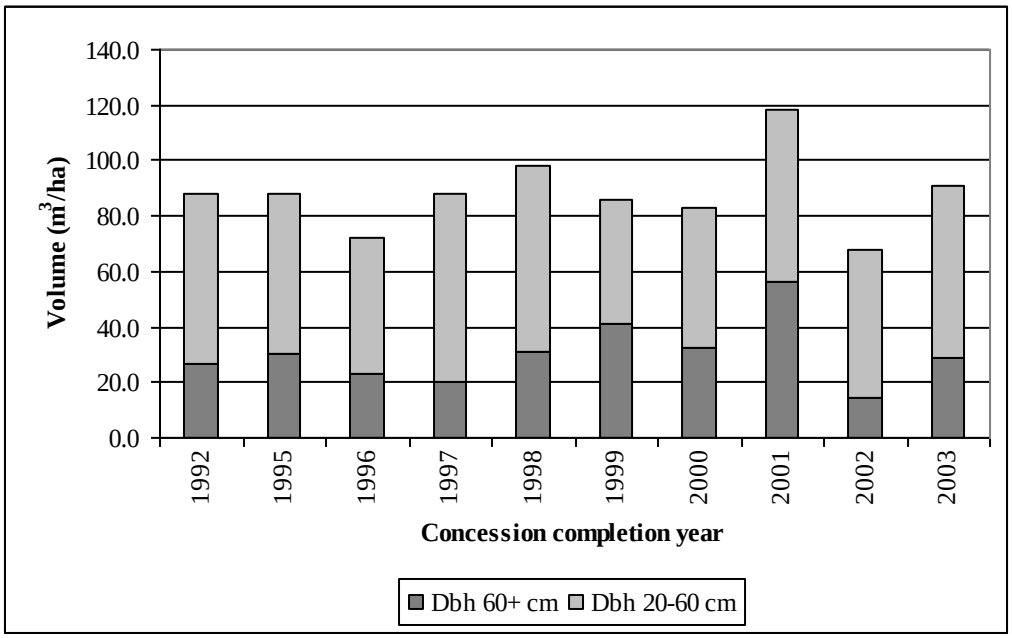
The inventory results were assessed for both gross and merchantable volumes, defined as:

> *Gross volume* - the volume of the merchantable tree bole assessed as it stands in the forest.
>
> *Merchantable volume* - the gross volume reduced to account for unsighted internal and external defects, felling damage and trees missed by harvesting operations.

A key outcome of the inventory was to be an indication of the rate of forest recovery, however the data collected from logging operations completed between 1992 and 2003 did not show an underlying trend of increasing volumes with time (Figure 4-3). There are several factors which may be contributing to this result:

- Through improved management of environmentally sensitive areas, volumes remaining today are greater than those remaining in the past;
- Low volumes in older stands may reflect the progressive loss of trees due to harvesting damage as wounds lead to rot over time. This can be a significant factor in tropical forest recovery; or
- Excessive opening of stands following the removal of commercial trees, promoting the growth of vines which can lead to strangulation and increased risk of wind damage.

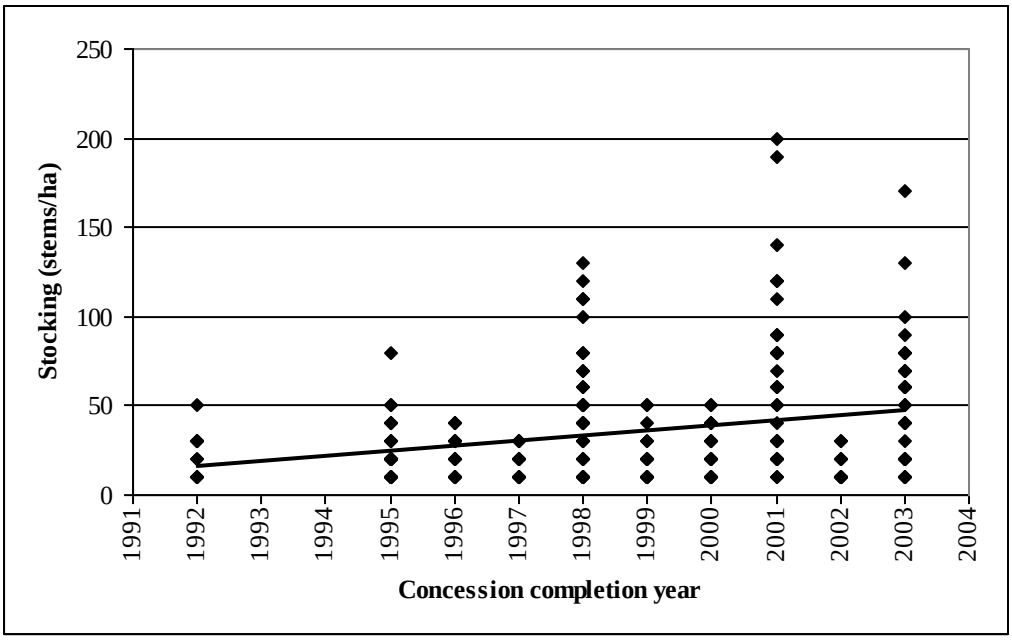
Figure 4-3: Gross volumes averaged by concession completion year



Source: SIFMP

Evidence of one or more of these factors seems to be supported by a trend in decreasing stocking levels over time since logging (Figure 4-4). Should this trend be due to logging damage or competition from vines, it raises serious concerns about the regeneration capacity of natural forests in the Solomon Islands. It may be an early signal that the forests require some degree of intervention to promote regeneration following logging, if they are to achieve similar volumes again within a landowners lifetime.

Figure 4-4: Post harvest tree stocking by plot and overall trend



Source: SIFMP

Given that stands were very similar for all the concessions assessed, irrespective of the time since logging, all post logging inventory data were combined and then summarised by Province for gross (Table 4-4) and merchantable (Table 4-5) volumes.

Table 4-4: Gross volumes by Province

Province	Export (m^3/ha)		Domestic (m^3/ha)		Total (m^3/ha)	Precision +/- @ 95% prob.
	20-60	60+	20-60	60+		
Western	42.6	18.1	13.1	9.1	82.9	8%
Isabel	52.3	39.3	17.1	9.7	118.4	10%
Choiseul	28.9	5.1	17.0	19.6	70.5	19%
Makira	29.9	18.1	27.7	15.2	90.9	13%
Central	50.6	21.0	20.2	15.4	107.1	11%
National	*43.6*	*22.8*	*16.9*	*11.4*	*94.7*	*5%*

Source: SIFMP

Table 4-5: Merchantable volumes by Province, dbh 60+ (m^3/ha)

Province	Form		Total
	Export	Domestic	
Western	14.9	7.4	22.3
Isabel	31.4	7.8	39.2
Choiseul	4.2	15.1	19.3
Makira	14.8	12.1	26.9
Central	17.3	12.7	30.0
National	*18.5*	*9.2*	*27.7*

Source: SIFMP

Of note is the significant volume of export quality logs remaining in Isabel. This is due to a combination of both high residual tree numbers and a high average diameter of 85cm.

The low residual volume in Choiseul reflects current logging practices in Choiseul Bay, where the local company is returning to recently logged areas while they work towards resolving a number of land disputes in other areas.

The most prominent commercial species in logged over areas and their stocking levels are shown in Table 4-6 and Table 4-7 respectively.

Table 4-6: Most common species by Province

Western	%	Choiseul	%	Central	%
Calophyllum	14.2	Mixed red	21.8	Mixed white	20.5
Dillenia	11.1	Pometia	21.5	Mixed red	20.2
Dysoxylum	10.9	Mixed white	20.8	Dysoxylum	7.0
Mixed red	7.7	Vitex	14.9	Eugenia	6.6
Parinari	6.9	Parinari	5.5	Burckella	6.0
Mixed white	6.9	Celtis	4.3	Dillenia	5.4
Pometia	6.1	Dysoxylum	4.3	Palaquium	5.2
Eugenia	5.9	Pterocarpus	1.8	Pometia	4.4

Isabel	%	Makira	%	National	%
Pometia	22.1	Pometia	24.3	Mixed white	14.1
Mixed white	17.1	Mixed white	21.1	Pometia	13.6
Mixed red	11.2	Canarium	8.9	Mixed red	11.2
Terminalia bra.	6.8	Mixed red	7.6	Dillenia	6.8
Campnosperma	5.7	Pterocarpus	6.2	Calophyllum	6.5
Canarium	5.3	Vitex	4.3	Dysoxylum	6.3
Dillenia	4.6	Intsia bijuga	3.9	Parinari	4.6
Intsia bijuga	4.3	Parinari	3.4	Canarium	4.3

Source: SIFMP

Table 4-7: Stocking levels by diameter and form class

DBH	Form	Stocking (stems/ha)					
		Central	Choiseul	Isabel	Makira	Western	National
60cm+	Export	5	1	6	5	4	4
	Domestic	4	4	2	5	2	3
	Unmerch	4	6	1	1	1	2
	Sub total	*14*	*12*	*9*	*11*	*7*	*9*
20-60cm	Export	61	36	65	46	53	55
	Domestic	33	30	25	52	20	27
	Unmerch	25	13	14	19	12	15
	Sub total	*120*	*80*	*104*	*118*	*85*	*97*
5-20cm	Export	149	55	272	106	163	175
	Domestic	114	77	91	121	84	93
	Unmerch	85	66	114	76	72	84
	Sub total	*348*	*198*	*477*	*303*	*319*	*352*
	Total	*481*	*289*	*591*	*432*	*411*	*458*

Source: SIFMP

4.4 Volume assessment of unlogged areas

For areas not logged since the SOLFRIP assessment, and in the absence of large scale forest disturbances from cyclones or landslips, the data collected at the time could still be valid for the assessment of current forest volumes. To test this assumption, SOLFRIP data were benchmarked against logging company field assessments which suggest that the average commercial volume is about 28m^3/ha (Table 4-8).

