

# The Fair Value of Forestry Assets: Analysis of Precious Woods and Green Resources

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## Abstract:

The purpose of this dissertation is to explore the Fair Value concept in the context of biological assets, more precisely forestry assets. In order to evaluate how Fair Value has been employed in the forestry assets field, I first approach the Fair Value in general terms in the Literature Review, and the Fair Value in the specific context of biological assets (IAS 41). Further, I develop an analysis of two standing timber companies, namely Precious Woods and Green Resources. This analysis encompasses both the methodologies undertaken by each company to value its forestry assets and the impacts on the Financial Statements of changes in fair value of biological assets performed by each company in each year under analysis. Based on the results obtained, both Precious Woods and Green Resources use the Income approach to value its forestry assets and these assets have an overall heavy weight on the financial statements of both companies. Besides, throughout the study one can notice that slight shifts in judgement concerning one or more variables relevant for the DCF model to measure forestry assets can have significant impacts on Financial Statements. Moreover, one can conclude that there is room for improvement not only in the disclosures but also in the accuracy and reliability of financial information reported in the Annual Reports of Precious Woods and Green Resources.

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## **Introduction:**

This dissertation is divided in 3 main topics:

Firstly, I address Fair Value definition, the three approaches to Fair Value, the arguments concerning the responsibility of fair value in the financial crisis, its relation with volatility, arguments in favour and against the use of Fair Value accounting and some recommendations.

Secondly, I present a section relative to biological assets and its guiding rule IAS 41 and also a narrow subsection concerning forestry assets, which are a type of biological assets. According to IAS 41, biological assets should be measured at fair value and the suitable basis for ascertaining the fair value of a biological asset is the quoted price in an active market, followed by the most recent market transaction price and sector benchmarks. If active markets are not available (especially during the growth period, for biological assets with a long growth cycle), the entity should base its analysis on discounted cash-flow methods.

Thirdly, I apply the theory absorbed in the two previous sections to analyse the application of Fair Value in two standing timber Companies: Precious Woods and Green Resources. These two companies measure their biological assets at Fair Value using DCF models, which imply several assumptions, and during the years under analysis, these companies performed changes in assumptions used to measure their biological assets at Fair Value, which had relevant impacts on the Financial Statements. These changes in assumptions reveal both the vulnerability of the DCF models and the concern to disclose more accurate and consistent valuation methods.

## Literature Review:

### Fair Value Definition:

According to IFRS 13, Fair value is defined as “the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date” (IASB, 2012).

It is an exit price because it is the price that would be received if the asset was sold or paid if the liability was transferred, which is different from the amount of money paid when the asset was purchased, or received when the liability was created. Fair value therefore differs from Historical Cost, which is an entry price. When measuring fair value, it is assumed that buyers and sellers are independent and that information is available to them to support wise decisions in a hypothetical transfer of liabilities or sale of assets (Zyla, 2010).

By considering “orderly transaction”, Fair Value implies that the hypothetical sale does not correspond to a forced liquidation or distress sale. It rather assumes that the asset or liability is present in the market before the measurement date so that marketing activities create enough competitive tension (IASB, 2012).

If possible, fair value measurements should be based on the principal market, which is the “market with the greatest volume and level of activity for the asset or liability” (IasPlus). In the absence of this market, the most advantageous market should be considered, that is, the “market that maximises the amount that would be received to sell the asset or minimises the amount that would be paid to transfer the liability, after taking into account transaction costs and transport costs” (IasPlus).

Transaction costs are solely relevant to identify the most advantageous market. Actually, to estimate the fair value of assets and liabilities, the price under estimation should not take into account transaction costs. The idea behind this stance is that transaction costs are “typically unique to a specific transaction and may differ depending on the transaction, not the asset or liability” (Zyla, 2010). As for transportation costs, these may be included in the fair value estimates.

As far as market participants are concerned, to be considered as such, they need to present four characteristics: be “independent of each other” (IASB, 2012), knowledgeable, by undertaking “efforts, such as normal due diligence, to become knowledgeable about the asset or liability” (KPMG, 2011), be “able to enter into a transaction for the asset or liability” (IASB, 2012), and be “willing to enter into a transaction” (IASB, 2012).

Fair value considers that market participants deal with assets at their highest and best use. Highest and best use is the “use of a non-financial asset by market participants that would maximise the value of the asset or the group of assets and liabilities within which the asset would be used” (IasPlus). “Highest and best use” requires the use of the asset to be “physically possible, legally permissible and financially feasible” (IASB, 2012). It must also maximise its value.

As an example, let’s suppose one reporting entity acquires a telecommunications company in a business combination. This telecommunications company developed a certain technology that is outside its core business so that technology was not implemented in the telecommunications company’s current services. Let’s also suppose that the reporting entity (acquirer) doesn’t intend to use that technology in its operations either. The point is not on whether the acquirer intends or not to exploit the technology in its business, as “if the technology would be exploited by other market participants, the fair value of the technology would be based on its highest and best use” (Zyla, 2010). Accordingly, the fair value reported in the acquirer financial statements should be estimated as if the technology would be utilized (by other market participants) (Zyla, 2010).

### Application of Fair Value to Liabilities:

The relevance of this specific topic is due to the fact that the way liabilities are accounted for financial reporting purposes can be misleading. Liabilities reported at fair value have to be adjusted for credit risk changes. If the credit risk of the liabilities measured at fair value decreases, the fair value of the liability increases. This increase in the liability, seen as an improvement in the credit risk of the company (because it decreased), leads to a loss in the income statement. In pure financial accounting terms, there is a Debit in Expenses and Credit in Liabilities. On the other hand, if the credit risk deteriorates (increases), the fair value of liabilities decreases, in which case there is a debit in liabilities and a credit in Revenues, leading to a fair value gain.

Gaynor performed a research where the participants were financial-statement users, to test them in this topic. “The majority of participants incorrectly associated gains (losses) arising from a change in a liability’s fair value with a (n) decrease (increase) in credit risk” (Gaynor et al, 2011). Besides this first experiment, they performed another one with relational disclosures that “stated the directional effect of the change in the company’s credit risk on the income statement” (Gaynor et al, 2011). Better results were achieved in this second experience.

Having said that, and bearing in mind that Certified Public Accountants were the participants of this research, it is clear that this topic is not still a comfortable one in the accounting area, but it is also clear that better disclosures improve the knowledge or at least the ability to understand financial statements.

Besides the counter- intuitive effect, these gains or losses can be seen as somewhat artificial because the responsibility of the company to its creditors remains the same, due to the fact that the face value of the debt and its prospective debt service remain unchanged.



## **Fair Value Measurement Approaches:**

Three approaches may be used by management, and then audited by certified professionals, to estimate the fair value of assets and liabilities: Cost, Income and Market Approach.

### **Cost Approach:**

The cost approach “asks what it would cost today to acquire the same or similar assets” (King, 2006). This approach is not usually used concerning financial assets. It is more common in real estate, machinery and equipment assets (King, 2006). According to IFRS 13, the current replacement cost method (the usual method to calculate fair value under the cost approach) reflects how much it would cost to reproduce the service capacity of an asset of comparable utility, adjusting for physical, functional and economic obsolescence (IASB, 2012).

Physical obsolescence can have two causes that can be intertwined: the higher the age of the asset and/or the use of the asset, the higher the obsolescence. Functional obsolescence means that the asset is no longer able to perform the activity it is intended to. This happens a lot due to technological obsolescence, which is a type of functional obsolescence. Concerning economic obsolescence, it means that the asset is still able to perform its required function, but it is no longer profitable (Zyla, 2010).

One shortcoming that is associated with the cost approach is that opportunity cost of capital (incentive to invest in this asset in detriment of other choices) and profit percentages (incentive to stay in business) are not taken into account, although they should be included to reflect the true fair value amount (King, 2006).

### Market Approach:

The market approach, as the name dictates, applies when a market exists where it is possible to observe the prices of the same asset or similar assets (King, 2006). “It is not ordinarily utilized by appraisers for intangible assets” (King, 2006) because “intangibles, due to their unique characteristics, have virtually no market participants” (Catty, 2010). This is the most reliable approach, because it is not a product of judgemental values performed by management, which can lead into frauds; and the valuation approaches that are used should always aim to “maximize the use of relevant observable inputs and minimise the use of unobservable inputs” (KPMG, 2011).

Regarding stocks, there are two methods worth to be mentioned, as far as the market approach is concerned: the “Guideline Public Company method” and the “Guideline Transaction Method” (Zyla, 2010). The former “uses multiples derived from the market trading price of similar publicly trading companies, while the latter derives multiples from the acquisition price of similar companies that were recently acquired” (Zyla, 2010). The same reasoning behind these two methods regarding shares can be applied to other kinds of assets with a market, such as machinery or land.

The market approach may also present drawbacks, namely if the market for the asset is not fully liquid, possibly causing bias in fair value calculations.

### **Income Approach:**

The income approach “asks what investors are willing to pay for an asset with a given income stream in the future” (King, 2006). To value these assets one needs to forecast future cash-flows provided by the asset and use discount rates to reach the present value. Several valuation techniques are used concerning the Income Approach: Present Value Techniques, Option Pricing Models (Black-Scholes-Merton formula or binomial model) and Multi-Period Excess Earnings Method (used to calculate Intangible Assets such as customer relationships or technology) (IASB, 2012).

Concerning the Present Value Techniques, IFRS 13 mentions two: the discount rate adjustment technique and the expected present value technique. “The discount rate adjustment technique uses a risk-adjusted discount rate and contractual, promised or most likely cash flows” (IASB, 2012). The expected present value technique has two possible methods. It can adjust for risk in the cash-flows, which are then discounted at the risk-free rate, or it can use a risk-adjusted discount rate with expected cash-flows, which are probability weighted (IASB, 2012).

### Critical analysis and Limitations:

Despite the fact that it is relevant for financial statement users to acknowledge the approaches used by firms when valuing assets, it is also mandatory, according to IFRS 7, to classify assets and liabilities according to inputs. Level 1 concerns unadjusted quoted prices in active markets for similar instruments, which is the most reliable input. Level 2 inputs are relative to directly observable (prices) or indirectly (derived from prices) market inputs other than Level 1 inputs. Finally, level 3 inputs are basically mark-to model, because they are unobservable inputs, which mean that they are not based on market data, which implies immediately that they are less trustworthy (IASB, 2012).

The company Ernst & Young goes even further in its analysis of Level 3, mark-to-model assets and liabilities, stating that “the IASB has placed too much emphasis on its view of what constitutes relevant information and has given insufficient consideration to the other attributes, in particular reliability and understandability” (Ernst & Young, 2005).

Having said that, the question posed next is how to improve Level 3 information. Song and Yi find not only that companies with stronger corporate governance mechanisms increase the accuracy of Level 3 assets and liabilities estimates compared to companies with weaker corporate governance mechanisms, but also that “the impact of corporate governance on the value relevance of fair values is greater for Level 3 assets compared to Level 1 and Level 2 assets” (Song and Yi, 2010). By value relevance, the authors refer to fair value information that more accurately reflects real volatility, therefore subject to less estimation errors by management and prone to less managerial manipulation.

