

# Forest valuation and the AASB 141 accounting standard

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Revised manuscript received 28 April 2007

## Summary

This paper examines issues relating to forest valuation using the Australian Accounting Standards Board accounting standard AASB 141 for large and medium-sized forestry entities. Current practices generally follow AASB 141:25 that states that an independent valuation of land *may* (emphasis added) be deducted from the present value of the combined asset to yield a value for the living trees (i.e. value of the biological asset), from which gains or losses relative to the previous year may be brought to account in the income statement. Such an approach distorts the income statement by gains and losses that are arbitrarily one-sided because the value of the living trees becomes a residual whose value is influenced by any movements in land value, sometimes masking the inherent productivity and value of the living trees.

The paper reviews key terminology and principles of AASB 141 and other standards, including the definitions of biological assets, non-current assets, fair value, active markets, combined assets, and highest and best use.

In the absence of an active market for medium and large forestry assets, which is generally the case in Australia and New Zealand, the estimation of fair value using the present value of expected cash flows is central to valuation. Whatever the respective form of ownership, land and living trees constitute a combined asset in which the roles are inseparable biologically. To be consistent with the use of fair value of the combined asset based on the present value of expected cash flows, the planning horizon needs to be extended to a uniform future year for the entire asset. This is to enable the optimum schedule of wood and cash flows and hence the maximum present value to be estimated.

We describe an operational method to derive the present value of the living trees (the biological asset value as rigidly defined in AASB 141) by discounting the cash flows relating solely to those living trees, in essence the current crop. Segmenting those cash flows from those used in evaluating the present value of the combined asset can do this. Assuming the going concern is viable, such that forestry is the highest and best use, the remaining issue is how to ensure that the fair value of the combined asset is properly reflected in the balance sheet. This can be done by deducting the present value of the living trees (i.e. the value of

the biological asset) from that of the combined asset (after due adjustment for land improvements). The resulting present value of 'future rotations' should then be shown as a non-current asset under 'property, plant and equipment'.

Finally, the discount rates used in forest valuations generally allow for taxation (and risk) in using a weighted average of the discount rates for equity and debt. Post-tax evaluation of cash flows is therefore recommended, rather than pre-tax, subject to avoiding double counting of any tax liabilities or debts elsewhere in the accounts.

*Keywords:* valuation; assets; accounting; standards; terminology; cash flow analysis; stock accounting; tenure systems; discount rates

## Introduction

Corporations law prescribes that the Australian Accounting Standards Board (hereafter AASB) Standard AASB 141 'Agriculture' be used in preparing the annual financial statements required of most private and public forestry entities under that law. Accounting standards such as AASB 141 prescribe the processes to be used in 'general purpose financial reporting' and aim to meet the needs of a broad array of stakeholders by providing information for making and evaluating decisions about the allocation of scarce resources. For example, providers of resources may want to know whether the reporting entity is achieving its stated objectives in the use of resources economically and efficiently. Recipients of goods and services, and stakeholders with review and oversight responsibilities, may want to assess the ability of the reporting entity to continue in the future and whether it is making those goods and services economically and efficiently. The standards and reports are therefore not aimed simply at the valuation of the business or specific assets but at a much wider set of financial evaluations using accrual accounting and, in most cases, assuming the entity will continue as a going concern. Nevertheless, the specified processes in AASB 141 have considerable significance for the valuation of forestry assets when an 'independent valuation' is required which, as discussed later, is generally the case.

Following its decision to adopt the International Accounting Standards, the AASB adopted substantially all the International Accounting Standard (hereafter IAS) IAS 41 'Agriculture'

content and wording, except where Australian legislation had to be accommodated in AASB 141. Its application to accounting in agriculture became mandatory commencing 1 January 2005. New Zealand adopted the international standard IAS 41, commencing in 2006.

Dowling and Godfrey (2001) provide a survey and review of the accounting practices applicable to forests, among other things, at the time of introduction of the previous so-called SGARA<sup>1</sup> Standard (AASB 1037). Herbohn (2006) provides a later survey and review of the adoption of the SGARA Standard and implications of AASB 141. Forestry entities have encountered a number of issues in implementing the changes relating to the use of AASB 141 and these form the focus for this paper. However, the AASB 141 Standard applies to a wider array of assets than forests, including vineyards and orchards. These may also be affected by these issues but are beyond the scope of this paper.