Table 4-8: Harvest volume predictions based on logging company field assessments

Harvest plan source	Year	Area ha	Harvest Volume m3	Average Volume m3/ha
Bulacan Integrated Wood Industries, West Are-Are (Tim 2/46), Malaita	2001	4,969	142,247	28.6
Bulacan Integrated Wood Industries, West Barora Ite (A1001), Isabel	2002	2,374	76,158	32.1
Eastern Development Enterprises, Lot 17, Isabel	2000	1,747	29,318	16.8
Eastern Development Enterprises, Banafao (A10114), Isabel	2003	780	15,075	19.3
Orion Ltd, Vella La Vella (A10030), Western Province	2001	1,700	52,020	30.6
Golden Springs International, Vahole (Tim 2/108), Western Province	2002	2,212	47,686	21.6
North Arosi Holdings Ltd, North Arosi (Tim 2/036), Makira	2003	2,100	38,976	18.6
KTC, Tive Customary Land (Tim 2/25), Rendova Island, Western Province	1993	1,700	51,200	30.1
	1994	1,200	37,800	31.5
	1995	900	34,300	38.1
	1996	1,400	43,200	30.9
	1997	1,500	46,000	30.7
	1998	800	18,300	22.9
	1999	1,900	64,000	33.7
	2000	2,500	76,000	30.4
Total		*27,782*	*772,280*	*27.8*

Source: Random selection of harvest plans held by FD, Honiara.

SOLFRIP was also benchmarked against harvest volumes, derived by dividing the total provincial export volumes by the estimated commercial area logged to date (Table 4-9). Based on total exports of 5.8 million m^3, export data suggests that the average commercial volume is about 32m^3/ha.

Table 4-9: Export harvest volumes per hectare

Province	Export Volume[1] 1994-2003	Logged Area[2]	Volume / ha
	(1)	(2)	(1)/(2)
Guadalcanal	358,000	26,000	14
Western	3,276,100	79,000	41
Isabel	1,062,800	45,900	23
Malaita	216,700	10,000	22
Choiseul	560,000	13,800	41
Makira	172,400	4,900	35
Temotu	0	0	0
Rennell	0	0	0
Central	163,000	3,800	43
National	*5,809,000*	*183,400*	*32*

Source: 1 FD log export database
2 SIFMP, GIS data analysis

When comparing the yields per hectare for harvest plan and export data, both suggest that the SOLFRIP assessment of a 53m^3/ha average commercial yield from virgin forest is a significant overestimate (Table 4-10).

Table 4-10: Summary of merchantable volumes for unlogged forests (dbh 60+) with export potential

Province	SOLFRIP[1]	SIFMP[2]	
	(m3/ha)	(m3/ha)	(m3)
Guadalcanal	37	14	623,000
Western	66	41	2,632,200
Isabel	37	23	1,796,300
Choiseul	56	41	3,653,100
Makira	35	35	735,000
National	*53*	*32*	*9,439,600*

Source: 1 ACIL (1995a).
2 SIFMP

Likely sources of the SOLFRIP overestimate could include a lack of data for the estimation of a utilisation factor[1] used to calculate SOLFRIP merchantable volumes, SOLFRIP's overestimation of logs constituting export log quality or SOLFRIP's underestimation of the number of commercial logs left behind.

4.5 Woodflow predictions and sustainability assessment

The flow of wood over time from a forest resource, commonly known as woodflow, can be estimated from the likely schedule of future harvesting operations, the area available for harvest and an estimated harvest yield per hectare.

To forecast the national woodflow, the provincial areas were combined and treated as a single resource. This assumes that as the availability of wood decreases in one province, logging companies will move to other provinces to maintain continuity of supply to their export markets.

[1] Utilisation factor is a percentage adjustment applied to a standing trees log volume to account for unseen internal defects that affect the final harvested log yield.

Woodflows were split into short and long term predictions. Short term woodflows use the current merchantable volume for unlogged, virgin forests (9.7 million m^3) and assume a continuation of harvesting levels at the average annual export rate for 1994-2003 of 644,800m^3/yr (Table 4-11). Long term woodflows use the predicted rates of recruitment into commercial regrowth forest (see Section 4.2) assuming a sustainable 45 year rotation length.

Table 4-11: Historic roundlog exports by province

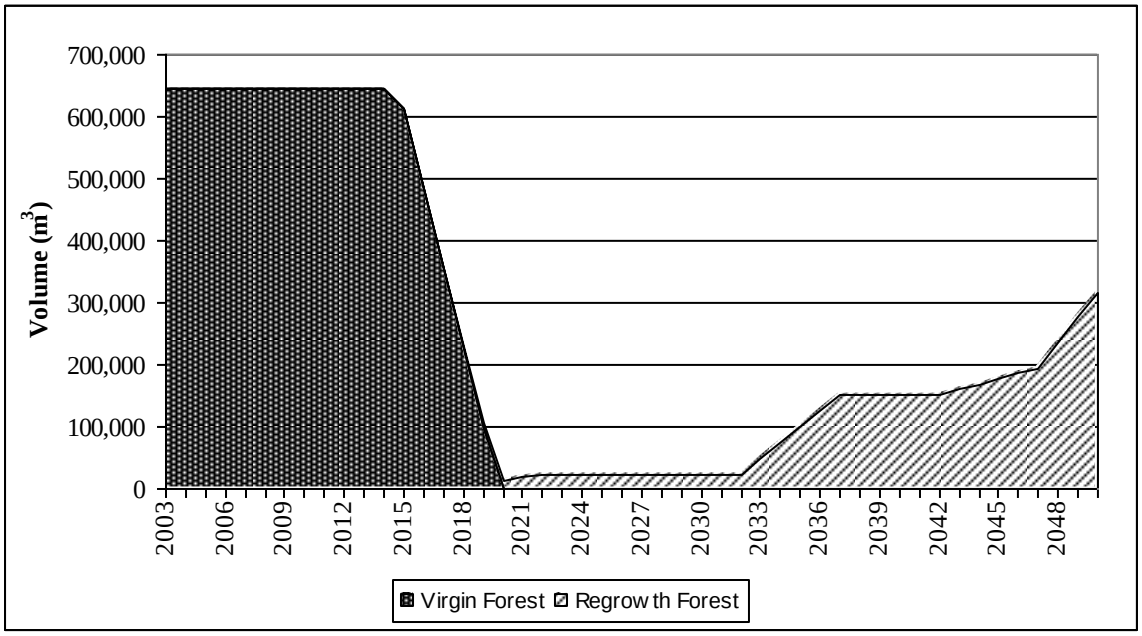
Year	Guadal-canal	Western	Isabel	Malaita	Choiseul	Makira	Central	Total
1994	15,400	403,100	50,100	41,300	80,900	26,900	0	617,700
1995	55,100	392,200	102,700	38,400	88,400	40,300	19,900	737,000
1996	76,500	457,800	81,200	37,900	87,500	31,000	34,000	805,900
1997	75,200	284,800	126,100	12,300	83,000	11,500	16,700	609,600
1998	99,900	234,500	130,200	4,500	89,100	11,600	17,000	586,800
1999	21,800	397,700	82,600	13,100	35,700	23,100	41,900	615,900
2000	14,100	322,900	101,300	17,700	44,100	16,100	5,100	521,300
2001	0	282,300	167,400	34,100	8,200	1,500	15,900	509,400
2002	0	357,300	171,800	17,400	21,000	7,200	9,500	584,200
2003[1]	0	430,400	148,100	0	66,200	9,500	8,900	663,100
Total	*358,000*	3,563,000	*1,161,500*	*216,700*	*604,100*	*178,700*	*168,900*	6,250,900
Average[2]	*51,100*	356,300	*116,200*	*24,100*	*60,400*	*17,900*	*18,800*	644,800
Maximum	*99,900*	457,800	*171,800*	*41,300*	*89,100*	*40,300*	*41,900*	942,100

1 Annual volume based on 1st quarter projections.
2 Average applies only to those years in which exports took place.
Source: FD export database.

The resulting woodflows (Figure 4-5) show that current harvest rates can be maintained until 2015 when virgin forest resources become exhausted. The sharp subsequent drop in available volumes is a direct consequence of harvesting forests quicker than they can regenerate.

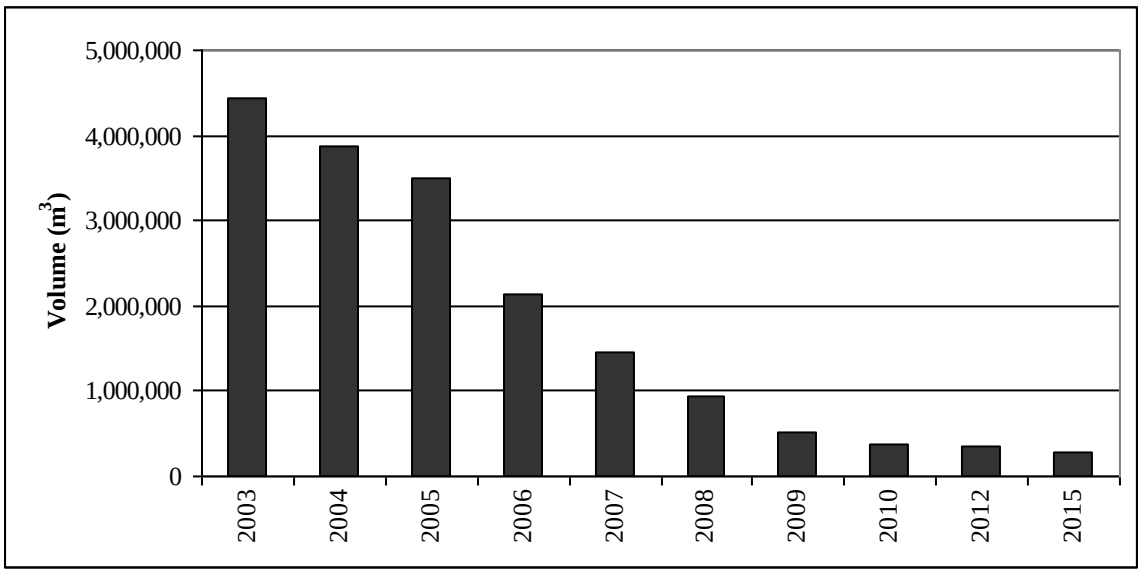
This scenario is strongly underpinned by logging licence agreements already in place whose combined volume quota sum to more than six times the current harvest rate (Figure 4-6).