## Fair Value and the Financial Crisis:

### Introduction:

In order to better understand the impact of fair value in the Financial Crisis that started in 2008, and because this crisis started in the banking sector, I will first provide a brief explanation of the role of banks in the economy. Casu, Girardone and Molyneux (2006) identify three transformation functions performed by banks: size transformation, maturity transformation and risk transformation. Size transformation occurs because banks collect small deposits and lend higher amounts of money. This can happen because banks benefit from economies of scale, because of the huge amount of deposits they collect in the market. Maturity transformation occurs because banks borrow short-period amounts of cash and lend with a bigger time frame. With this maturity transformation the liquidity risk emerges, which is the risk of not receiving cash from whom they lent money as fast as it is needed by the depositors. Finally, risk transformation occurs because there is a credit risk, which is the risk that the institutions or people to whom the bank lent money, will default.

On the other side of the balance sheet, liabilities, banks cannot default on their commitments, because it would generate loss of confidence in the banking system. Therefore, banks reduce the risk of defaulting in their liabilities through diversification and through capital buffers. The amount of capital required to cushion against asset impairments is not only based on the assets values overall, but mainly on the risk-weighted assets. Capital requirements are a pillar issue in banking, materialized in Basel agreements, which are given such an importance because higher capital buffers trade-off with higher return on equity (Casu, Girardone and Molyneux, 2006).

Concerning the financial crisis itself, what happened, for accounting purposes, was the following: with the rise in the interest rates, subprime homeowners were not able to pay their mortgages, which led to impairment on banks assets, and therefore to reductions in capital (because liabilities couldn't suffer from these impairments, or it would reduce banking confidence levels). However, Basel rules implied that banks maintained a certain level of capital, so to keep up with these capital requirements, banks sold assets. These asset sales were considered distressed transactions, in which

the “seller is forced to accept the best price offered in the shortened time available” (KPMG, 2011).

### **Was Fair Value the main responsible for the financial crisis?**

Some authors argue that fair value accounting is not the main responsible for the financial crisis. “The subprime crisis was caused by firms, investors, and households making bad operating, investing, and financing decisions, managing risks poorly, and in some instances committing fraud, not by accounting” (Ryan,2008).

Besides, “banks failed not because of fair value accounting but due to a loss of investor confidence and their inability to attract funding and liquidity” (Harris and Kutasovic, 2010) and also due to “loose credit policies, poor internal controls and bad business judgment” (Harris and Kutasovic, 2010).

On the other hand, fair value accounting is blamed by some authors to be responsible for the financial crisis.

“FVA has accelerated and amplified the current financial crisis” (Magnan, 2009). Indeed, “marking to market pushed many banks toward insolvency and forced them to unload assets at fire-sale prices, which then caused values to fall even further” (Pozen,2009).

SEC performed a study in late 2008 across the banking sector, which reached the conclusion that only approximately 22% of financial assets were both reported at fair value and had a direct impact in regulatory capital and net income in 2008, concerning the banks included in the study (Pozen, 2009).

However, this argument solely pinpoints that there were few assets recorded at fair value that impacted regulatory capital in a direct way. If there were more assets recorded at fair value, maybe the crisis would have been even deeper. In fact, with IFRS 9 (already published and being used by some banks, but mandatory only from 2015 onwards), more financial assets will be recorded at fair value, and only if this IASB standard was applied in 2008 it would be possible to ascertain credible conclusions.

Some authors blame the regulatory bodies instead of accounting itself: “FVA-based financial reporting is only the messenger that a firm’s solvency is undermined by its financial strategies or lending practices, but it is up to regulators to figure out how to use such information” (Magnan, 2009). Therefore, “this is simply a case of blaming the Messenger. Fair value accounting is not the cause of the current crisis. Rather, it communicated the effects of such bad decisions as granting subprime loans and writing credit default swaps” (Pozen, 2009).

To sum up, opinions diverge concerning the impact of fair value in the financial crisis. The debate over the impact of fair value in the financial crisis is the debate over the alternatives, mainly historical cost. If fair value was the responsible for the crisis, could the alternative, historical cost, have prevented this crisis? Considering a recent situation, what would investors prefer regarding banks with Greek debt in their assets? Not to perform mark-to-market valuations and therefore not present their losses? Isn’t it better to be transparent, by recognizing their losses and consequently be required to increase capital buffers?

On the one hand, “we do not want banks to become insolvent because of short-term declines in the prices of mortgage-related securities” (Pozen, 2009). But on the other hand, reporting financial assets at historical cost may ignore reality, as happened in Japan after 1990, where bank losses were hidden and the cleanup of toxic assets was delayed (Pozen, 2009).

## Financial Crisis and Volatility:

The use of mark-to-market techniques to measure the value of financial assets can have two different impacts. On the one hand, mark-to-market correctly gives insights about fundamental volatility. On the other hand, this fundamental volatility influences financial institutions actions, which are then reflected in prices again. This is called artificial volatility, reflected into prices (Sapra, 2010).

There is “the possibility of the emergence of a feedback loop whereby anticipation of short-term price movements may change the behaviour of financial institutions in such a way as to further amplify these price movements” (Sapra, 2010).

This feedback effect is higher if banks are more sensitive to short-term price changes, which occurs with fair value option. These shocks inside the system are due to endogenous risk. If it resulted from a feedback loop outside the system, we would be in the presence of exogenous risk (Sapra, 2010).

If these feedback loops generate strong effects, banks decision makers base their guesses on other financial institutions decisions, instead of fundamentals (of prices) themselves. This is what happened in the financial crisis. Eventually, “prices spiralled down even further, which led more banks to sell their loans, and so on” (Sapra, 2010).



## Pros and Cons of Fair Value Accounting:

Before entering in the subject, fair value accounting, and accounting itself, wouldn't be of relevance if markets were completely liquid, if there was no private information, and if decision makers had no distorted incentives. "Accounting measurement is relevant only because we live in an imperfect world" (Sapra, 2010).

### Arguments against Fair Value:

Starting with the critics against fair value accounting, "when banks and insurance companies complain about fair value accounting, they don't have liquid assets such as currency futures in mind" (Sapra, 2010). Having said that, "the damage done by marking-to-market is greatest when claims are long – lived, illiquid, and senior. These are precisely the attributes of the key balance sheet items of banks and insurance companies" (Plantin, Sapra and Shin, 2008). This is the reason why banks and insurance companies were not the main apologists of the introduction of fair value in accounting rules. While for banks these claims appear in the asset side, for insurance companies it appears on the liabilities side (Plantin, Sapra and Shin, 2008).

Another disadvantage is relative to artificial volatility, mainly focused on assets that are market-to-model, "driven by short-term fluctuations in financial market valuations, or caused by market imperfections or by inadequate development of valuation techniques" (Enria, Cappiello et al, 2004).

Another drawback, also related to market-to-model assets, is the reduction in the comparability and reliability of financial reports in different companies. When no markets exist, models are developed, and despite the attempt by IASB and FASB to seek convergence in the model assumptions and inputs, there is room for manipulation or inaccuracy. In fact, Michel Magnan advocates that unverifiable future cash flows, reached through inaccurate capitalizations, lead to "managerial opportunities to make strategic valuation choices" (Magnan, 2009) and "introduce significant noise into the financial reporting process that may be costly to investors" (Magnan, 2009).

Another disadvantage relative to managerial behaviour is also pinpointed by Michel Magnan, and advocates that corporate management can postpone asset impairments by avoiding the day the impairment should be recognized. This leads into lack of transparency and relevance of financial reporting (Magnan, 2009).

#### Arguments for Fair Value:

Concerning the advantages of fair value accounting, not only it gives a better insight about the accuracy of the risk profile of banks, but also contributes to more financial stability to shareholders and depositors, by readily identifying “a deterioration in the safety and soundness of a bank” (Enria, Capiello et al, 2004).

Mary E. Barth advocates that fair value can reflect in a better way than Historical Cost the qualitative characteristics envisaged by the Conceptual Framework for the Preparation and Presentation of Financial Statements. Firstly, investors are concerned about the changes in fair value on a certain reporting period. “The fact that investors consider these changes to be relevant indicates that fair value must be somewhat effective at capturing timely information on fluctuating economic values” (Mary E. Barth, 2010). This is in accordance with “Timeliness”, one of the qualitative characteristics. Furthermore, “relevance” also perfectly matches fair value idiosyncrasy, because the current (fair) value of assets and liabilities are “capable of making a difference in the decisions made by users” (IasPlus). Two other characteristics, comparability and neutrality, fall into the fair value definition. Concerning comparability, “Fair value will differ for items that differ economically, and be the same for items that are the same economically” (Mary E. Barth, 2010), and concerning neutrality, “fair value is an unbiased measure of assets and liabilities” (Mary E. Barth, 2010).

## Recommendations:

Fair Value enables investors to have access to more timely information than historical cost. Investors appreciate that possibility of having precise values for assets and liabilities. However, as seen before, this can lead to higher volatility. The solution was not through less use of fair value, according to IASB rules. Actually, fair value application is increasing, followed closely by stricter capital rules in the banking sector according to Basel III to absorb the increased volatility. Therefore one recommendation is, in the case of the financial sector, to deal with “the relevance of establishing a capital buffer that looks through the cycle, augmenting the capital position during boom cycles to withstand the burden on capital that stems from economic downturns” (Novoa, Scarlata and Solé, 2009).

Stronger capital concerns to mitigate possible impacts in crisis situations don't confine to fair value assets and liabilities. One interesting point is relative to provisions. “Broadening the current narrow concept of provisions to incorporate additional methods of retaining income in upswings could provide a way of better offsetting balance sheets' procyclical effects, for not-fair-valued assets” (Novoa, Scarlata and Solé, 2009). Provisions are “liabilities of uncertain timing or amount” (IasPlus) where payment is probable and the obligation event is part of the past, therefore they can be seen as expected losses, unlike regulatory capital that is needed to face unexpected losses. If provision amounts were estimated with the best possible link to “expected volatility, higher risks and potentially larger losses of an asset” (Novoa, Scarlata and Solé, 2009), they could prevent negative shocks of the business cycle in a more accurate way. “Coordination between accounting standard setters and supervisors would be needed to effect such changes” (Novoa, Scarlata and Solé, 2009).

Due to lack of accuracy in certain mark-to-model assumptions, Novoa, Scarlata and Solé, in their study concerning financial instruments of banks, advocate that the register of assets at fair value “should be supplemented by information on a financial instrument's price history, the variance around the FV calculations, and management's forward-looking view of asset price progression”. (Novoa, Scarlata and Solé, 2009) This approach would help clarify the volatility impacts in such assumptions. In fact, according to IFRS 13 (IASB, 2012), disclosure rules concerning

recurring fair value measurements (which are relative to assets measured at fair value at each reporting date, which doesn't necessarily imply that appraiser valuations are performed every year, because it would be too costly), of financial assets and liabilities accounted for at fair value and that fall into the Level 3 of fair value hierarchy, imply that such measurements should be accompanied by narrative and quantitative sensitivity analysis of changes in unobservable inputs.

Concerning truthful information, it would be possible to achieve higher transparency by increasing, in a compulsory way, the frequency of financial statements available to the public (Sapra, 2010). These reports could focus on more relevant information, with a particular section addressing risk analysis in depth (Novoa, Scarlata and Solé, 2009). Besides, this increased timely information would minimize informational mismatches across financial investors in the stock market, increasing price efficiency, and could improve corporate governance mechanisms (Sapra, 2010).