The Association of Consulting Foresters of Australia (ACFA) has issued its interpretation of the previous AASB 1037 Standard (ACFA 2004, 2005). ACFA recognised that these interpretations did not necessarily represent the views of AASB and were subject to change as understanding evolved and as the AASB standards evolved. The introduction of the new and, in some respects, different AASB 141 necessitated revision of the ACFA forest valuation standard. This paper was intended to assist that revision, which will shortly become publicly available (ACFA 2007).

Whereas AASB 1037 required either an 'independent valuation' or a 'directors' valuation', AASB 141 does not specify either. Nevertheless, most governing boards or authorities use 'independent valuations' if financially prudent, because they reduce the risks to directors or the controlling authority. Australian Securities and Investment Commission (2006) guidelines state that an 'independent valuation' intended for publication to a section of the public and issued for a purpose regulated by the corporation law should be an objective and unbiased assessment, independent of any interested party. The aim of this paper is to examine issues pertaining to an independent valuation of a forestry asset, to indicate the problems that stem from current practices in applying AASB 141, and to recommend an operational method to overcome the issues.

The issues emerging with respect to the application of AASB 141 and, to a large extent, its forerunner AASB 1037, affect many forestry entities that are required to report according to this standard and some potentially have a major effect on financial reporting of profit or loss. Differing interpretations of the AASB 141 Standard and its forerunner AASB 1037 by relevant entities are adding to the uncertainties of valuation. Our principal focus relates to the valuation of large and medium-sized forests because, as noted in ACFA (2004), it is not appropriate to value these by simple application of the market prices to the log volumes of the living trees because an active market does not exist for such properties. Under these circumstances, the estimation of 'fair value' becomes a critical element.

## Current valuation practices

Present value is currently the valuation method used by most large and medium-sized forestry entities in Australia and New Zealand (ACFA 2004, 2005 and NZIF 1999) because the market for such assets is not active (AASB 141.8) — the frequency and asset characteristics of sales are irregular — and because market-determined values or sector benchmarks are insufficient in number to provide a usable alternative. Most purchases are therefore based on an assessment of present value of expected cash flows, often across a wide array of age classes, site productivities and (sometimes) locations relative to customers. The use of present value also links to the methods typically used for the preparation of business plans, as well as sale or acquisition valuations by these entities. These assessments almost invariably value the forest as a going concern, unless it is to be broken up and sold in separate parts.

AASB 116 'Property, Plant and Equipment' has a set of 'Australian Guidance' notes attached to it that are not a formal part of that standard but include an important guiding principle (G2) that valuations of assets should be based on the 'highest and best use', the application of which to forestry assets is the subject of detailed examination in a later section. Prior to the 1990s, the issue of highest and best use did not need much further consideration by consultants as real prices for marginal farming land were relatively stable and low, or even declining as structural adjustment of farming in some areas proceeded through natural attrition.

That trend has changed, especially over the past ten years. Rural land values in a number of areas have increased, mainly reflecting competition for potential forestry land by managed investment companies in Australia (see Paton and Associates 2005) and by the apparent prosperity of dairy farming in New Zealand (see Manley 2004). These trends have highlighted a major issue for forest valuation — that of valuing the living trees in a consistent and accurate manner. Few detailed studies are available but Wilton (2005) and a Jaako Pöyry report<sup>2</sup> illustrate the issue.

Wilton's report deals with a relatively small New Zealand estate of about 415 ha of pruned radiata pine (*Pinus radiata* D.Don) planted in 1996 and 1997 (see Forest Enterprises 2007 for details). Wilton applied the last sentence of AASB 141:25 ('... the fair value of raw land and land improvements may be deducted from the fair value of the combined assets to arrive at the fair value of biological assets') in calculating the values of the living trees at the beginning and end of the period<sup>3</sup> and then derived the gain or loss by subtraction. In the case cited, land values rose from NZ\$850 000 to \$1 325 000, an increase of NZ\$475 000, due to the increased profitability of grazing in the area. Applying these land values would imply that the value of the living trees (the

<sup>2</sup>Jaako Pöyry (2005) Valuation of Evergreen Forest Limited's forest assets as at 30 June 2005. Letter from W. Liley, JP Management Consulting (Asia-Pacific) Ltd, Auckland to David Sayer, Evergreen Forest Ltd, dated 10 July 2005, previously available on the then Evergreen Forest Ltd's website.