Figure 4-5: Predicted National woodflow



Source: SIFMP

Figure 4-6: Total volumes already covered by current logging licences



Based on the total commercial forest area (or "land base") of 559,000ha, it will be 2050 before the SI's can support its long term sustainable export level of 398,000m^3/yr. To achieve this level without exhausting the land base in the interim, log exports would need to be capped at 263,000m^3/yr from 2004 to 2049.

Should Government implement a cap of 550,000m^3/yr, identified as a key strategy in the recently released National Forest Policy Statement (Solomon Islands Government, 2003), virgin forests would only support an additional three years of logging to 2018 by which time the land base would again become exhausted.

4.6 Revenue predictions

Natural forests contribute revenue to both the National Government and landowners. Government receives revenue through duties payable on log exports. The export value (in US dollars) on which the duty is payable (in SI dollars) is called the Determined Price. Its a value set by FD on the basis of log sales of similar species in the Asia Pacific region, adjusted for differences in transportation costs. By using a fair market price to set the value on which duty is payable, the Government protects itself from transfer pricing, i.e. when the declared value of exported logs does not reflect their destinations landed price. The SBD/USD exchange rate is set by Customs on a monthly basis and is currently 0.1354.

The amount of duty payable is determined using a sliding scale, where:

- Any log with a Determined Price listed below SBD 550, duty is levied at 25% of the log value;
- Any log with a Determined Price listed between SBD 550 and SBD 880, duty is levied at 25% for the first SBD 550 plus 40% of the remaining log value above SBD 550; and
- Any log with a Determined Price listed above SBD 850, duty is levied at 25% for the first SBD 550 plus 40% of SBD 300 plus 60% of the remaining log value above $880.

The schedule for determined values was last reviewed in August 2003 (Table 4-12). Given that international demand for tropical timbers is strong and their supply is likely to become more limited, determined values can be expected to remain steady or gradually increase in real terms.

Table 4-12: Determined Price schedule for log exports – 26 August 2003

Species Group	Species	Regular Grade	Small Grade	Super Small Grade	Low Grade
I	*Palaquim* (Pencil Cedar)	95	85	75	57
	Calophylum	95	85	75	57
	Pometia (Tuan, Akwa)	95	85	75	57
	Planchonella	95	85	75	57
II	*Schizomeria* (Beabea)	80	70	65	55
	Dillenia	80	70	65	55
	Gonostylus (Ramin)	80	70	65	55
	Terminallia brasii	80	70	65	55
III	*Canarium* (Gnali)	70	60	55	52
	Burkella	70	60	55	52
	Celtis	70	60	55	52
	Alstonia (Milky Pine)	70	60	55	52
	Dysoxylum	70	60	55	52
	Eugenia (Water Gum)	70	60	55	52
	Endospermum	70	60	55	52
	Amoora	70	60	55	52
	Campnosperma	70	60	55	52
	Other *Terminalia spp.*	70	60	55	52
IV	*Maranthes*	60	55	52	50
	Mixed Reds	60	55	52	50
	Mixed Whites	60	55	52	50
	Paranari	60	55	52	50

Source: FD

To forecast the duty payable for predicted woodflows, the distribution of export volumes by species group and grade was estimated from data entered into the FD log export database since 1st January 2002 (Table 4-13). Based on these proportions, the average duty payable is currently SBD 138/m^3.

Table 4-13: Distribution of export log grades since 1 January 2002

Species Group	Grade				Total
	Regular	Small	Super Small	Low	
I	20%	3%	1%	6%	*29%*
II	22%	1%	0%	8%	*31%*
III	14%	2%	1%	4%	*20%*
IV	5%	2%	0%	12%	*20%*
Total	*61%*	*8%*	*2%*	*30%*	*100%*

Source: FD log export database

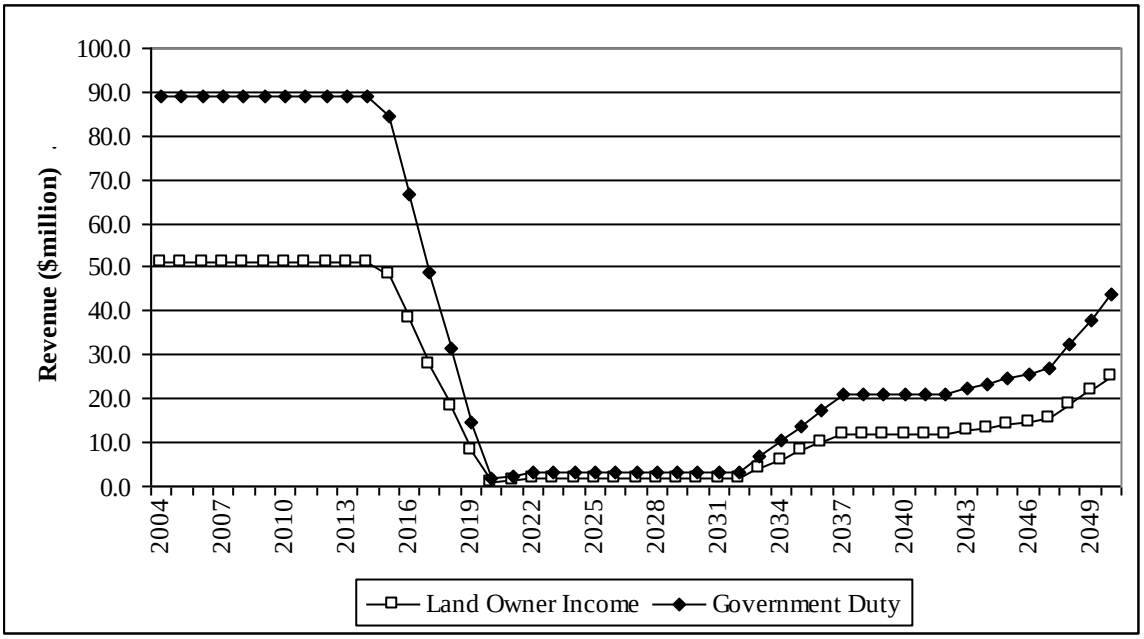
The amount of revenue received by landowners is negotiated with the logging company on a concession by concession basis, often including promises of infrastructure developments such as schools, sport fields and community halls. As a general rule, it is thought that landowners receive

about 15% of the total log value, equivalent to an average of SBD 79/m^3, using the species group and grade proportions in Table 4-13.

The resulting predicted revenue flows in Figure 4-7 follow the sharp decline in virgin forests should current levels of harvesting continue.

Note that only direct revenues have been assessed and indirect revenues from company tax, income tax, GST and duties on imported equipment would boost the result. The multiplier effect of the forest industry on the wider economy was also not assessed.

Figure 4-7: National revenue prediction for log exports from natural forests



Source: SIFMP

To achieve the long term sustainable export level of 398,000m^3/yr without exhausting the land base in the interim, as discussed in the section on woodflow scenarios (Section 4.5), log exports duties could generate SBD 36 million/yr from 2004 to 2049.

5 Plantation Forests

5.1 Current commercial forest area

Large scale, "industrial" plantations are located on Shortland, Gizo, Kolombangara, New Georgia, Isabel and Santa Cruz islands. The total planted area reported by companies is 35,000ha, however large proportions have failed in the absence of ongoing management and their commercial areas are thought to be considerably smaller (Table 5-1).

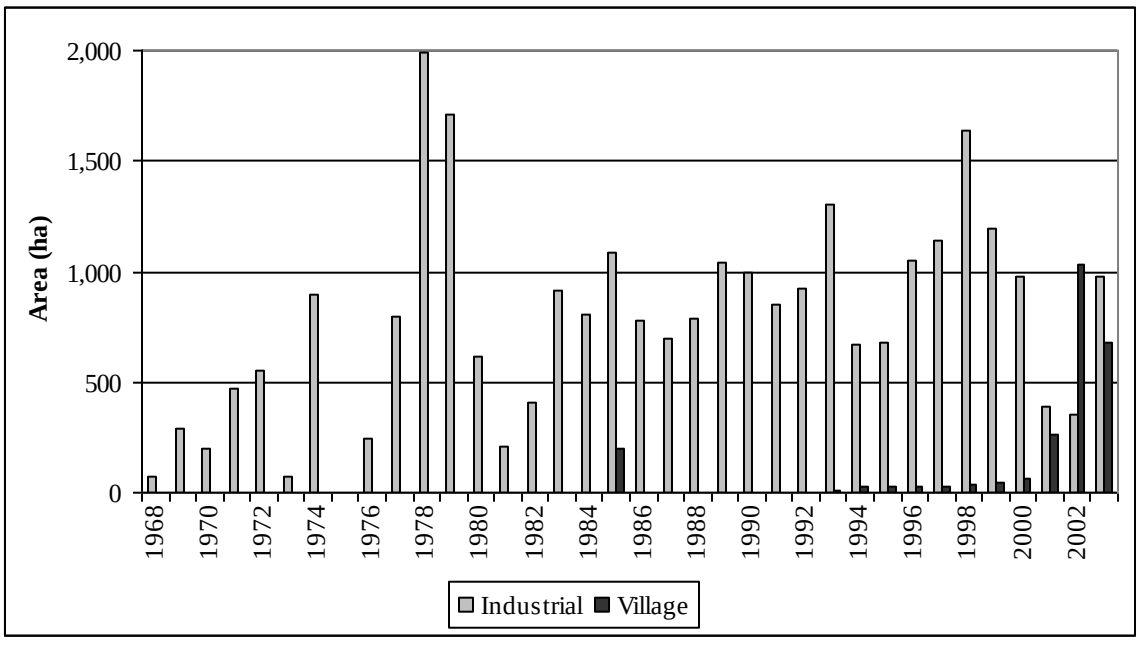
Table 5-1: Summary of industrial scale plantations

Province	Owner	Location	Planted Area[1]	Commercial Area[2]
Western	KFPL	Kolombangara	12,000	12,000
	Eagon (EPPL)	Viru Harbour	12,500	8,900
	FD	Shortland Is	2,100	1,200
	FD	Gizo	600	200
Choiseul	Eagon (ERC)	Choiseul Bay / Moli	3,200	300
Isabel	FD	Allardyce	2,300	2,300
Temotu	FD	Santa Cruz	2,900	2,900
Total			*35,600*	*27,800*

Source: 1 Plantation owners.
2 SIFMP, based on recent field assessments.