However, the same question raised before emerges in this argument: we can have more frequent reports that improve financial information to stakeholders and shareholders, but does the relevance of these reports improve with or without more assets and liabilities reported at fair value? Maybe to add to these more frequent reports, the reports themselves could publish for example "two versions of its earnings per share (EPS) each quarter – one calculated with fair value accounting and the other without" (Pozen, 2009). This could be one step to overcome volatility.

## Accounting for Biological Assets:

### Introduction:

Despite the fact that nowadays agriculture has been given its due importance in the accounting world, it has not always been like this, although agriculture has always been a cornerstone of many economies in several countries. Traditionally, agricultural companies were of small size, family held businesses, not obliged to produce financial statements, and only performed some kind of accounting activity to comply with tax and subsidy requirements (Argilés and Slob, 2001). “Also, grantors of farm credit have historically looked to the character of the borrower, usually a long time resident with deep roots in the community, rather than to financial statements” (Epstein and Jermakowicz, 2010).

Another factor possibly contributing to the scant attention given to agriculture by standard setters around the world is based on the fact that the main regulatory bodies have been based in the US or UK, and in these economies agriculture is not given such importance as in less developed countries. Besides, singular characteristics of this industry, such as biological transformation like growth, production, degeneration and procreation, which cannot be accounted with traditional accounting classification schemes, postponed its concern by financial reporting rules (Epstein and Jermakowicz, 2010).

### IAS 41:

In this section I will provide a summary of IAS 41 implications based on the standard provided by the European Commission website ([www.ec.europa.eu](http://www.ec.europa.eu)). IAS 41 effective date was 1 January 2003, although the IASB encouraged earlier application.

According to IAS 41, biological assets are living animals or plants. This standard deals not only with biological assets but also with agricultural produce at the point of harvest, where agricultural produce is the harvested product of the entity's biological assets.

After the point of harvest, agricultural produce is no longer ruled by IAS 41, but instead by IAS 2 (Inventories) or another applicable standard. For example, sheep and dairy cattle are biological assets; wool and milk are their agricultural produce, respectively. But the process of converting wool into yarn and carpet or of converting milk into cheese, are no longer relevant for IAS 41, because these are products that are the result of processing after harvest. Similarly, and with greater relevance for this study, trees in a plantation forest are biological assets, felled trees are agricultural produce, and logs/lumbers are products that are the result of processing after harvest.

Harvest is the detachment of produce from a biological asset or the cessation of a biological asset's life processes. The "cessation of a biological asset's life" is concerned with consumable biological assets, which are those that are to be harvested as agricultural produce or sold as biological assets. Examples of consumable biological assets are livestock intended for the production of meat, livestock held for sale, fish in farms, crops such as maize and wheat, and trees being grown for lumber. The "detachment of produce from a biological asset" is concerned with bearer biological assets, which are for example livestock from which milk is produced, grape vines, fruit trees, and trees from which firewood is harvested while the tree remains.

According to IAS 41, biological assets can be grouped into mature and immature. This distinction enables stakeholders to analyze future impacts of these biological assets in P&L and balance sheet, in terms of the future economic benefits that will be generated in the short-term (mature biological assets) or in the long-term period (immature biological assets) (Costa, 2011). Mature ones can still be divided between those that have attained "harvestable specifications (for consumable biological assets) and those that are able to sustain regular harvests (for bearer biological assets)" ([www.ec.europa.eu](http://www.ec.europa.eu)).

Concerning the recognition and measurement of biological assets, according to IAS 41, these are to be measured at its fair value less costs to sell, on initial recognition and at the end of each reporting period, except for the cases where fair value cannot be measured reliably. Costs to sell are the "incremental costs directly attributable to the disposal of an asset, excluding finance costs and income taxes" ([www.ec.europa.eu](http://www.ec.europa.eu)).

The quoted price in an active market or in the most relevant market if the entity has access to different active markets, which exists for a biological asset or agricultural produce, is the suitable basis for ascertaining the fair value of that asset. If these active markets don't exist, the company bases its evaluation on the following 3 alternatives: the most recent market transaction price, if there have not been considerable changes in the economic environment since the date of the transaction until the end of the reporting period; "market prices for similar assets with adjustment to reflect differences" ([www.ec.europa.eu](http://www.ec.europa.eu)); and sector benchmarks. Sector benchmarks are for example "the value of an orchard expressed per export tray, bushel, or hectare, and the value of cattle expressed per kilogram of meat" ([www.ec.europa.eu](http://www.ec.europa.eu)).

If market based prices are not available, the entity bases its analysis on discounted cash-flow methods. The calculation of cash-flows is based on what market participants would expect the asset to reproduce in the most relevant market. Cash-flows for financing the asset, taxation and for re-establishing biological assets after harvest, "for example, the cost of replanting trees in a plantation forest after harvest" ([www.ec.europa.eu](http://www.ec.europa.eu)), are not included.

According to IAS 41, gains and losses arising on initial recognition of a biological asset or of agricultural produce at fair value less costs to sell, and from changes in fair value less costs to sell of biological assets, should be reported in the income statement in the respective period.

Biological assets shall be measured at cost less accumulated depreciations and impairment losses, only on initial recognition, and only when neither market based prices are available or when alternative ways of accounting at fair value are clearly unreliable. Once the fair value calculation becomes an accurate estimate of the value of the asset, the entity shall value the asset at fair value less costs to sell until disposal ([www.ec.europa.eu](http://www.ec.europa.eu)).

According to some authors, the fact that biological assets strengthen, mature or fatten over time, therefore changing its physical condition constantly, makes it inherently less reliable to value these assets at cost (Argilés and Slof, 2001).

However, the cost method may be a reasonable way to value biological assets, and it might be a good approach to estimate fair value, in two specific situations: if tree

seedlings are planted just before the end of the reporting period, or other situations where no relevant biological transformations have taken place, or in the case of a biological asset with a long life, like a pine plantation with a production cycle of 30 years, where in the initial growth phase the impact of the biological transformation on price is not considered to be relevant ([www.ec.europa.eu](http://www.ec.europa.eu)).

### **Historical Cost Versus Fair Value in Biological Assets:**

There are production periods for many crops that are so long that impose the need to account the fair value changes in operating profit every period, otherwise gross distortions would be made, because with cost methods the entire earnings of a long production process would be reported only at distant intervals, “which would not faithfully represent the underlying economic activities being carried out” (Epstein and Jermakowicz, 2010). This can be compared with long-term construction undertakings, which are commonly accounted for as percentage-of-completion, for the same reasons. Beyond these periodic distortions that would be committed by cost methods, it is relevant to stress that each stage of the biological transformation process (growth, degeneration, procreation and production) has significance and contributes to the expected economic benefits coming from biological assets. If the cost model would be the norm, “there would be a lack of explicit recognition (in effect, no matching) of the benefits associated with each of these discrete events” (Epstein and Jermakowicz, 2010). These biological transformations, reflected in financial statements, represent two kinds of changes in the fair value of biological assets, physical changes and price changes.

When market prices are not available, and biological assets are valued with a discounted cash flow approach, the discount rate chosen should reflect the risks inherent to the future cash-flows. However, these risks are not only those concerned with the entity, but also with the biological transformation itself, which the company doesn't fully control, and even more important with the high risk of the agricultural activity, such as climate changes, price volatility and the possibility of adverse meteorological conditions (frosts, hail, persistent rain, natural disasters).



Another factor contributing to the difficulty to measure biological assets at fair value is the lack of active markets, especially during the growth period, for biological assets with a long growth cycle (like pine trees with 30 years of growth until harvest). Besides, there can be also a lack of match between fair market prices and selling prices, because the selling price can be regulated by contracts, like exclusive contract deals bargained with cooperatives (Costa, 2011). But even if these active markets do exist, their access conditions can imply high and discouraging costs to agricultural companies, especially to small-sized ones, where the information cost may not offset the generated benefits (Mendes, 2010).

Still, some authors advocate that it is difficult to reliably ascertain the production cost of biological assets. One of the biggest barriers to use the cost method binds with the presence of joint costs in agriculture, and the frequent lack of analytical accounting systems in agricultural companies able to deal and analyze these data to elaborate correct estimations (Mendes, 2010).

Concerning the fact that a change in the fair value of biological assets is reported in the income statement in the period when it occurs, even if the objective is to improve the relevance of accounting information available to investors, it is nevertheless a solution that can mislead shareholders expectations about the future value to be distributed as dividends (Mendes, 2010). “Consequently, financial statements users can develop unrealistic expectations of distributable profits, creating pressure for entities to declare and pay dividends for which no funds are available” (Elad and Herbohn, 2011). To deal with this situation, some authors propose that financial statements should separately present the “obtained and distributable income” and the earnings that have not been transacted yet (González and Lauro, 2007).

## Biological Assets: An international analysis

Some authors developed a study concerning fair value in the agricultural sector based on a survey and an analysis of annual reports in France, Australia and UK (Elad and Herbohn, 2011).

The main objective of the study is to investigate in an empirical way the application of IAS 41 in these countries, and ascertain about harmonization practices in farm accounting. It is relevant to state that in Australia IAS 41 is not applicable. Instead, Australian companies apply the AASB 141, which resembles IAS 41 as regards fair value measurements.

In France (that possesses the largest agricultural share in Europe, with more than 20% of the European Union agricultural output), more than 50% of the companies analyzed used historical cost method under IAS 41. Therefore, the weak impact of the standard is explained by the fact that the “Plan Comptable Général Agricole” remains the regulatory guidance in most agricultural entities in France.

Furthermore, as far as small and medium-sized agricultural entities are concerned, IAS 41 is not expected to have a significant impact on these companies, both in France and in Australia and UK, because not only there is an option to use historical cost when fair value cannot be determined reliably, but also because the IASB itself recommends that these companies don't use fair value unless it implies minimized cost or effort.

In their annual report analysis, that relates to the financial year 2006-2007, these authors found on the one hand that the option to use historical cost under IAS 41 is more common in France than in Australia or UK. On the other hand, the present value method is the more commonly used in Australia and UK (when using the Fair Value approach), where the valuations were usually undertaken by independent external appraisers, mainly in the plantation and forestry area.

These same authors found in their study that discount rates estimated in net present value methods, besides being subject to judgement and assumptions, are difficult to determine in less developed capital markets, particularly the risk free rate. In the 3 countries analyzed, it is difficult to establish risk premium for forestry assets, that's why some companies present sensitivity analysis in their financial reports.

These difficulties in reaching an accurate value for the discount rate can lead into problems with auditors and regulatory bodies. It happened with Touchwood Ltd (Sri Lankan company), its auditor (KPMG) and the local stock exchange regulator. At the date of the book (Elad and Herbohn, 2011), it was subject of a pending court case between Touchwood, the Sri Lankan Accounting and Auditing Standards Monitoring Board, and the local stock exchange regulators. The company advocated a discount rate of 12%, whereas the auditors advocated that the appropriate discount rate was of 17%, which would decrease the value of the forest.

Another case, where a company was embroiled in a major dispute with their auditors, occurred in a French biological company, whose accounts were subject to a qualification by their auditors. The company mentioned is DUC SA, specialized in poultry farming. In the aftermath of an avian influenza epidemic, concerning the financial year ending 2006, the auditors, Synergie – Audit and Mazars & Guerard, advocated that the company didn't use effective strategies to assess future cash-flows, taking into account the uncertainties of these cash-flows generated by lack of consumer confidence in the safety of poultry goods.