More recently, through a combination of better access to timber markets, high market prices and the gradual loss of their own natural resources due to logging, villagers are now establishing significant areas in their own right (Figure 5-1). These plantations, despite being individually small in size (on average 0.25-1ha), have the potential to become both a significant source of cash income and building materials. SIFMP has already compiled a database of 1,600 individual stands.

Figure 5-1: Age distribution of commercial industrial and village plantings



Source: SIFMP.

The species mix for industrial plantations mainly consists of *Gmelina*, *Campnosperma*, *Eucalyptus deglupta*, *Terminalia* and mahogany (Table 5-2). Current trends indicate that *Campnosperma* will generally be replaced by *Gmelina* and *Eucalyptus*, and *Acacia* and "other" species replaced by a mix of teak, mahogany and *Gmelina*.

In the past villagers planted similar species to those used in the industrial plantations. More recently the focus has switched to high value and relatively easy to grow teak and mahogany. It is likely that these species will gradually replace the harder to grow and relatively lower value *Gmelina* and *Eucalyptus* village plantations.

Table 5-2: Summary of plantation species

Industrial		Village	
Species	**Proportion**	**Species**	**Proportion**
Gmelina	29%	Teak	42%
Campnosperma	20%	*Eucalyptus degulypta*	23%
Eucalyptus degulypta	17%	*Gmelina*	23%
Mahogany	11%	Mahogany	10%
Terminalia	7%	*Cedrela*	1%
Agathis	5%	Other species	<1%
Other species	3%		
Teak	3%		
Acacia	2%		
Cedrela	1%		
Balsa	<1%		
Planchonella	<1%		
Octomeles	<1%		

Source: SIFMP.

5.2 Woodflow predictions

Using the information collated for the plantations established to date, the potential future flow of wood from this resource was predicted.

The assessment was based on a general management regime and yield for each of the main species (Table 5-3). For species such as teak and mahogany, management includes one or two thinning operations. Such an operation removes a proportion of mainly small and poorly formed trees which promotes the growth of the remaining high value trees by reducing competition for water and nutrients. The end of a stands rotation is marked by the clearfall operation which removes all trees on the site.

To predict future harvest volumes after current plantations are harvested, it was assumed that each site would be replanted.

Table 5-3: Standard plantation management regimes

Species	Operation	Year of Operation	Harvest Volume (m^3/ha)
Teak	1st thinning	14	50
	2nd thinning	20	50
	Clearfall	25	150
Mahogany, Cedrela	1st thinning	20	50
	Clearfall	30	180
Campnosperma, Terminalia	Clearfall	30	60
Balsa	Clearfall	4	50
Eucalyptus, Octomeles	Clearfall	15	200
Gmelina, Acacia	Clearfall	10	100
Agathis	Clearfall	40	200
Other	Clearfall	40	100

Source: SIFMP, KFPL.

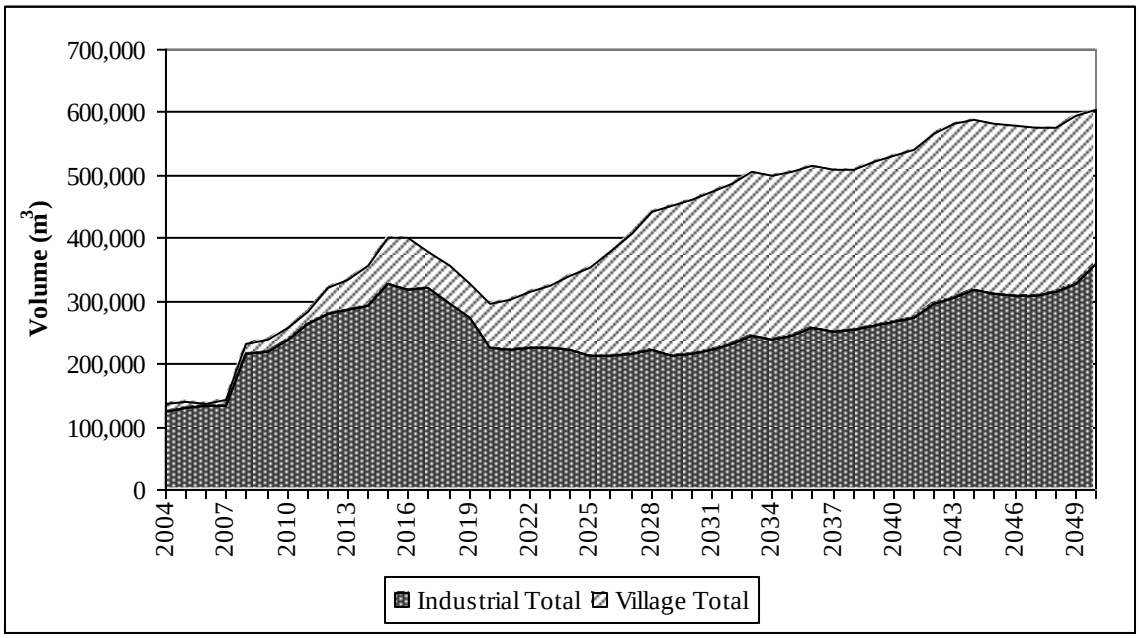
The assessment also took into account the potential for new plantation establishment on previously unplanted land. In the past, all the industrial scale plantations were developed on alienated government land, however the current trend has seen some alienated land returned to its traditional owners. Therefore the land base for industrial scale plantations is shrinking rather than growing. Under this scenario it is unlikely that the SI's will see significant industrial scale plantation expansion in the near or medium term.

In contrast, at the village level the opportunity for plantation expansion is significant. The tradition of subsistence agriculture is ideally suited to small, family based plantation development where trees can be tended alongside food crops. The infrastructure required is minimal. If no roads exist, small portable mills can be used to cut timber on site for easy transport to nearby villages or market collection points.

It is possible that the current planting rate of 1,000ha/yr could be maintained for some time into the future when taking into account the availability of seed, the FD infrastructure now in place supporting plantation extension work and the support from local NGO's. The planting momentum is also likely to be stimulated further once harvesting of village plantations gathers pace and the benefits are seen by others. To assess the potential benefits of this type of plantation development, the impact of a 1,000ha/yr national establishment program was assessed.

The resulting woodflow (Figure 5-2) shows that industrial plantations are currently nearing the end of a maturing phase that could see production lift from 120,000m^3/yr to approximately 200,000m^3/yr by 2020. As expected, more recent village plantation development will not begin to produce timber until 2008 when the first thinning operations are scheduled, then building to a potentially significant 250,000m^3/yr by 2030 as the estate matures.

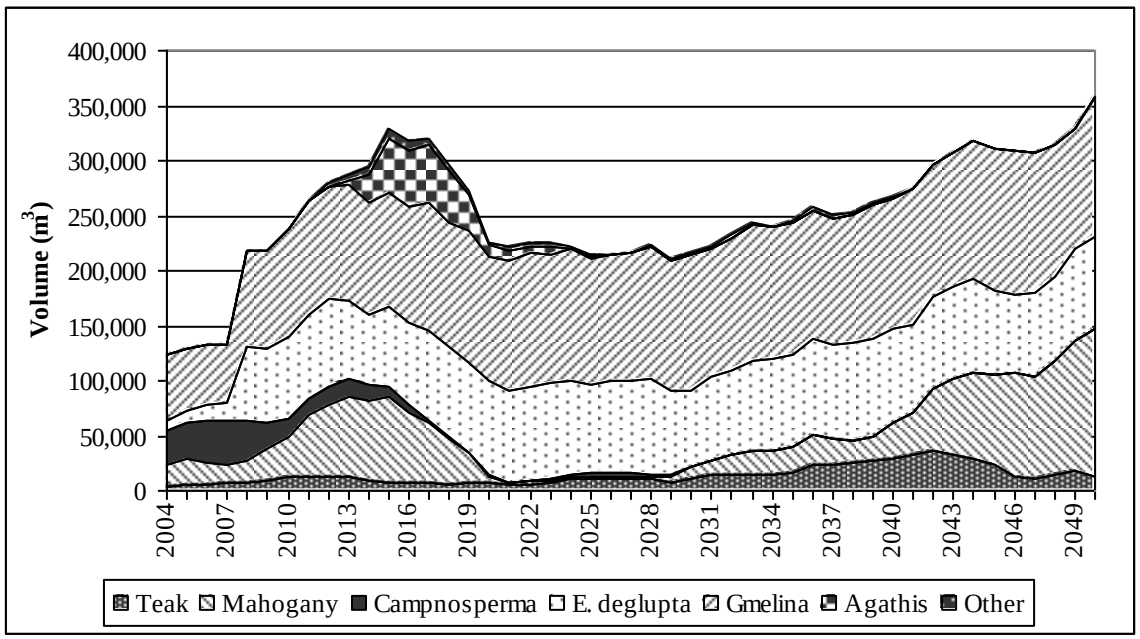
Figure 5-2: Potential woodflow by ownership



Source: SIFMP

When breaking down the woodflows by species for industrial plantations (Figure 5-3), it is possible to see the effect of replanting *Agathis* (only planted in Santa Cruz) and *Campnosperma* with *Gmelina*, *E. deglupta* and mahogany.

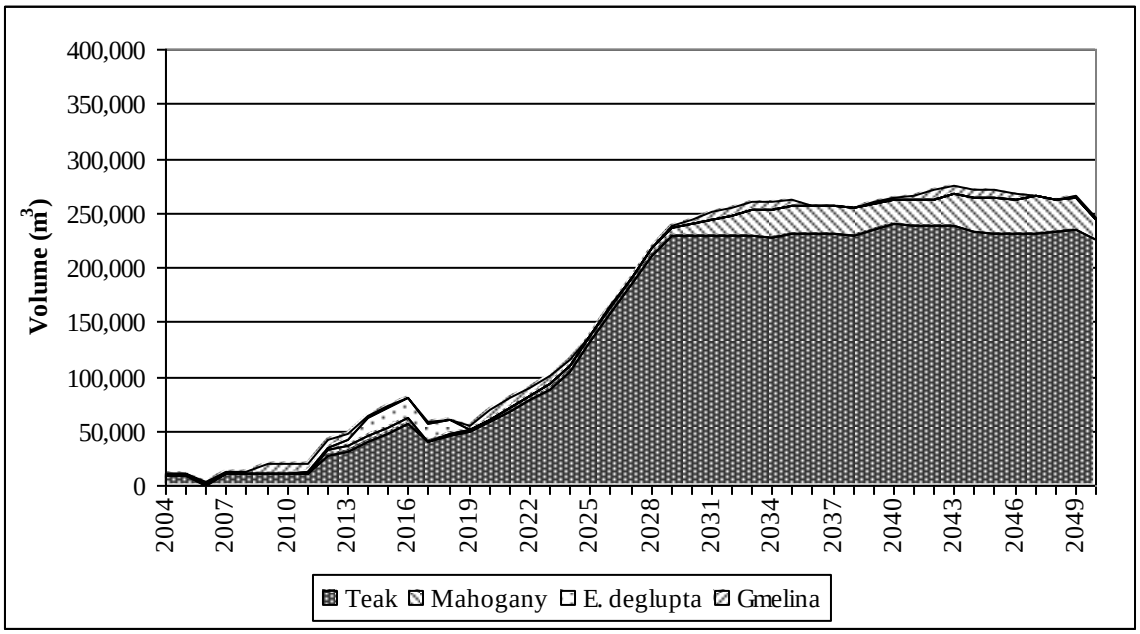
Figure 5-3: Potential woodflow by species for industrial plantations



Source: SIFMP

The species break down for village plantations (Figure 5-4) further highlights the rapid development of a considerable plantation estate by only planting 1,000ha/yr and that teak is likely to dominate production. The overall size of the estate would be easily sufficient to generate its own marketing infrastructure when considering the current interest in container size parcels of as little as $40m^3$, even though plantations would be widely scattered.

Figure 5-4: Potential woodflow by species for village plantations



Source: SIFMP

5.3 Revenue predictions

There is no duty payable on the export of plantation grown logs so all proceeds, after deducting harvesting and transport costs, go directly to the forest owner (Table 5-4).

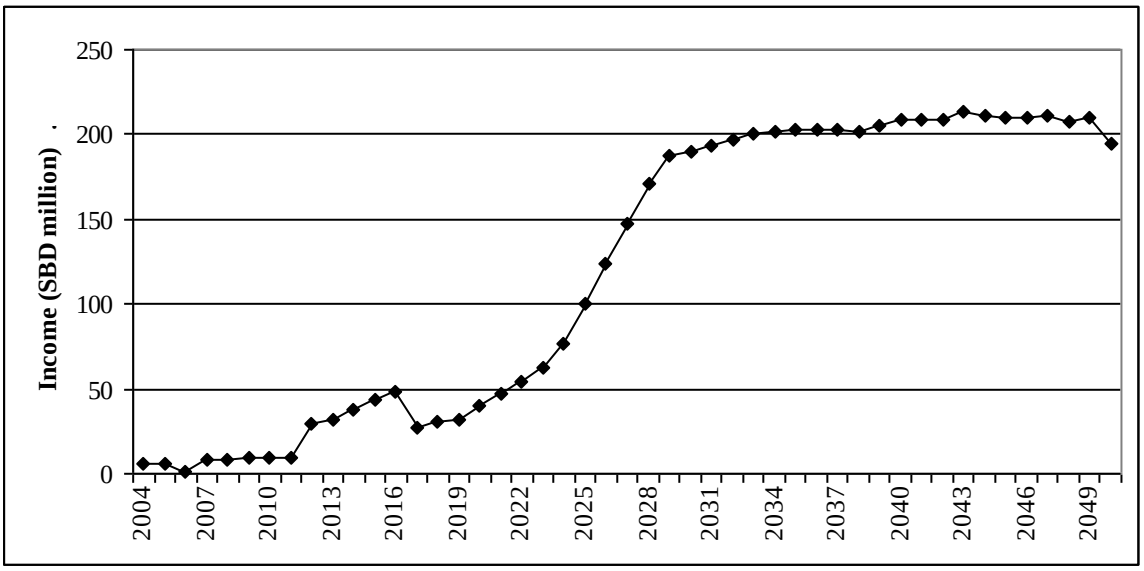
Table 5-4: Estimated landowner revenues after costs for the main SI plantation species

Species	Operation	USD	SBD
Teak[1]	1st thinning	80	591
	2nd thinning	100	739
	Clearfall	120	886
Mahogany[1]	1st thinning	70	517
	Clearfall	110	812
Campnosperma[2]	Clearfall	10	74
Eucalyptus deglupta[2]	Clearfall	20	148
Gmelina[2]	Clearfall	20	148
Agathis[2]	Clearfall	10	74
Other[2]	Clearfall	10	74

Source: 1 URS (2003)
2 FD log export database minus USD 40 for harvesting and transport costs (URS 2003)

For the village based plantations this translates into a potential direct income of SBD 200 million/yr (Figure 5-5) if current planting rates can be maintained (as per the woodflow scenario presented in Section 5.2). The small "bump" in revenue from 2012 to 2016 comes from the plantations planted circa 1986.

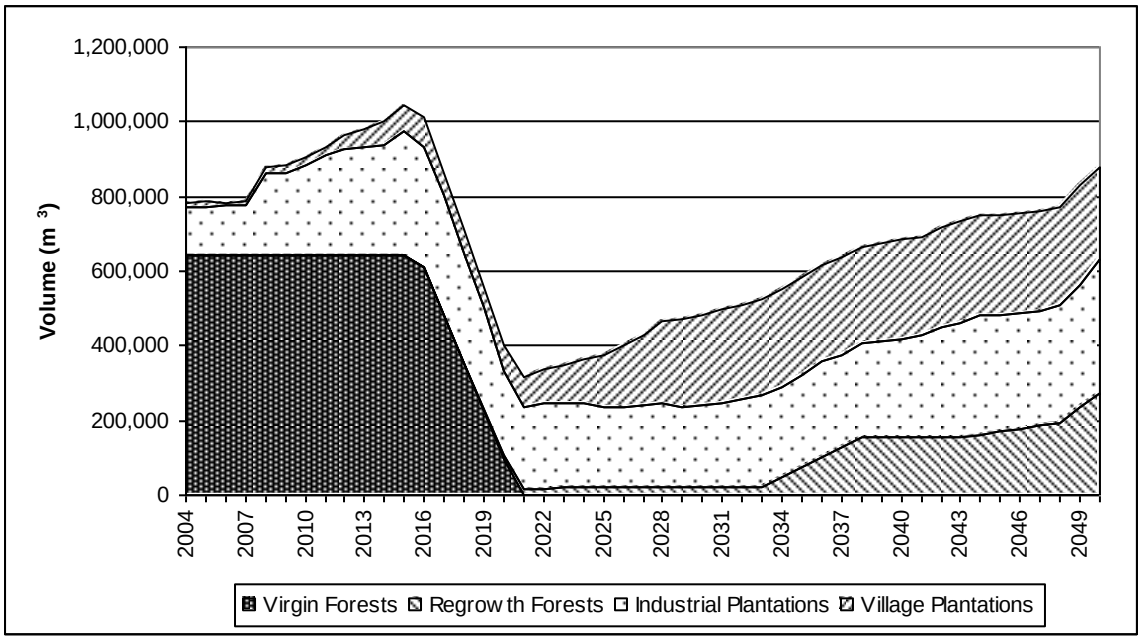
Figure 5-5: Potential revenue generated by village plantations



6 National Woodflow & Revenue Summary

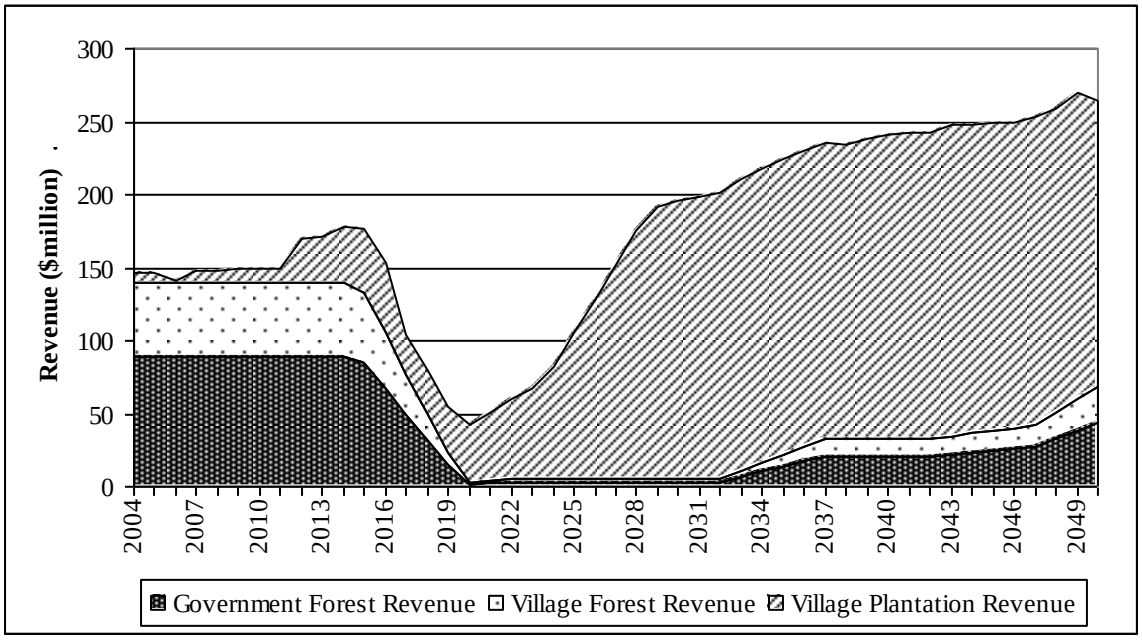
The woodflows for natural forests and plantations were combined to produce a national forest industry perspective. Under the scenario of maintaining current logging rates, Figure 6-1 shows that virgin forests will be exhausted before regrowth forests and village plantations can make a significant export contribution. This is despite the reintroduction of large areas to the natural forest land base by including areas that were formerly set aside for reservation.

Figure 6-1: Natural forest and plantation woodflow summary



Potential direct government and village revenues follow woodflow trends, with a significant dip in revenue for the period 2017 to 2025 (Figure 6-2).