Lastly, this study denotes that IAS 41 may promote social conflict in some countries (mainly tropical ones), “where stakeholder advocacy organisations have argued that fair values established by market forces do not reflect the real value of tropical agricultural commodities such as coffee, tea, banana, or cocoa” (Elad and Herbohn, 2011).

Some stakeholder advocacy groups and human rights activists don't accept the fair value, stating that the minimum fair trade price is higher than the fair market value. Therefore, by reporting these kinds of biological assets in financial statements at fair value, IAS 41 is promoting alienation of reality. This issue is behind global campaigns fostered by ethical investors, environmental non-governmental organizations and religious groups around the world, all united by the Fair-trade Foundation. This movement seeks to give a voice to disadvantaged agriculture workers in tropical countries, so that altruistic consumers in industrialised countries can “demonstrate empathy and solidarity by their willingness to pay a price premium (above the conventional market price) to alleviate the inequities of free trade” (Elad and Herbohn, 2011).

Likewise, in Europe, biological assets according to IAS 41 are subject to subsidised and politically mediated market prices, because of the vast impact of the European Union's Common Agricultural Policy (CAP). To give an example, in 2009, 41 billion Euros were distributed to European farmers as subsidies, amounting to over 40% of the European Union's budget.

Therefore, selling prices of farm goods that are transacted with developing countries are below production costs. "Such protectionist policies undermine the fair value model in IAS 41 which forges a tight link between heavily subsidised market prices and the value of biological assets" (Elad and Herbohn, 2011).

### **Fair Value of Standing Timber:**

Several motivations led to a study of standing timber assets performed by PwC in 2009 (and also the update study in 2011). On the one hand, institutional investors support that these assets provide "an alternative and sustainable long-term investment strategy" (PwC, 2009), thus legitimating the growing interest in forestry assets. On the other hand, "forestry is attracting new strategic investor interest as wood-based biomass is seen as a vital renewable energy resource" (PwC, 2009).

Standing timber active markets "are limited in comparison with the total volume of standing forest" (PwC, 2009) because most of these markets are solely available as regards the harvested products of forest, such as logs. Therefore, most companies in the PwC study use discounted cash-flow methods to value timber assets, "in particular, all preparers with slow-growing forests located in the Nordic region apply DCF methods" (PwC, 2009). Companies that value their timber assets using active market prices, and consider these markets to be reliable, usually possess "plantations with relatively short rotation periods, typically between 5-20 years" (PwC, 2009). However, a few companies still apply historical cost approaches, where besides the lack of market-based prices, there is also a lack of growth rate patterns or physical volumes. Moreover, companies stick to historical cost for newly planted seedlings (immature forests) where few biological changes have taken place.

Climate change also affects growth patterns of timber assets and therefore it is relevant for valuation issues, because it impacts financial reports, “for example, the increasing role of woody biomass as a renewable energy source. There are nascent markets in forest carbon credits, which is seen as one way of monetising the environmental contribution of forests” (PwC, 2009). This challenges the traditional valuation of timber assets that was headed towards log prices, because “biomass sourcing extends to the whole tree, potentially roots and all” (PwC, 2009).

According to this PwC study, the main assumptions undertaken by companies valuing their timber assets with net present value models comprise harvesting plans, growth rates, timber prices, discount rates and forestry costs. The main differences in the assumptions relate to obvious differences in the geographic location of the plantations, rotation periods, silvicultural practices and idiosyncrasy of the species.

Regarding timber prices, companies either use current market prices or adjusted market prices. Adjusted prices are used by companies with longer growth cycles “and the adjustment is made to smooth out short term volatility in market prices for logs” (PwC, 2009). In regions where species present faster rotation patterns, current unadjusted prices are considered trustworthy to develop accurate fair value models.

Concerning harvest plans, it is considered the most important assumption for an accurate modelling. It “includes planned volumes to be harvested (both clear felling and thinning) over a foreseeable future, and related extrapolations of the remaining volumes for the period of time until harvest” (PwC, 2009). Usually, a harvest plan is one entire cycle from seedlings until the trees are harvested. However, if in the presence of plantations with short rotation periods, the harvest plan can include more than one cycle, “where trees are left to regenerate naturally after the first felling” (PwC, 2009).

Regarding growth rates, these are “dependent upon general climate conditions, soil, silvicultural practice and quality of genetic material” (PwC, 2009). Furthermore, forest management activities, such as “land preparation, nursing seedlings, planting, thinning, fertilizing, protecting from animals and insects” (PwC, 2009) generate expenses called forestry costs. These costs, such as felling costs, silvicultural costs,

point-of-sale costs, “costs incurred to protect from natural hazards, such as fires and hurricanes” (PwC, 2009) must be taken into account when developing net present value models for standing timber assets.

Finally, the last assumption worth to be mentioned is the discount rate. It is a very sensitive variable, because a small change in its estimation can misstate the value of the asset. That’s why companies are increasingly presenting in their financial reports sensitivity analysis with, among other variables, the discount rate. In the PwC study, some companies apply the same overall company’s WACC for all their Plantations; others differentiate rates for individual plantations. Besides, it is a common practice to use pre-tax cash-flows and pre-tax discount rates.

In the update study performed by PwC in 2011, it is shown that “many companies lack information regarding the rotation period, even though this information is key to determining the harvesting plan” (PwC, 2011). The discount rate is often not disclosed as well. Furthermore, there is also limited information regarding growth assumptions and the variables that might cause them to fluctuate. This is particularly important for plantations with shorter growth cycles, because “broadly, the sensitivity of the valuation to changes in growth factors increases as the growth cycle for standing timber reduces” (PwC, 2011).

Finally, the authors suggest that preparers of financial statements “disclose the assumptions used and estimates made in the valuation and provide explanations as to why it is difficult to make those assumptions” (PwC, 2011) and also encourage them to “consider including a discussion on when and how the values and related cash flows are expected to be realised” (PwC, 2011).

## Case study:

In order to proceed with a practical perspective of the fair value changes and assumptions in biological assets, I selected two companies as groundwork for the analysis: Precious Woods and Green Resources.

I chose these companies not only because the annual reports present detailed information concerning the fair value method adopted by the company to measure biological assets (mainly Green Resources), but also because in some of the years under analysis these companies performed changes in the assumptions on how fair value is measured concerning standing timber assets (mainly Precious Woods). These are therefore very interesting cases, both from a practical and a conceptual perspective. I will provide further explanations about this “change in assumptions” more thoroughly later in the course of the work.

## Precious Woods

### Company Presentation:

Precious Woods is a representative company of its sector. This can be observed in Figure 1, which is taken from the PwC study concerning Fair Value of Standing Timber. The data is relative to annual reports of 2009 or 2010. Figure 1 shows that Precious Woods is ranked the 6<sup>th</sup> company with the biggest Forest Land (approximately 1 million hectares) out of a universe of 25 representative companies. It is also approximately ten times bigger than the Portuguese Psi 20 companies Portucel or Altri.

Figure 1:

Forest Land sizes of the most representative companies in the industry (PwC study)

Home country	Company	Forest land in '000 Ha	Location of main forests
Portugal	Portucel Soporcel	120	Portugal
Portugal	Altri	82	Portugal
Switzerland	Precious Woods	1 096	Brazil, Costa Rica, Gabon, Nicaragua,
Sweden	Kinnevik	15	Sweden
Sweden	Holmen	1 032	Sweden
Sweden	SCA	2 600	Sweden
Sweden	Sveaskog	4 300	Sweden
Sweden	Södra	26	Sweden, the Baltics
Finland	Metsäliitto Group	Not published	Finland
Finland	Stora Enso	114	Brazil, Finland, Sweden, Uruguay
Finland	UPM-Kymmene	1 200	Finland, Uruguay, USA
Finland	Tornator	614	Estonia, Finland, Romania
Ireland	Smurfit Kappa	105	Colombia, Venezuela
Norway	Green Resources	14	Mozambique, Republic of Sudan, Tanzania, Uganda
France	Lecta	Not published	Not published
South Africa	York	61	South Africa
South Africa	Mondi	2 440	Russia, South Africa
South Africa	Safcol	141	South Africa
South Africa	Sappi	555	South Africa
Chile	CMPC	646	Argentina, Brazil, Chile
Chile	Arauco	1 611	Argentina, Brazil, Chile, Uruguay
Chile	Masisa	243	Argentina, Brazil, Chile, Venezuela
Malaysia	Samling Global	43	China, Malaysia, New Zealand
Australia	Gunns	210	Australia
Australia	Wilmott Forests	1,3	Australia

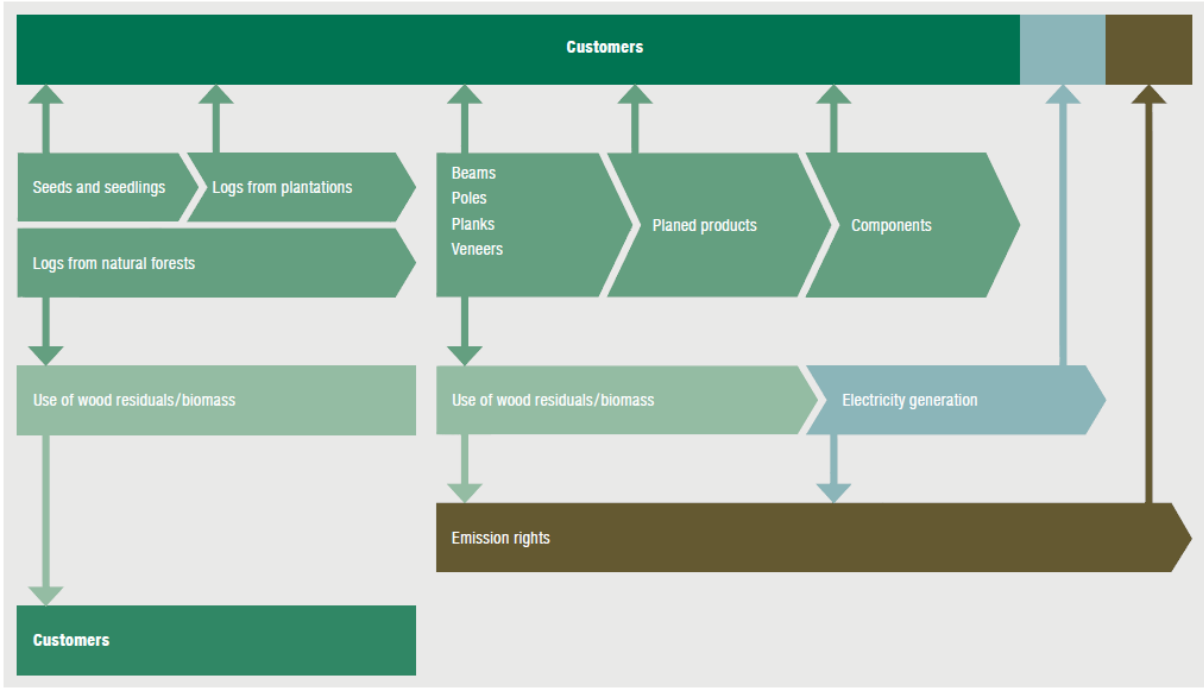
Having in mind that my study will embrace the annual reports between 2006 and 2010, in this section it is useful to address the most recent annual report under analysis. In 2010, Precious Woods had its Holding located in Switzerland, with 14 employees performing functions concerning corporate services, emission rights business and timber trading. This last activity was also prosecuted in The Netherlands by 32 employees. In Gabon, Precious Woods employed 638 people doing timber processing and forest operations in a forest area of 616700 ha. These two activities were also carried out in Brazil, more precisely in the Amazon State. Plus, in Brazil there was also electricity production. The forest area was 473000 ha and 718 employees were allocated to this region. Finally, in Central America (Costa Rica and Nicaragua), 155 employees dealt with reforestation and timber processing in a reforestation area of 6488 ha (Annual Report, 2010).