Figure 6-2: Natural forest and village plantation, direct revenue summary



Smoothing to some extent the revenue transition, from harvesting in virgin forests to harvesting plantation and regrowth forests, could promote a more economically sustainable climate for forest industry development.

To smooth the revenue transition, the SBD 1,953 million generated from virgin forests between 2004 and 2025 could support annual direct revenues of SBD 93 million. This is equivalent to capping harvesting levels in virgin forests at 430,000m^3/yr.

The national overview also highlights that, while woodflows for village plantations, industrial plantations and regrowth forests are projected to eventually contribute one third of the national log harvest each, village plantations have the potential to generate 80% of the total revenue.

7 References

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1990. *Solomon Islands National Forest Inventory, Working Paper No. 4: Inventory Design and Techniques*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1992. *Solomon Islands National Forest Inventory, Inventory of the Allardyce tract, Isabel*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1994a. *FRIS, Forest Resource Information System, Operator Documentation*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1994b. *Solomon Islands National Forest Resource Inventory, Forests of the Solomon Islands: Volume Six – Western Province*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1994c. *Solomon Islands National Forest Resource Inventory, Forests of the Solomon Islands: Volume Four – Choiseul Province*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1994d. *Solomon Islands National Forest Resource Inventory, Forests of the Solomon Islands: Volume Three – Malaita Province*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1994e. *Solomon Islands National Forest Resource Inventory, Forests of the Solomon Islands: Volume Seven – Makira Province*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1994f. *Solomon Islands National Forest Resource Inventory, Forests of the Solomon Islands: Volume Two – Guadalcanal & Central Province*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1994g. *Solomon Islands National Forest Resource Inventory, Forests of the Solomon Islands: Volume Nine – Rennell & Bellona Province*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1994h. *Solomon Islands National Forest Resource Inventory, Forests of the Solomon Islands: Volume Eight – Temotu Province*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1995a. *Solomon Islands National Forest Inventory, Volume 1: National Overview & Methods*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

ACIL Australia Pty Ltd, International Forest Environment Research and Management Pty Ltd & ERSIS Australia Pty Ltd, 1995b. *Solomon Islands National Forest Resource Inventory, Forests of the Solomon Islands: Volume Five – Isabel Province*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

FORTECH, 2000. *Review of Inventory Systems and Sustainable Yield Management in the SI Forestry Sector*. Prepared for AusAid and Ministry of Forest, Environment and Conservation.

Solomon Islands Government (2003). *Media release - National Forest Policy Statement*. Ministry of Forests, Environment & Conservation, July 2003.

URS (2003). *Marketing Plantation Teak and Mahogany Grown in the Solomon Islands, Solomon Islands Forestry Management Project, Phase 5*. Prepared for AusAid and Ministry of Forestry, Environment and Conservation.

Appendix A – Provincial Summaries

NATIONAL FOREST RESOURCE ASSESSMENT

SEPTEMBER 2003

WESTERN PROVINCE SUMMARY

Forests, both natural and planted, play an important part in the lives of all Solomon Islanders.

Forests provide wood for cooking, timber for domestic housing, habitats for wildlife, a range of non-wood products such as foods and medicines, as well as protecting both land and coastal water quality. Logging in natural forests also provides significant income for land owners and the Government.

Plantations can provide an alternative source of timber and provide significant cash incomes for landowners and economic benefits to the nation.

Because of the importance of forests, the AusAID funded Solomon Islands Forest Management Project (SIFMP) carried out a study to produce a description of the current state of the nations forests.

Western Province has a land area of 550,000 hectares and supports the highest number of current logging operations in the nation. Forestry Department records show that there are 56 completed logging concessions, 13 current concessions and 9 concessions where logging is still to start. Total exports for the Province have averaged 356,000m^3/yr since 1994 (Table 1), at an average 41m^3/ha.

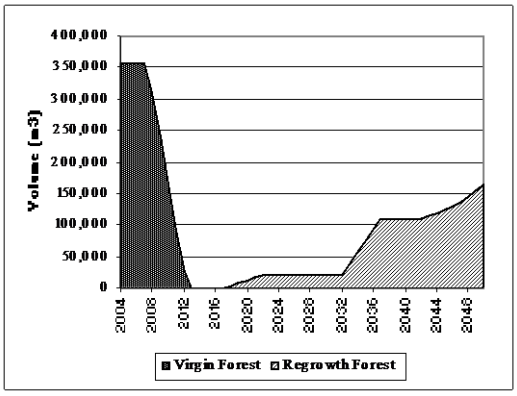
Table 1: Western Province exports 1994-2003

Year	Exports (m^3)
1994	403,000
1995	392,000
1996	458,000
1997	285,000
1998	235,000
1999	398,000
2000	323,000
2001	282,000
2002	357,000
2003 est.	430,000
Total	*3,563,000*
Average	*356,000*

The Province has an estimated total commercial forest area of 203,000 hectares, of which 64,000 hectares is still unlogged (or virgin) forest.

It is estimated that logged forests will take a minimum of 45 years to regenerate. If current export levels are maintained, a sharp drop in the amount of wood available can be expected around 2008 (Figure 1). This is a direct result of logging the Province's forests faster than they can grow back.

Figure 1: Estimated export yields if current export rates are maintained

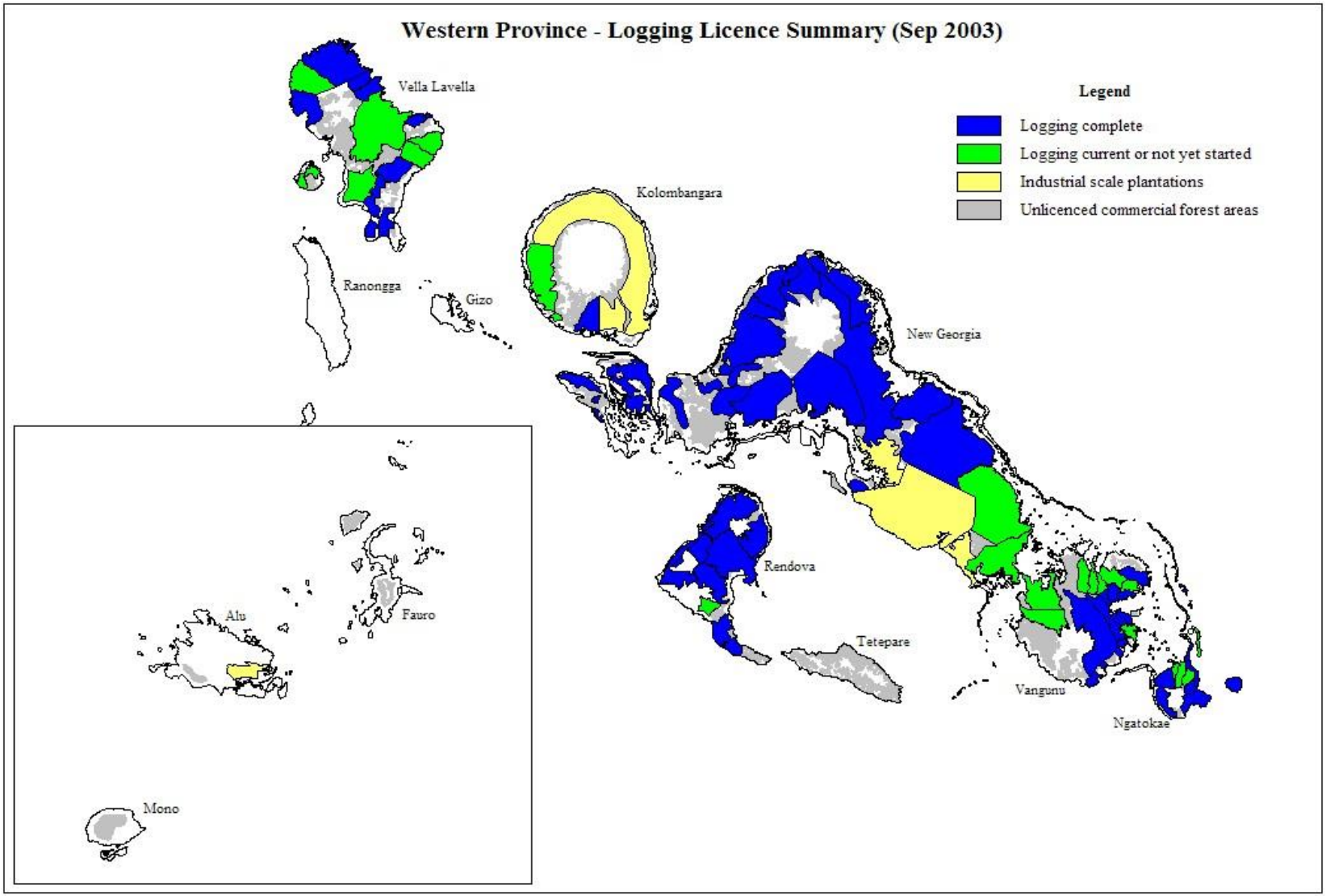


If the forests were harvested in a sustainable manner from one year to the next, they could support an annual export cut of 185,000 m^3/yr by 2050. However, to achieve this long term sustainable level, forests can only support an annual cut of 97,000 m^3/yr to 2049.

Many land owners, through a combination of better access to timber markets, high market prices and the gradual loss of their own natural resources due to logging, have begun to establish significant areas of plantations.

Though each grower may only have 200 to 800 trees, SIFMP has already identified 563 individual plantations in Western Province, totaling 1,800ha.

These plantations are expected to provide small incomes by 2013 from cutting the poorest trees, leaving behind the best trees with room to grow at their maximum potential. The remaining trees are then likely to reach their most valuable stage from 2020 onwards.


Western Province - Logging Licence Summary (Sep 2003)
Legend
Logging complete
Logging current or not yet started
Industrial scale plantations
Unlicenced commercial forest areas
Vella Lavella
Kolombangara
Ranongga
Gizo
New Georgia
Rendova
Tetepare
Vangunu
Ngatokae
Alu
Fauro
Mono

Appendix B – Derivation of Commercial Forest Areas

Current commercial forest area

The SOLFRIS GIS layer for forest type was the basis for determining commercial forest areas. The associated data table was amended as per Table B-1 to produce the layer *_TYPE_2003_C.

Table B-1: Forest classification GIS data table

Data Label	Description	Source
Province	Province	SIFMP
Type	Four character forest type classification (ACIL, 1995a)	SOLFRIS
F_Type1	First character of forest type classification only, used for data summaries	SOLFRIS
F_Type2	First two characters of forest type classification only, used for data summaries	SOLFRIS
Comm	Future commercial (C) or non-commercial (N) classification	SIFMP
Comm_2003	Current commercial (C) or semi-commercial (S) classification	SIFMP
Comm_FRIS95	SOLFRIS commercial (C) or semi-commercial (S) classification	SOLFRIS
Area	Area calculated by MapInfo	SIFMP
Slope	Slope class for 0-15 (15) degrees and 15-30 degrees (1530)	SOLFRIS
Concession	Location inside (Y) or outside (N) a known concession or logged area	SIFMP
Status	Operational status for areas located inside known concessions	SIFMP
LogFinish	The year logging was completed for areas inside known concessions	SIFMP

The classification of currently commercial areas (Comm_2003 in *_TYPE_2003_C) was based on the forest types described in Table B-2. SIFMP classifications were generally the same as those adopted by SOLFRIP (Table B-6) and crosschecked by overlaying Landsat satellite images, which show past logging activities, with forest type data.

The main classification difference between SOLFRIS and SIFMP applies to forests along the 1972 path of cyclone Ida, South Isabel. Most of this area has recovered since it was classified as non-commercial by SOLFRIP and some has already been logged. To take account of this, areas of HM2V (hills forest, partly disturbed) were assumed to have been recruited into HM3V (hills forest, undisturbed) and classified commercial.

Table B-2: Forest type classification of commercial (C) and semi-commercial (S) classes

Forest Type	Sub Type	Code	Class
Freshwater swamp and riveraine forest	*Campnosperma* dominated	FK3M	C
	Mixed species	FM2V	S
		FM3M	C
		FM3V	C
	Terminalia dominated	FT2V	S
		FT2M	S
		FT3M	C
		FT3V	C
Lowland forest (on nearly level lands)	Mixed species	LM2V	S
		LM3M	C
		LM3V	C
	Degraded rainforest	LN3V	S
Hill forest	*Campnosperma* dominated	HK2V	S
		HK3M	C
		HK3V	C
	Mixed species	HM2M	S
		HM2V	C
		HM3M	C
		HM3V	C
	Maritime atoll soils	HR2V	S
		HR3V	S

Source: SIFMP

Having identified commercial forest types, other non-commercial factors where then progressively subtracted by using GIS overlay analysis, where:

- Slope was greater than 30 degrees (on the basis of Code of Practice exclusion);
- Elevation was greater than 400m (on the basis of Code of Practice exclusion);
- Forests were located within a one kilometre radius of a village (to account for agricultural activities); and
- Conventional logging is unlikely because of stand size or poor access due to isolation. An arbitrary assessment based on local experience of logging practices, potential road and ship access.

GIS overlay analyses was then used to classify the remaining areas with their location inside or outside a logging concession area (Table B-3) , and their slope (0-15 or 15-30 degrees).

Table B-3: Classifications of logging status used to determine commercial area

Areas Outside Concessions	Areas within Concessions	
	Completed Areas	**Incomplete Areas**
All areas outside concessions	Operations complete	Operations current
Concessions not yet started	Areas converted to plantations	Operations of unknown status
	Logged areas identified with Landsat	

Source: SIFMP

The completed GIS dataset is exported to the MS Access database "Area Statement.mdb" where a logging "Status" field is added and area summaries generated. The area summaries are then exported to the Base Data worksheet in Area & Woodflow Summary.xls, where the multipliers in Table B-4 are applied to determine the final net commercial area.

Areas proposed for conservation management by ACIL (1995) were ignored, many of which have been logged in the meantime and their future enactment being unlikely due to complex land tenure issues.

Table B-4: Commercial forest type area multipliers

Forest Type		Logging Status			Slope		Stream Buffer	Access	Total Area
Commercial (C) or Semi-commercial (S)	Multi-plier[1]	Outside (N) or Inside (Y) Concession	Logging Current (C) or Finished (F)	Multi-plier[2]	Class (deg)	Multi-plier[3]	Multi-plier[4]	Multi-plier[5]	Multi-plier
C	100.0%	N	NA	100.0%	15	100.0%	93.0%	93.0%	91.1%
C	100.0%	N	NA	100.0%	15-30	50.0%	93.0%	93.0%	45.6%
S	40.0%	N	NA	100.0%	15	100.0%	93.0%	93.0%	36.5%
S	40.0%	N	NA	100.0%	15-30	50.0%	93.0%	93.0%	18.2%
C	100.0%	Y	C	50.0%	15	100.0%	93.0%	93.0%	
C	100.0%	Y	F	0.0%	15	100.0%	93.0%	93.0%	9.1%
C	100.0%	Y	C	50.0%	15-30	50.0%	93.0%	93.0%	0.0%
C	100.0%	Y	F	0.0%	15-30	50.0%	93.0%	93.0%	4.6%
S	40.0%	Y	C	50.0%	15	100.0%	93.0%	93.0%	0.0%
S	40.0%	Y	F	0.0%	15	100.0%	93.0%	93.0%	3.6%
S	40.0%	Y	C	50.0%	15-30	50.0%	93.0%	93.0%	0.0%
S	40.0%	Y	F	0.0%	15-30	50.0%	93.0%	93.0%	1.8%

Source:
1 ACIL (1995a).
2 Adjustment for current logging operations is based on the assumption that these operations are on a continuum from just started to nearly finished, the mid point (50% complete) being the average.
3 ACIL (1995a).
4 Estimate based on field observations and GIS analysis plus additional 40% allowance for unmapped gully buffers.
5 Adjustment for areas isolated by current licence boundaries, based on a GIS analysis of Western Province.

Future commercial forest area

The assessment of future commercial areas (Comm in *_TYPE_2003_C) was undertaken to take into account the future recruitment of forests not currently commercial.

The definition used to classify current commercial forests was broadened to include a wider range of forest types for future commercial forests (Table B-5). This was based on the assumption that most forests exhibiting moderate disturbance (canopy density class 2) would develop into relatively undisturbed (canopy density class 3) forests over time. Semi-commercial forests were reclassified as commercial for the same reason.

Table B-5: Forest types classified commercial for the purpose of assessing recruitment areas (canopy density classes 2 & 3 only)

Forest Type	Description	Sub Type
Freshwater swamp and riveraine forest	*Casuarina* dominated freshwater swamp/riveraine forest	FC
	Campnosperma dominated freshwater swamp/riveraine forest	FK
	Logged forest	FL
	Freshwater swamp/riveraine forest, mixed species composition	FM
	Terminalia dominated freshwater swamp/riveraine forest	FT
Lowland forest (on nearly level lands)	Lowland beach forest	LB
	Logged rainforest	LL
	Campnosperma dominated lowland rainforest	LK
	Lowland rainforest, mixed spp. composition	LM
Hill forest	*Albizia falcataria* dominated hills rainforest	HA
	Campnosperma dominated hills rainforest	HK
	Logged hill forest	HL
	Hills forest, mixed spp. composition	HM
	Maritime atoll hills rainforest	HR
	Agathis dominated hill rainforest	HX
Non forest and other areas	Cloud obscured areas*	NC
	No air photo coverage*	NT

* In the absence of any other data, cloud obscured areas and areas not covered by air photos were assumed to be commercial

The rotation length over which the recruitment of forests is likely to occur was assessed by ACIL (1992). Data from the Kolombangara Ecological Study was used to predict a 40-45 year rotation length for logged forests. No new data have been collected in the Solomon Islands since this study was carried out that could verify this work.

The main sources recruitment in the future are likely to come from:

- Land harvested in the mid 1970's and 1980's when the first large scale commercial logging commenced in Western and Isabel Provinces, potentially coming back into production from 2020 onwards. Assumed to be those areas already classified as being logged by SOLFRIP;
- Land logged using modern methods, between the early 1990's and 2003, and potentially coming back into production from 2035 onwards. Based on the SIFMP assessment of licence areas where logging is thought to be complete and LandSat data;
- Land supporting a current harvest operation, potentially coming back into production from 2045. Based on the SIFMP assessment of licence areas where logging is thought to be current; and
- Land likely to support a new harvesting operation in the next five to ten years, potentially coming back into production from 2050. Based on the SIFMP assessment of commercial forest areas not yet covered by a logging licence.

Table B-6: SOLFRIS and SIFMP commerciality classifications by Forest Type

Where, C = Commercial, S = Semi-commercial, N = Non-commercial, "-" = No known occurrence.

Forest Type	SOLFRIP												SIFMP	Comment
	Western[1]	Isabel[2]	Choiseul[3]	Malaita[4]	Makira[5]	GaudalC[6]	Florida's[6]	Russell's[6]	Rennell[7]	Vanikoro[8]	Utupua[8]	Nendo[8]		
HM3M	C	C	C	C	C	C	C	C	C	C	C	C	C	
HM3V	C	C	C	C	C	C	C	C	C	C	C	C	C	
LM3V	C	C	C	C	C	C	C	C	C	C	-	C	C	
LM3M	N	C	C	C	-	C	C	C	S	-	-	C	C	From satellite photography this class looks to be commercial for the West. Changed to "C" for 2003 assessment.
FT3M	C	C	C	C	C	C	C	-	-	-	-	-	C	
FT3V	C	C	C	C	C	C	C	N	-	N	-	-	C	Russells and Vanikoro changed to "C" for consistency.
FM3V	C	C	C	C	C	C	N	N	-	N	-	-	C	Small areas of non-commercial classifications changed to "C" for consistency.
FM3M	C	C	C	N	N	N	N	N	-	-	-	-	C	Small areas of non-commercial classifications changed to "C" for consistency.
HM2V	S	C	S	S	N	S	S	S	S	S	S	S	C	From satellite photography this class looks to be commercial. Changed to "C" for 2003 assessment.
HK3M	C	-	C	-	-	-	-	-	-	-	-	-	C	
FK3M	C	N	-	-	-	-	-	-	-	-	-	-	C	Changed Isabel to commercial (only 32ha).
HK3V	-	-	C	-	-	-	-	-	-	-	-	-	C	
LM2V	N	S	S	S	N	S	S	N	S	S	N	S	S	Changed Western and Makira to "S". No reason found for them to be different.
FM2V	S	N	S	S	N	S	N	N	-	N	N	-	S	Changed Isabel and Makira to "S". No reason found for them to be different.
FT2V	S	N	N	S	N	S	-	N	-	-	-	-	S	Changed Isabel, Choisuel and Makira to "S". No reason found for them to be different.
FT2M	-	-	-	-	-	S	-	-	-	-	-	-	S	
HK2V	-	-	S	-	-	-	-	-	-	-	-	-	S	
HM2M	-	S	N	-	-	-	-	-	-	-	-	-	S	Changed Choiseul to "S" (only 12ha).
HR2V	-	-	-	-	-	-	-	-	S	-	-	-	S	
HR3V	-	-	-	-	-	-	-	-	S	-	-	-	S	
LN3V	-	-	S	-	-	-	-	-	-	-	-	-	S	
HL2V	N	N	-	-	N	N	-	-	-	S	-	N	N	Changed Vanikoro to "N".
HM3S	N	N	N	N	S	N	N	-	N	N	N	N	N	Changed Makira to "N".