In order to better understand how the business activities of Precious Woods are connected, I present the Value Chain in Figure 2.

Figure 2:

Value Chain and Products (Annual Report, 2010)



However, not all the business segments have the same weight on the Total operating income generated by the company. The same happens to the different regions where Precious Woods is present. In Figure 3 one can observe that “Sustainable Forest Management” is the main business segment of the company, which relates to Brazil

Figure 3:

Revenues generated by Business Segments and Market Regions (Annual Report, 2010)

Total Operating Income by Business Segment	Percentage		Total Net Sales by Market Region	Percentage	
	2009	2010		2009	2010
Carbon & Energy	5,60%	6,80%	Europe	71,30%	68,80%
Plantations	7,20%	13,10%	Latin America	9,70%	15,50%
Sustainable Forest Management	59,50%	52,70%	Africa	2,70%	10,20%
Timber Trading Europe	27,70%	27,40%	Other Countries	15,50%	5,20%
			Switzerland	0,80%	0,30%

and Gabon where “no more timber is harvested than can simultaneously grow back” (Annual Report, 2010). Although the revenues provided by the “Sustainable Forest Management Segment” have reduced from 2009 to 2010, they still accounted for more than half of the Total Operating Income in 2010. As far as the Net Sales by market region are concerned, “Europe” has by far the most considerable share in the total amount, even though it has reduced its share in 2010 compared to 2009. “Latin America” and “Africa” increased their proportion in considerable amounts in 2010, mostly at the expense of “Other Countries”.

Regarding the Company as a whole, Figure 4 presents some key data essential to a brief analysis of the years I will address in this Case Study.

Figure 4:

Key Financial Data in Thousand U.S. Dollars

Precious Woods	2006	2007	2008	2009	2010
Revenues	59932	99752	116758	87843	80501
EBITDA	13382	20521	10077	-5881	-5659
EBITDA/ Revenues	22,33%	20,57%	8,63%	-6,69%	-7,03%
Net Income	5183	10852	-14434	-28389	-65606
Equity	156802	213252	184340	168318	96840
Assets	185269	312250	279458	291324	224404
Equity/Assets	84,63%	68,30%	65,96%	57,78%	43,15%

Revenues almost doubled between 2006 and 2008 essentially due to increases in trading activities, but fell 18% in 2009 and 8% in 2010. EBITDA doubled in 2007 but more than halved in the following year, entering in the red in 2009. Reflecting this evolution, the EBITDA margin came down from 22% in 2006 to -7% in 2010. Consequently, the Net Income presents a negative trend, in this case from 2008 onwards.

As far as the Balance Sheet Analysis is concerned, one cannot conclude too much from the absolute values of Equity and Assets. Equity started a declining trend in 2008 reflecting the Group's annual losses and the Assets have been going up and down between 2006 and 2010.

But an interesting case happens with the Equity/Assets ratio, which has been always decreasing between 2006 and 2010. This means that this company has been increasing its leverage every year, and therefore the risk to the potential creditors has been increasing, possibly meaning future higher interest rates.

Three main shareholders in 2010 were: Baloise Holding (with 8, 88% of shares), Round Enterprises Ltd. (with 5, 85%) and Franke Artemis Holding AG (with 5, 52%) (Annual Report, 2010).

## Analysis of the period between 2006 and 2008:

### Methodology and Assumptions

The following information is based on the Annual Reports between 2006 and 2008. Precious Woods biological assets measured at fair value in 2006 were tree plantations in Central America. The methodology approach depends on the growth phase of the tree plantations. In the beginning of a plantation cycle the fair value is no more than the cost of arranging and sustaining the plantations so that they can grow according to the expectations. As the plantations start to grow, the fair value approach becomes the Income approach, in which plantations are valued according to discounted cash-flow methods. The cash-flows are based on the estimated future harvest values of the plantations less the point-of-sale costs.

Having in mind that growth patterns differ by species and also within species of Plantations, Precious Woods, in order to achieve an accurate valuation of its biological assets, divided each species (Teak and Pochote) in five different growth classes ( Excellent, High, Average, Low, Marginal). The classes that grow faster have, consequently, a cash-flow stream (based on future income and costs) that is higher than the ones that grow slower. These growth classes are not tight, in other words, each year there is an appraisal in order to check how the Plantations are growing. If they are growing faster than expected, they can move on to a higher growth class. The same can happen the other way around. These appraisals and the definition of how to determine each growth class volumes and prices are based not only on Precious Woods professionals with vast experience in the area, but also on external estimates.

As the Plantations' valuation is grounded on a DCF method, a discount rate is put in place for each growth class of each species in order to discount expected estimated income. Besides, in the Teak species, there is also a distinction in the discount rate between regions (Costa Rica and Nicaragua). This further distinction is probably due to the fact that since 1995 Precious Woods has been planting mainly Teak, therefore the valuation gets more accurate each year.

However, there is a lack of accuracy for the particular case of the indigenous species' valuation. In fact, for the indigenous species (ronron, almendro, caoba, cocobolo,

etc.), which sum up to more than twelve different kinds, there is no distinction in its valuation not only between species, but also between growth patterns, because of scarce trustworthy information is available. This is not a huge problem having in mind that the Total Value of Plantations (after discounting with the appropriate discount rate) concerning indigenous species in 2006 is not even 5% of the total (Figure 5).

Figure 5: (December 2006)

Values in Million USD of the different Plantation Species

	Value in Million USD	%
Areas Planted With Teak	32,03	74,04%
Areas Planted With Pochote	9,4	21,73%
Areas Planted With Indigenous Species	1,83	4,23%

Regarding the harvest period, between 2005 and 2008 Precious Woods considers that the final harvest shouldn't take place before the Plantations are in their maximum potential of growth, which occur between 26 and 30 years (Figure 6).

Concerning the weighted average discount rate (weighted by the different species and different growth classes in Central America), it has been similar between 2005 and 2008 (Figure 6).

Figure 6:

Harvest Period and Discount Rate between 2005 and 2008

Year	2005	2006	2007	2008
Harvest Period	26-30	26-30	26-30	26-30
Discount Rate	10,80%	10,80%	10,87%	10,75%

**Changes in Fair Value of Biological Assets and its impacts**

As it is possible to observe in Figure 7, the caption in the Income Statement concerning increases in Fair Value of Biological Assets reached an amount in the end of 2006 of about 5, 4 Million USD, which was slightly higher than the Profit before Tax itself (5, 35 Million USD), therefore contributing in a considerable way to the positive results of the Company in 2006. It is relevant to pinpoint that the value that

is exhibited in the Income Statement concerning changes in Fair Value of Biological Assets matches the difference in the value of biological assets between two consecutive years in the Balance Sheet, for the years between 2005 and 2008, except in 2006, where the caption in the Income Statement was 353205 USD higher than the difference between the biological assets in the Balance Sheet between 31.12.2005 and 31.12.2006. In the annual report of 2006 no explanation was given regarding this difference.

Figure 7:  
Decomposition of the caption in the Income Statement of 2006 concerning Changes in Fair Value of Biological Assets

Change in Fair Value of Biological Assets (Income Statement)	Values in USD
Growth of Previously existing Plantations	6151579
New Plantations in Reporting Period	484123
Fair Value of Biological Assets Harvested	-599410
Change in Valuation Assumptions	-638788
Total	5397504

In Figure 7 one can observe that more than the new Plantations implemented in 2006, what most impacted in a positive way the income statement was the growth of existing Plantations. The biological assets harvested refer to 44 hectares in Costa Rica. The change in valuation assumptions refer to a reduction in the market prices of Pochote in 2006 for the growth category “Excellent”. According to Precious Woods, market prices available for Pochote are not truly reliable. The reduction undertaken was from 240 USD to 200 USD. No more information is given in the 2006 Annual Report, but as Precious Woods chose the Income Approach, I assume these are average prices (because prices vary according to the diameter of the logs) at the expected year of harvest, per m<sup>3</sup>, that are the basis for the cash-flow stream before discounting with the appropriate discount rate. The impact of this change in assumptions was a reduction of about 11% in the Profit before Tax.

In spite of the fact that this study only embraces an analysis between 2006 and 2010, it was introduced in 2005 a GPS technology to measure the Plantation areas that brought a remarkable impact in the Income Statement (Figure 8). Before the GPS system was introduced, Plantations were measured through tape, which didn’t give accurate results, mainly in steep areas. GPS solves this problem by taking into

account “complex shapes and boundaries” (Annual Report, 2005). The impact of the new measurement procedure using GPS technology was a reduction of about 16% in the Profit before Tax.

Figure 8:  
Decomposition of the caption in the Income Statement of 2005 concerning Changes in Fair Value of Biological Assets

Change in Fair Value of Biological Assets (Income Statement)	Values in USD
Growth of previously existing Plantations	6081253
New Plantations in Reporting Period	591006
Fair Value of Biological Assets Harvested	-133623
Correction to areas planted with GPS remeasurement	-1234254
<b>Total</b>	<b>5304382</b>

Finally, the impact on the balance sheet of these two occurrences (change in valuation assumptions in 2006 and re-measurement through GPS technology in 2005) on total assets was not meaningful (Figure 9). In fact, the impact of these changes was less than 1% of the total assets, either in 2005 or in 2006.

Figure 9:  
Impact on the Total Assets of the Biological Assets value presented in the Balance Sheet in 2005 and 2006 (Values in USD)

	2005	2006
(1) Biological Assets (Balance Sheet)	38224201	43268500
(2) Biological Assets without Change in Valuation Assumptions (2006) or without correction to areas planted with GPS remeasurement (2005)	38224201 + 1234254 =39458455	43268500 + 638788 =43907288
(3) Total Assets	172206850	185268817
(1)/(3)	22,20%	23,35%
(2)/(3)	22,91%	23,70%

In 2007 and 2008 there were no changes in assumptions on how to measure biological assets. However, in 2007, 76 hectares which were until then classified as

biological assets, changed its classification to Investment Property. Figure 10 shows that both in 2007 and 2008 the biggest impact on the Increase of Biological Assets in the Income Statement is due to growth of previously plantations.

In 2007 the percentage of the growth of previously plantations in the total value concerning increases in fair value of biological assets in the Income Statement was bigger than 100% because the write-off with a value of 985 TUSD of certain biological assets that moved to Investment Property had a negative effect on the Increase of Biological Assets. Still in Figure 10, in 2007 the Increase of Biological Assets in the Income Statement had a positive impact in the Profit before Tax (around 50%), and in 2008 it helped to turn the Profit before Tax nearly 40% less negative. Finally, both in 2007 and 2008, approximately 5% of the Total Revenues (which also include trading and emission reduction activities besides Increases in Fair Value of Biological Assets) was due to Increase in Fair Value of Biological Assets. It is relevant to mention that, in Figure 10, both the values regarding Total Revenues and Profit before Taxation are after adding the Increase in biological assets due to changes in Fair Value (4888 TUSD in 2007 and 6730 TUSD in 2008).

Figure 10:

Decomposition of the caption in the Income Statements concerning Changes in Fair Value of Biological Assets, PBT and Total Revenues (2007 and 2008)

Increase of Biological Assets (Income Statement)	Values in TUSD (2007)	Values in % of the Increase in Biological Assets (2007)	Values in TUSD (2008)	Values in % of the Increase in Biological Assets (2008)
Growth of previously existing Plantations	5474	111,99%	6338	94,18%
New Plantations in Reporting Period	399	8,16%	392	5,82%
Fair Value of Biological Assets in Investment Property	-985	-20,15%	0	0,00%
(1) Total	4888	100,00%	6730	100,00%
(2) Profit Before Tax	10050		-15665	
(3) Total Revenues	99752		116758	
(1)/(2)	48,64%		-42,96%	
(1)/(3)	4,90%		5,76%	

Concerning the impact on the Balance Sheet (Figure 11), not only the percentage of the Biological Assets on Total Assets has increased from 2007 to 2008, but also the percentage of the increase in biological assets (value that goes every year to the Income Statement) on Total Assets. However, both in 2007 and 2008 the percentages of the Biological Assets on Total Assets are lower than in 2005 or 2006 (compare with Figure 9).



Figure 11:

Impact on the Total Assets of both the Biological Assets value presented in the Balance Sheet and the value presented in the Income Statement concerning changes in Fair Value of Biological Assets (2007 and 2008)

	Values in TUSD (2007)	Values in TUSD (2008)
(1) Biological Assets (Balance Sheet)	48156	54886
(2) Increase of Biological Assets (Income Statement)	4888	6730
(3) Total Assets	312250	279458
(1)/(3)	15,42%	19,64%
(2)/(3)	1,57%	2,41%

**Analysis of the Year 2009:**

**Methodology and Assumptions**

The following information is based on the 2009 Annual Report. The year 2009 is being analysed in a different subchapter, not only because the year 2010 will not be analysed having in mind that in 2010 no changes were made to the assumptions on how to measure biological assets, but also because in 2009 several changes were made to the assumptions of the model in order to provide to the market a more accurate valuation.

The methodology to measure biological assets remained the discounted cash-flow method. However, starting in 2009, a current market-determined pre-tax rate was used to discount the cash-flows expected to be earned upon harvest of the Plantations. Concerning the native species, only Mahogany was considered for the valuation in this year, due to the lack of growth of other native species that doesn't justify its inclusion in the valuation.

Figure 12:

Changes in Valuation Parameters from 2008 to 2009

<b>Teak</b>	<b>31.12.2009</b>	<b>31.12.2008</b>
Valued plantations	5 951 ha	5 782 ha
Harvest volumes according to growth class	87–174 m <sup>3</sup>	159–344 m <sup>3</sup>
Harvest age	20 years	26–30 years
Expected diameters according to the growth class	28.0–44.6 cm	not used
Average prices	USD 160–284	USD 262–325
Price and cost adjustments (nominal)	2.5%	none
Interest rate	11%	IRR (8–15%)
<b>Pochote</b>	<b>31.12.2009</b>	<b>31.12.2008</b>
Valued plantations	653 ha	918 ha
Harvest volumes according to growth class	47–125 m <sup>3</sup>	50–184 m <sup>3</sup>
Harvest age	22 years	30 years
Average prices	USD 65	USD 200
Price and cost adjustments (nominal)	2.5%	none
Interest rate	11%	IRR (2–9%)
<b>Natives</b>	<b>31.12.2009</b>	<b>31.12.2008</b>
Valued plantations	52 ha	385 ha
Species	only Mahogany	approx. 15 different species
Harvest volumes according to growth class	74–192 m <sup>3</sup>	200 m <sup>3</sup>
Harvest age	30 years	36 years
Average prices	USD 400	USD 300
Price and cost adjustments (nominal)	2.5%	none
Interest rate	11%	IRR (9%)

Figure 13:

Impact of Changes in Assumptions in the Income Statement

<b>Analysis of changes in market value 2009</b>				
in USD million				
	<b>Teak</b>	<b>Pochote</b>	<b>Natives</b>	<b>Total</b>
Increase in market value (according to old model)	6.4	0.3		6.7
Increase due to changes in the calculation model (usable volume, interest rate, market prices)	1.7			1.7
Increase due to the reduction of the forest cycle to 20 years	7.1			7.1
Reduction in harvest areas	-0.7	0.0		-0.7
Other influences	0.2			0.2
Changes due to usable volume, market prices and interest rate		-8.9	-1.9	-10.8
<b>Total change in market value, net</b>	<b>14.7</b>	<b>-8.6</b>	<b>-1.9</b>	<b>4.2</b>

Relative to the harvest cycle, major reductions were made in 2009 (Figure 12). Teak Plantations reduced its cycle from 30 to 20 years, Pochote reduced its cycle from 30 to 22 years, and Mahogany reduced its cycle from 36 to 30 years. The changes in the Teak Plantations' harvest cycle were undertaken because "the incremental volume and price increases did not justify a prolonged growth period beyond 20 years" (Annual Report, 2009) because after 20 years of growth the discount rate "weighs more than the expected volume and price increases" (Annual Report, 2009). No explanations were given concerning the changes in harvest cycle of the remaining species (Pochote and Mahogany). In order to keep up with the best practices in the sector, Precious Woods used a 10-year average inflation rate (2, 5%) of the USD currency for revenues and costs used in the DCF model (Figure 12). Also, instead of discount rates that vary between species, a discount rate of 11% was used for all species categories to discount the estimated cash-flows. The remaining changes observed in the valuation parameters can also be observed in Figure 12.

#### **Changes in Fair Value of Biological Assets and its impacts**

The impact of changes in Fair Value of Biological Assets in the Income Statement in 2009 was an increase of 4840 TUSD (4572 TUSD due to changes of Fair Value and 268 TUSD due to new Plantations) (Figure 14). The harvested volume of 8515 m<sup>3</sup> of wood with a value of 678 TUSD didn't count for the impact of Changes in Fair Value of Biological Assets in the Income Statement (as opposed to the practice undertaken in 2006, the last year where there was harvesting). No explanation is given in the Annual Report for this change of practice. However, the 678 TUSD in harvested area were subtracted to the 4840 TUSD when calculating the Balance Sheet Value of Biological Assets in 31.12.2009, being therefore 4162 (4840-678) TUSD higher than the value presented in the Balance Sheet at 31.12.2008.

It is possible to observe that the impact in the Income Statement (4840 TUSD) is equal to the "Total change in market value, net" (4, 2 million USD) plus 0, 7 million USD of "Reduction in harvest areas" (Figure 13). The difference (0, 06 million USD) is due to rounding issues.

Going deeper in the analysis of Figure 13, the caption "Increase due to the reduction of the forest cycle to 20 years" concerns Teak plantation species, and the increase was

very meaningful (7, 1 million USD) not only because with a shorter period of time the denominator of the discounting function diminishes, therefore increasing the present value, but also because in the long-term the growth of biological assets value is lower than the discount rate due to “relatively slower growth in the final years” (Annual Report, 2009).

Concerning the caption “Changes due to usable volume, market prices and interest rate” in Figure 13, this led to substantial reductions in the value of Pochote and Native species. The changes due to volume concern a change of methodology: “instead of a qualitative estimation of tree stocks in five categories from “poor” to “excellent”, this parameter looks at the forest’s commercial volume using the trunk diameter relevant for processing” (Annual Report, 2009). Still in the same caption, now relative to market prices, Pochote Plantations suffered a substantial reduction in its market prices as a basis to estimate the net cash-flows at the age of harvest (Figure 12).

Finally, and still in the caption “Changes due to usable volume, market prices and interest rate” in Figure 13, which led to a reduction of 10, 8 million USD in the changes of biological assets in the Income Statement, the fact that the company adopted a discount rate of 11% in 2009 instead of the previously used rates also led to reductions in the Present Value of Plantations, at least for the species Pochote and Native Species (Mahogany). This can be observed in figure 12, where the discount rate of Pochote varied between 2% and 9%, and for Natives it was 9%, both below the actual 11% which lead to a lower Present Value because the denominator is higher.

Relatively to the impact on the Income Statement and on the Balance Sheet of the changes in assumptions performed in 2009, one can observe in Figure 14 that these changes reduced the Profit before Tax with a lower impact than in 2005 and 2006; however 7% is still a reasonable impact. In Figure 15 it is shown that the impact on Total Assets of changing assumptions is not significant, and that the weight of biological assets in the total assets remains around 20% as in 2008.

Figure 14:

Decomposition of the caption in the Income Statements concerning Changes in Fair Value of Biological Assets (and the hypothetical value without change in valuation assumptions) and PBT in 2009

Increase of Biological Assets (Income Statement)	Values in TUSD (With Change in Valuation Assumptions)	Values in TUSD (Without Change in Valuation Assumptions)	
Increases due to new Plantations	268	-	
Changes of Fair Value	4572	-	
Increase in Market Value according to old model (Figure 12)	-	6700	
Total	4840	6700	% Decrease in PBT
Profit Before Tax	-29292	-29292+6700-4840=-27432	7%

Figure 15:

Impact on the Total Assets of the Biological Assets value presented in the Balance Sheet in 2009 (Values in TUSD)

	2009
(1) Biological Assets (Balance Sheet)	59048
(2) Biological Assets without Change in Valuation Assumptions	59048+6700-4840=60908
(3) Total Assets	291324
(1)/(3)	20,27%
(2)/(3)	20,91%

# Green Resources

## Company Presentation:

Having in mind that the subsequent analysis of Green Resources' biological assets will be based on the Annual Reports of 2007, 2008 and 2009 (because those are the only ones publicly available), the information I present in this section is based on those three annual reports. In 2009, Green Resources held Plantations in Uganda, Sudan, Tanzania and Mozambique. However, its Headquarters were located in Oslo, because it is a private Norwegian Company. The other main offices were situated in Dar es Salam, Jinja and Maputo. The shares were distributed among more than 60 international shareholders. Concerning the number of employees and the new Plantation areas undertaken in each of the three years under analysis, we can observe in Figure 16 an increasing trend in both variables.

Figure 16: (Annual Reports between 2007 and 2009)

Number of Employees for each year and Plantations introduced in each year (in Hectares)

Year	2007	2008	2009
Employees	3100	3200	3700
New forest Planted for the year (Ha)	3100	4200	4700

Concerning the Financial Performance of the Company, in Figure 17 I present a summary of relevant data concerning the period between 2006 and 2009. The increase in sales from 2006 to 2008 was due to higher prices and volume. From 2008 to 2009, sales slightly decreased (although in Figure 17 this decrease is only possible to be observed in NOK currency, because in USD it remains the same due to rounding) "due to lower deliveries of transmission poles" (Annual Report, 2009).