LM2S	N	N	-	-	-	-	-	S	-	N	N	N	N	Changed Russells to "N".
Forest Type	**SOLFRIP**												**SIFMP**	**Comment**
	Western[1]	Isabel[2]	Choiseul[3]	Malaita[4]	Makira[5]	GaudalC[6]	Florida's[6]	Russell's[6]	Rennell[7]	Vanikoro[8]	Utupua[8]	Nendo[8]		
LM3S	N	N	-	-	-	N	-	S	N	N	-	-	N	Changed Russells to "N".
NC	N	-	N	N	N	N	-	-	N	N	N	N	N	
NT	-	N	N	-	-	-	-	-	-	-	-	N	N	

Source:
1 ACIL (1994b)
2 ACIL (1995b)
3 ACIL (1994c)
4 ACIL (1994d)
5 ACIL (1994e)
6 ACIL (1994f)
7 ACIL (1994g)
8 ACIL (1994h)

Appendix C – Inventory Methodology

The assessment of post logging standing volumes was broadly based on the project time scale (eight months) and budget. It was judged that two inventory crews of four people each could be supported for five months, with the remaining project time divided between the initial planning phase and subsequent data analysis.

The GIS layer of commercial forest types was used to determine the likely future commercial area available for harvesting following regeneration. This represented the target area for the inventory.

Due to general forest access and topography, circular plots located at 100m intervals along a compass transect were favoured over continuous strip plots. Crews were able to travel one to three kilometres per day, resulting in the assessment of between 10 and 30 plots per day spent in the forest (Table C-1).

Table C-1: Inventory sampling intensity

Province	Number mapped logging concessions identified		Number of logging concessions sampled			Field time allocated (crew days)	No. of transects / plots
	Complete	Current	Complete	Current	% of total		
Western	48	13	11	4	25%	67	38/635
Isabel	11	13	7	2	26%	40	33/384
Choiseul	28*	4	7	0	22%	21	7/91
Makira	17	4	10	1	52%	19	13/171
Central	2	1	1	1	66%	14	12/160
Total	*106*	*35*	*36*	*8*	*31%*	*161*	*103/1441*
Guadalcanal	Desktop assessment only due to field crew safety considerations						
Malaita	Desktop assessment only due to field crew safety considerations						
Shortlands	Desktop assessment only, no large scale future logging envisaged						
Santa Cruz	Desktop assessment only, no large scale future logging envisaged						
Rennell	Desktop assessment only, no large scale future logging envisaged						

* Bulk of the concessions represent Eagon annual logging boundaries.
Source: SIFMP

Transect start points were determined in the field due to the difficulty of identifying readily accessible start points in the office. Crews were instructed to target logged areas and transects were adjusted accordingly.

Plot design followed the SOLFRIS methodology of using staggered plot sizes to economically sample the tree diameter size class distribution found in the SI's:

- Main plot - 0.1 ha (17.8m radius, corrected for slope) for trees > 60cm dbh;
- 1st sub plot - 0.02 ha (8.0m radius, corrected for slope) for trees 20-60cm dbh; and
- 2nd sub plot - 0.002 ha (2.5m radius, corrected for slope) for trees 5-20cm dbh.

For each commercial tree greater than 20cm dbh, its species, dbh, merchantable log length and form class were recorded, where:

- Form class 1 is a recognised species of export quality, bole straight and >6m long;

- Form class 2 is a recognised merchantable species with a millable bole >2m long; and
- Form class 3 is non-commercial.

For trees 5-20 cm, the merchantable log length was omitted.

All field data were entered into the MS Access database "Field inv data.dbf" where a number of data checks were carried out. Data were then transferred to the MS Access database "NFRA.dbf" for analysis.

The calculation of gross and merchantable volumes followed ACIL (1994a), based on the definitions:

> *Gross volume* - the volume of the merchantable tree bole assessed as it stands in the forest.
>
> *Merchantable volume* - the gross volume reduced to account for unsighted internal and external defects, felling damage and trees missed by harvesting operations.

The gross volume was derived using the function:

$$\text{Volume} = e^{(-8.858+1.959*\ln(\text{dbh})+0.729*\ln(\text{length}))}$$

dbh = Diameter at breast height or above buttress, in centimetres; and

length = Bole length in metres

The merchantable volume was derived by reducing the gross volume by:

1. 7.5% to account for external defects, felling damage and trees missed by harvesting operations; and

2. Reductions to account for internal defects as per Table C-2.

Table C-2: Internal defect reductions for assessing merchantable volume

Species	Dbh	Reduction
Terminalia brassii	>100cm	40%
Terminalia brassii	<100cm	15%
Pometia Pinnata	All	15%
Vitex	All	20%
All other species	All	10%

Appendix D – Data Dictionary

SOLFRIS MapInfo data layers were organised by provincial subdirectories with files prefixed by a provincial code (Table D-1). The "*" character is used to depict these codes in Tables D-2 and D-4 below.

Table D-1: Provincial MapInfo file prefixes.

Province	Directory	File prefix
Central	Central	T
Choiseul	Choiseul	C
Guadalcanal	Guad	G
Isabel	Isa	I
Makira	Makira	K
Malaita	Mala	M
Western	West	W
Rennell/Belona	Rennell	R
Shortlands	Short	H
Santa Cruz	SCruz	S

Table D-2: SOLFRIS data layers collected and databases compiled 1990-1995

Data	File Name	Database System
Coastline	*_Coast.tab	MapInfo
Rivers	*_River.tab	MapInfo
Contour lines (200m)	*_Cont.tab	MapInfo
Elevation polygons (200m)	*_Elev.tab	MapInfo
Ground slope	*_Slope.tab	MapInfo
Catchment boundaries	*_Catch.tab	MapInfo
Ward boundaries	*_Ward.tab	MapInfo
Villages	*_Villages 97.tab	MapInfo
Roads	*_Road.tab	MapInfo
Land system boundaries	*_Degfor.tab	MapInfo
SOLFRIS forest type boundaries	*_Type.tab	MapInfo
Hansell and Wall land systems	*_Ls.tab	MapInfo
Logged areas	*_Logged.tab	MapInfo
Timber volume data	Tplot.dbf / Ttree.dbf	FoxPro
Sociological data	Soc.dbf / Social.dbf	FoxPro
Forest ecology	Eco.dbf	FoxPro
Agricultural opportunity areas		ERMS
SRU boundaries		ERMS
Susceptibility to deterioration		ERMS
Environmental domains		ERMS
Ecologically significant areas		ERMS
Environmentally sensitive areas		ERMS
Constraints to development		ERMS

All GIS files are stored in C:\windata\... and referred to by a number of MapInfo workspaces.

Table D-3: Forestry Department databases consulted in 2003

Data	File Name	Database

		System
FD log export database – calculations, reports	Log export.dbf	MS Access
FD log export database – export base data	Log export_be.dbf	MS Access
FD log export database – operations base data	Operations_be.dbf	MS Access

Table D-4: GIS data layers created or updated, databases and spreadsheets compiled in 2003

Data	File Name	Database System
Coastline – conversion from polyline to region	*_Coast_2003.tab	MapInfo
Forest type – tagged with commercial/non-commercial code	*_Type_2003.tab	MapInfo
Forest type – commercial forests only	*_Type_2003_C.tab	MapInfo
Forest type – simple assessment for Shortland Islands	H_Type_2003_C.tab	MapInfo
Sub regional boundaries used by SOLFRIP	*_Sru_2003.tab	MapInfo
Extent of LandSat coverage purchased	Landsat_Cover.tab	MapInfo
National coastline, built up from provincial data	Coast_2003.tab	MapInfo
National licence boundaries, built up from provincial data	Logged_2003.tab	MapInfo
National forest type cover, built up from provincial data	Type_2003.tab	MapInfo
Cyclone tracks	Cyclones_2003	MapInfo
SOLFRIS inventory data – conversion of Tplot and Ttree.dbf	Fris.dbf	MS Access
Area statement compiled from GIS, Type_2003_C.tab	Area statement.dbf	MS Access
Logged over area field inventory data	Field inv data.dbf	MS Access
Logged over area field inventory analysis	NFRA.dbf	MS Access
Plantation database of industrial scale planted areas	Plantation database - Company.xls	MS Excel
Plantation database of industrial and village commercial areas, used to assess plantation woodflows	Plantation database - Company.xls	MS Excel
Plantation woodflow assumptions and calculations	Plantation woodflow.xls	MS Excel
Assessment of stumpage prices for "other" plantation species	Plantation prices – Other spp.xls	MS Excel
Natural forest woodflow assumptions and calculations	Natural forests woodflows.xls	MS Excel
Natural forest revenue flow assumptions and calculations	Natural forests revenue.xls	MS Excel
Summary of annual logging quotas approved to date	Annual log quota assessment.xls	MS Excel
Post logging volume assessment, report summary	Post logging volume assessment.xls	MS Excel
Post logging stocking assessment, report summary	Post logging stocking assessment.xls	MS Excel
Summary of historical yields from natural forests to 2003	Historical yields.xls	MS Excel
Field data collection sheets	Field data sheets.xls	MS Excel

Note: All GIS files updated or created are suffixed with the year 2003.