The increasing trend in cost of sales between 2006 and 2009 was due to higher wood prices, higher transport costs (because of fuel costs and transport distances increases), and inventory write-offs. However, in spite of the fact that the cost of sales presented an increasing trend, it is possible to observe in Figure 17 that EBITDA exhibits an increasing trend between 2006 and 2009, much due to the company's

efforts to stabilize administrative costs through more efficiency in its organizational structures.

In 2007 and 2008 “Finance Costs” amounted to -2 NOK millions and -4 NOK millions, respectively, lower than -8 NOK millions reported in 2006. This fact, linked to the higher EBITDA in 2007 and 2008, led to a higher Net Profit in 2007 and 2008 than in 2006 (which was virtually null). In 2009 the Net Profit decreased significantly, due to a huge increase in Finance Costs (from -4 NOK millions in 2008 to -31 NOK millions in 2009).

Concerning the Balance Sheet analysis, no relevant conclusion can be attained from the Equity/Assets Ratio, because it has been going up and down between 2006 and 2009. However, Figure 17 reveals an increasing trend both in Assets and in Equity between 2006 and 2009.

Figure 17: (Annual Reports between 2007 and 2009)

Key Financial Data in USD millions

Green Resources	2006	2007	2008	2009
Sales	4	6	8	8
Cost of Sales	-3	-6	-5	-8
EBITDA	1	8	9	11
Net Profit	-	4	5	1
Equity	15	34	49	76
Assets	23	47	73	94
Equity/Assets	65,22%	72,34%	67,12%	80,85%

Key Financial Data in NOK millions

Green Resources	2006	2007	2008	2009
Sales	27	35	54	51
Cost of Sales	-20	-32	-38	-51
EBITDA	9	42	65	67
Net Profit	-2	22	33	4
Equity	95	183	340	438
Assets	141	254	508	543
Equity/Assets	67,38%	72,05%	66,93%	80,66%

## Methodology and Assumptions:

Green Resources' Plantations are measured using a DCF approach. For that purpose, the company uses a model named BAV (Biological Asset Valuation) to estimate the NPV of its plantations. This model takes into account several variables in order to reach accurate measures of its biological assets, namely: discount rate, inflation rate, exchange rate, wood prices, rotation lengths, mean annual increment, effects on incidents and area and frequency of losses.

Further, I will provide detailed explanations of each variable and how it impacts the values presented in the Financial Statements. It is relevant to stress that the values stated in these Financial Statements concerning biological assets correspond entirely to Forest Plantations. In the NPV calculation, Green Resources estimates the future revenues and then subtracts the estimated future costs. These costs comprise "field maintenance, land leases, fire protection, road maintenance and administration costs" (Annual Report, 2009).

### a) Inflation Rate and Discount Rate

In order to reach the values presented both in Figure 18 and Figure 19, Green Resources grounded its opinion in financial studies performed by experts. For example, in 2007, the real rate of return was 7% (12%-5%), both for Tanzania and Uganda. One of the companies taking part in Green Resources' groundwork was Merrill Lynch, which concluded that institutional investors of U.S. timberland companies estimate their real rate of return to be around 8%, whereas experts advocate a more conservative opinion, between 4% and 5% (Merrill Lynch, 2007).

The slightly decrease in the discount rate between 2008 and 2009 was "due to a lower average cost of capital" (Annual Report, 2009). Concerning the inflation rate, the increasing trend (4% to 5% in Uganda from 2006 to 2007, 5% to 6% in Mozambique from 2008 to 2009) was due to the rise in "international food, raw material and energy prices" (Annual Report, 2009).



Finally, in Figure 19, Mozambique only presents data in 2008 and 2009, and South Sudan only in 2009, because these Plantation regions were only explored by Green Resources starting in those years. It is, therefore, one of the factors that explain the increasing trend in the Assets of the Company in Figure 17.

Figure 18: (Annual Reports between 2007 and 2009)

Discount Rate between 2006 and 2009

Discount Rate	2006	2007	2008	2009
	12%	12%	12%	11%

Figure 19: (Annual Reports between 2007 and 2009)

Inflation Rate between 2006 and 2009

Inflation Rate	2006	2007	2008	2009
Tanzania	5%	5%	5%	5%
Uganda	4%	5%	5%	5%
Mozambique	-	-	5%	6%
S. Sudan	-	-	-	7,50%

b) Timber Prices and Exchange Rate

Concerning the timber prices estimated in order to reach the future cash-flows that discounted by the appropriate rate will derive the NPV of Biological assets, Green Resources, through the BAV Model, takes into consideration two factors.

Firstly, one must consider three scenarios of price increase for each year. Regarding the low scenario, 0% increase in price is considered; the medium one assumes 5% increase (except for Tanzania which accounts for 6%); and the high scenario considers 9% of growth in price levels.

For each scenario, certain probabilities are attached. For South Sudan, Tanzania and Mozambique, there is 20% of probability of a low scenario (0% increase in price), 60% of a medium scenario, and 20% of a high scenario. For Uganda, the probabilities are 20% (low), 70% (medium) and 10% (high). This is because “the Ugandan prices for pine are already comparatively higher” (Annual Report, 2009).

Secondly, one must also consider the probabilities of being a domestic sale, a sale to East Africa, or an Export. Therefore, Green Resources considers that for Mozambique, Tanzania and S. Sudan the probabilities are 40% (domestic sales), 30% (East Africa) and 30% (Export), whereas for Uganda the probabilities are 40% (domestic sales), 40% (East Africa) and 20% (Export) (Annual Report, 2009).

Regarding the prices themselves (Figure 21), Green Resources provides explanation only on a few fluctuations across the years. Concerning Tanzania in 2008, the decrease in Pine Price from 21, 5 to 19 and the decrease in Eucalyptus price from 27, 1 to 24 is explained by the devaluation in Tanzania Shilling compared to USD between 2007 and 2008, as can be observed in Figure 20. Therefore,  $19 = 21, 5 * 1132/1280$  and  $24 = 27, 1 * 1132/1280$ . Between 2008 and 2009 the same logic is applicable:  $18, 5 = 19 * 1280/1313$  and  $23, 4 = 24 * 1280/1313$ .

Regarding Eucalyptus in Uganda, “based on the rapid increase in demand for transmission poles” (Annual Report, 2008), Green Resources increased the price 10% (in Uganda Shillings) between 2007 and 2008. Thus, the decrease in price from 2007 to 2008 (Figure 21) is due to the devaluation in Uganda Shilling compared to USD between 2007 and 2008, as can be observed in Figure 20. To reach the price in 2008 (17, 1) which is exhibited on Figure 21, one has to perform the following calculations:  $18 * 1, 1 * 1703/1966$ .

Also regarding Eucalyptus in Uganda, “based on the continued increase in demand for transmission poles and general scarcity of wood in the country” (Annual Report, 2009), Green Resources increased the price 25% (in Uganda Shillings) between 2008 and 2009. Thus, the increase in price from 2008 to 2009 is due to both the appreciation in Uganda Shilling compared to USD between 2008 and 2009 (as can be observed in Figure 20) and the increase of 25%. To reach the price in 2009 (22, 6) which is exhibited on Figure 21, one has to perform the following calculations:  $17, 1 * 1, 25 * 1966 / 1863$ .

Also in Uganda, but now regarding Pine, there was an increase in price between 2008 and 2009 from 29, 4 to 31 (Figure 21) due to the appreciation in Uganda Shilling

compared to USD (Figure 20). The calculation is the following:  $31 = 29,4 * 1966 / 1863$ .

Concerning the Exports, having in mind that they didn't enter for the Low/Medium/High percentage price increase for each year (mentioned earlier), Green Resources assumes it increases 5% each year, both for Pine and Eucalyptus. Therefore, and based on Figure 21, one can conclude that:  $38,6 = 36,8 * 1,05 = 35 * 1,05$  (for Pine) and  $39,7 = 37,8 * 1,05 = 36 * 1,05$  (for Eucalyptus).

Finally, and bearing in mind that Teak plantations were only introduced in the BAV model of Green Resources in 2008, the Teak prices in Southern Sudan are lower than Tanzanian prices (in 2009) because of "higher transport costs to markets" (Annual Report, 2009) and the corresponding Teak export prices are also lower in Southern Sudan than in Tanzania "due to the long transport distance to export harbours" (Annual Report, 2009).

Figure 20: (Annual Reports between 2007 and 2009)  
Exchange Rate between 2007 and 2009

Exchange Rate	2007	2008	2009
TSH/USD	1132	1280	1313
USH/USD	1703	1966	1863

Figure 21: (Annual Reports between 2007 and 2009)  
Wood Prices in USD per m<sup>3</sup> between 2007 and 2009

Wood Prices in USD/m <sup>3</sup>	2009	2008	2007
<b><i>PINE</i></b>			
Mozambique	18,5	19	-
Tanzania	18,5	19	21,5
Uganda	31	29,4	29,2
East Africa	29,8	29,8	23,3
Export	38,6	36,8	35
<b><i>EUCALYPTUS</i></b>			
Mozambique	23,4	24	-
Tanzania	23,4	24	27,1
Uganda	22,6	17,1	18
South Sudan	22,6	-	-
East Africa	29,8	29,8	27,4
Export	39,7	37,8	36
<b><i>TEAK</i></b>			
Tanzania	114,1	114,1	-
South Sudan	86	-	-
Export, Tanzania	210	200	-
Export, South Sudan	175	-	-

### c) Rotation Length and Mean Annual Increment

The models developed to reach both the Rotation Length and Mean Annual Increment are based on scientific publications. As can be observed in Figure 22, Eucalyptus is harvested with a faster frequency than Pine and Teak, because it grows faster. However, in Mapanda (Tanzania), “the Eucalyptus have shown poor performance” (Annual Report, 2009), therefore instead of 13 years between 2007 and 2009, the final harvest occurs only after 15 years.

As can be observed in Figure 23, the values of the Mean Annual Increment (in m<sup>3</sup> per hectare per year) for Mozambique and Southern Sudan match the values for Tanzania, in each tree species. This similarity was adopted by Green Resources because the physical growth characteristics in Southern Sudan, Mozambique and Tanzania are alike.

Figure 22: (Annual Reports between 2007 and 2009)

Rotation Length between 2007 and 2009

Rotation Length (Years)	2009	2008	2007
Pine	21	21	21
Eucalyptus	13	13	13
Teak	25	25	-

Figure 23: (Annual Reports between 2007 and 2009)

Mean Annual Increment between 2007 and 2009

Mean Annual Increment (m <sup>3</sup> /ha/year)	2009	2008	2007
<b>Pine</b>			
Mozambique	19,1	20,7	-
Tanzania	19,1	20,7	20,7
Uganda	24,8	24,8	24,8
<b>Eucalyptus</b>			
Mozambique	24	22,5	-
Tanzania	24	22,5	22,5
Uganda	22,6	22,6	22,6
<b>Teak</b>			
Tanzania	15	15	-
Southern Sudan	15	-	-

#### d) Biological Risks

The last variables taken in consideration by Green Resources in the BAV model are related to risks of fire, draughts, pests and windfalls in its Plantations. Between 2007 and 2009 Green Resources improved its fire protection systems through “fire towers and forest patrols with radio communications, 24-hour stand-by fire fighting crews with necessary equipment during the dry season” (Annual Report, 2007) and also invested in “weed control and silviculture practice” (Annual Report, 2007) in order to improve productivity and diminish the probability of future diseases and pests in its Plantations. Due to these improvements, between 2007 and 2008 the assumptions in the BAV model concerning area and frequency of losses in Plantations (due to the incidents mentioned above) reduced in Tanzania from 8% of the total area every three years to 5% of the total area in every five years, and in Uganda from 7% in every four years to 5% in every five years.

Nevertheless, and albeit all the efforts spent by Green Resources to reduce the probability of biological risks, in October 2009 there was a huge fire in Tanzania

Plantations, provoked by arson, that had a significant impact in the Financial Statements. Thus, although reliable and detailed, the BAV model also presents weaknesses.

## Changes in Fair Value of Biological Assets and its impacts:

### Impact in the Financial Statements:

Regarding the impact of changes in fair value of biological assets in the income statement, Figure 24 shows that between 2007 and 2009 it is more than the Profit before Tax, reaching almost four times the PBT in 2009. In fact, to support this situation, the changes in fair value of biological assets account for more than 50% of the “Total Sales” caption of Green Resources in the Income Statement. The impact of biological assets in total assets is also quite significant, above 50%, between 2007 and 2009.

Figure 24: (Annual Reports between 2007 and 2009)

Impact of the increases in fair value of biological assets (value exhibited in the Income Statement of the respective year) on the Profit before Tax and impact of the Biological assets value (in the balance sheet) on the Total Assets (between 2007 and 2009)

Values in NOK millions	2007	2008	2009
(1) Changes in Fair Value of Biological Assets (Income Statement)	63	84	103
(2) Profit Before Tax	36	53	26
(1)/(2)	175,0%	158,5%	396,2%
(3) Biological Assets (Balance Sheet)	156	301	385
(4) Total Assets	254	508	543
(3)/(4)	61,4%	59,3%	70,9%

Figure 25 explains the reason why the caption related to changes in fair value of biological assets in the Income Statement is not merely the difference between the values in the Balance Sheet in two following years. Purchases of new Plantations and exchange differences are not considered as changes in fair value of biological assets in the Income Statement.

Figure 25: (Annual Reports between 2007 and 2009)

Decomposition of the caption in the Balance Sheet concerning Biological Assets in its respective parcels between 2007 and 2009

Values in NOK millions	2007	2008	2009
Biological Assets in the B.S. (at start of the year)	89	156	301
Purchases	9	20	43
Changes in Fair Value of Biological Assets (I.S.)	63	84	103
Exchange differences	-6	42	-62
Carrying Amount	156	301	385

#### Analysis of the caption in the Income Statement related to Changes in Fair Value of Biological Assets:

In order to analyse the most significant impacts in the caption concerning Changes in Fair Value of Biological Assets exhibited in the Income Statements between 2007 and 2009, I present the values in USD million (Figure 26) instead of NOK million because these major impacts are also presented in USD million. There was no need to search for the appropriate exchange rate because the Income Statement of Green Resources is presented in both currencies. In 2007, the biggest impact is related to an increase in price in Tanzania Plantations, from 5 USD/m<sup>3</sup> to 21, 5 USD/m<sup>3</sup> (Pine) and from 9 USD/m<sup>3</sup> to 27, 1 USD/m<sup>3</sup> (Eucalyptus). This huge increase is due to the fact that the prices concerning Plantations in Tanzania have been usually set by the Government, and they were much lower than the market prices. With this boost in prices, the gap shrank (Annual Report, 2007). These adjustments in wood prices led to an increase in the fair value of 10, 4 USD million, almost the total value of the caption in the Income Statement in 2007 (Figure 26). In 2008, due to “previous inaccurate mapping, losses to drought and weed competition and uprooting of plantings being done too close to watersheds” (Annual Report, 2008), the caption in the Income Statement, have these events not occurred, would have been 19, 8 USD million instead of 12 USD million (Figure 26), an increase of 65%. In 2009, a new system that was implemented to measure the Plantation areas, combined with the arson provoked in October (mentioned earlier), decrease the caption in the Income Statement concerning changes in Fair Value of Biological Assets by -10,9 USD million (Annual Report, 2009). Furthermore, the decrease in the discount rate from 12% in 2008 to 11% in 2009 (also mentioned earlier) increase the caption in the Income

Statement concerning changes in Fair Value of Biological Assets by 10,1 USD million (Annual Report, 2009).

Figure 26: (Annual Reports between 2007 and 2009)

Impact of the increases in fair value of biological assets (value exhibited in the Income Statement of the respective year) on the Profit before Tax and impact of the Biological assets value (in the balance sheet) on the Total Assets (between 2007 and 2009)

Values in USD millions	2007	2008	2009
(1) Changes in Fair Value of Biological Assets (Income Statement)	12	12	16
(2) Profit Before Tax	7	8	4
(1)/(2)	171,43%	150,00%	400,00%
(3) Biological Assets (Balance Sheet)	29	43	67
(4) Total Assets	47	73	94
(3)/(4)	61,70%	58,90%	71,28%



## Case Study Conclusion:

Forestry assets have an overall heavy weight on the Financial Statements both of Precious Woods and Green Resources. However, the impact in Green Resources Financial Statements is much higher than in Precious Woods. While in Precious Woods the weight of the caption in the Balance Sheet concerning biological assets was between 15, 42% and 23, 35% of total assets (from 2005 to 2009), in Green Resources this weight was between 59, 3% and 70, 9% (from 2007 to 2009).

Concerning the impact of the caption related to “changes of biological assets in the Income Statement”, measured as a percentage of the Profit before Tax, it was between 158% and 396% in Green Resources, and between -59, 28% (this negative value means that the Profit before Tax was negative, not the caption related to “changes of biological assets in the Income Statement”) and 100, 97% in Precious Woods.

After analysing these two Company’s forestry assets, one can observe that in spite of the fact that both Precious Woods and Green Resources apply Fair Value Accounting instead of Historical Cost to measure its biological assets, several assumptions undertaken by each company to compute the DCF model not only are not truly reliable, but also influence Financial Statements considerably when these assumptions are modified (mainly the Income Statement). Besides, some assumptions are not thoroughly clarified in the Annual Reports.

1. Regarding Precious Woods:
  - a) The first lack of accuracy emerges when different treatments were given to different species concerning growth models and discount rates until 2009. In fact, Teak plantations discount rates were separated not only between five growth classes, but also by region per growth class; while Pochote discount rates were only separated by growth classes and not by regions, and indigenous species discount rate was not separated by growth classes at all.
  - b) Secondly, no explanation is given concerning the reason for decreasing the harvest cycle for Pochote and Mahogany, only for Teak Plantations.

## 2. Regarding Green Resources:

- a) The first lack of accuracy emerges because Annual Reports provide explanations only on some price fluctuations between 2007 and 2009 (Figure 21) and not all of them.
- b) Secondly, a lack of reliability occurred in 2009, because although Green Resources engaged many efforts to reduce the probabilities of biological risks (which even led to a reduction in assumptions in the BAV model regarding area and frequency of losses), an unpredictable arson destroyed a considerable Plantation area in Tanzania in 2009.

With regard to the caption in the Income Statement relative to changes in fair value of biological assets, and also regarding changes in assumptions that impacted that caption, several observations must be mentioned.

## 3. Regarding Precious Woods:

- a) In 2005, the introduction of a GPS technology to measure Plantation areas decreased the Profit before Tax by 16% and decreased the Total Assets by 0, 71%.
- b) In 2006, the reduction of the market price of Pochote decreased the Profit before Tax by 11% and decreased the Total Assets by 0, 35%.
- c) In 2009, no explanation is given on why the harvested volume with a value of 678 TUSD didn't count for the impact of Changes in Fair Value of Biological Assets in the Income Statement, whereas in 2006, the last year where there was harvesting, the harvested volume did count for the mentioned impact.

d) In 2009, there were several changes in assumptions, which, together, decreased the Profit before Tax by 7% and decreased the Total Assets by 0, 64%. These changes in assumptions were due to reductions in the Harvest cycle, changes in the methodology on how to measure the usable volume, reductions in Pochote market prices and changes in the discount rate.

#### 4. Regarding Green Resources:

a) In 2007, the increase in prices in Tanzania Plantations (both Pine and Eucalyptus) increased the Profit before Tax by 305, 9% and increased the Total Assets by 28, 4%.

b) In 2008, droughts and inaccurate mapping decreased the Profit before Tax by 49, 4% and decreased the Total Assets by 9, 7%.

c) In 2009, a new system that was implemented to measure the Plantation areas, combined with the arson provoked in October, decreased the Profit before Tax by 73, 2% and decreased the Total Assets by 10, 4%.

d) The decrease in the discount rate from 12% in 2008 to 11% in 2009 increased the Profit before Tax by 166% and increased the Total Assets by 12%.

To sum up, and as observed in Precious Woods and Green Resources:

a) Slight shifts in judgement concerning one or more variables relevant for the DCF model to measure forestry assets can have significant (and sometimes huge) impacts on Financial Statements. ( 3.a; 3.b; 3.d; 4.a; 4.b;4.c and 4.d)

b) There is room for improvement not only in the disclosures (1.b; 2.a and 3.c) but also in the accuracy (1.a) and reliability (2.b) of financial information reported in the Annual Reports.

## **General Conclusion:**

An important issue addressed in the Literature Review concerned valuation models, a subject that also relates to the Fair Value approaches utilized by Precious Woods and Green Resources in measuring their biological assets. In fact, different DCF models based on the Income approach can reduce the comparability and reliability of financial reports in different companies. This can be observed between Green Resources (which uses the BAV model between 2007 and 2009) and Precious Woods (which uses different assumptions and different calculation methods than Green Resources concerning discount rates, growth rates, harvest periods, biological risks, etc.). Besides, if one looks at the assumptions undertaken by Precious Woods before 2009 and after 2009, comparability can also be affected in the same Company across these years because several changes in the methodology were performed.

Moreover, in the forestry business (as observed in Precious Woods and Green Resources) there is room for manipulation in determining the discount rates (because discount rates are not based only on company risks, but also on biological transformation risk and the high risk of agricultural activity, which are highly volatile), growth rates and harvest cycle. Inaccurate mapping of the Plantation areas or unpredictable events such as droughts or fires can also lead to meaningful distortions in the Financial Statements.

It is worth mentioning that several assumptions undertaken by Precious Woods and Green Resources to develop their biological assets models were not solely the responsibility of the Company's professionals with experience in the business. In fact, growth rates and classes appraisals in Precious Woods were also based on external estimates. Regarding Green Resources, not only inflation rates and discount rates were based on several external opinions (including Merrill Lynch) but also growth and yield assumptions were based on scientific volume functions developed for Tanzania and Uganda Plantations (including publications from Indufor). These external sources increase the credibility of the information presented in the Financial Statements and reduces the degree of judgement.

Regarding the trade-off between reliability of information and cost of preparing it, even if active markets exist for biological assets, maybe the costs of obtaining such information don't offset the benefits of providing more reliable information to investors.

To sum up, there is a lack of detail and consistency in the disclosures presented in Green Resources and Precious Woods Annual Reports. The disclosures concerning biological assets, mainly regarding assumptions, methodologies and results, should follow the best practices in Financial Reporting (such as Financial Instruments, where disclosures are required to be much more accurate and detailed), in order to achieve financial information of higher quality. Besides, external auditors' could have a more active role in the validation of Fair Value measurements in order to reduce the degree of discretion.

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