<sup>3</sup>The context of the analysis and use of rating valuations for land suggest that the duration of the period was one year.

<sup>1</sup>SGARA is an acronym for a self-generating and regenerating asset.

biological asset) *declined* by NZ\$364 937 despite an increase from NZ\$2 287 554 to \$2 397 617 in the present value of the combined asset (i.e. a gain of NZ\$100 063).

The Jaako Pöyry report concerns a sequence of valuations from June 2002 to June 2005 of a much larger and more varied estate of radiata pine owned by (then) Evergreen Forests Ltd in New Zealand. In addition to the effect of falling log prices, and revisions of transport and harvest costs and of yield tables, this report noted a similar effect on the value of living trees on freehold land, when calculated according to the last sentence of AASB 141:25, due to progressively increasing land prices.

The Jaako Pöyry report goes on to argue that the land is not capable of supporting viable grazing at those increased prices and therefore attributes part of the increase in land value to speculation on long-term capital gains, a point reiterated by Liley (2002). This raises an important but peripheral issue in relation to valuation. If speculation is the primary reason for investment in land, whether carrying trees or not, then AASB 141 is not the appropriate standard for valuation of the entity — AASB 140 ‘Investment Property’ should be applied unless, subject to certain qualifying conditions, it is owner-occupied, in which case AASB 116 ‘Property, Plant and Equipment’ applies. If it is not the primary reason, but nevertheless a factor, the consultant and entity owner would need to make an assessment whether they believed the speculation component was likely to be realisable in assessing and valuing the highest and best use according to the principles outlined earlier.

Returning to the principal issue relating to the use of AASB 141:25 to value the living trees, the nub of our argument is that while there may be cases involving small areas of forest where AASB 141:25 can be applied appropriately, it is not generally applicable, nor need it be, noting the use of the word ‘may’ in the earlier quotation from AASB 141:25.

If one were to accept the deduction method, the value of living trees automatically becomes the complement of the value of the ‘raw land’ in the best alternative use (i.e. the residual value after deducting the land value from that of the combined asset). A referee has argued that this treatment as a residual is valid, drawing an analogy between this value and the value of equity in the balance sheet in which equity is calculated as the difference between shareholders’ funds and liabilities. But that is a misleading analogy for a combined asset in which the different parts have to be valued separately. To do so would require that both shareholders’ funds and liabilities be allocated to the respective parts. That brings us back to the nub of this problem because the deduction method assumes that growing trees confers no economic benefits or disbenefits, which is a one-sided distortion of the valuation of one part over the other.

The issue is one of an inconsistency in valuation method for living trees in the income statement, not a particular outcome in terms of gains or losses. Other things being equal, if real land prices were to fall, gains would arise in the value of living trees, irrespective of the production by the living trees and resultant cash flows. In a medium to large forestry entity that is a going concern, a valuation method for living trees that is captive to annual fluctuations in real land price through the application of

AASB 141:25 will be inconsistent from year to year and be inaccurate.

How should the balance sheet most appropriately reflect the fair value, given that the living trees part has to be segmented and shown separately as a ‘biological asset’ (previously SGARA) in the asset statement? Clarification leading to a greater consistency of approach<sup>4</sup> is urgently needed.

The terminology used in AASB standards and in AASB 141, in particular, is critical to consideration of the issues relating to valuation of forestry assets. In the next section of this paper, we deal with some initial terminology and definitions, including those of biological assets, living trees, non-current assets and, most importantly, fair value. In the subsequent sections, we deal first with combined assets such as living trees and land, because that sets the scene for the principles involved in the section on the highest and best use. Successive sections then deal with valuing plantations held under single ownership of land and living trees, under forestry rights, and where land is leased. These sections provide a consistent basis for valuation of forestry assets. In the next two sections, an operational method for valuing all forms of plantation ownership is developed and its application to valuing commercial native forests considered. Sections dealing with discount rates and further concerns follow.

## Terminology and definitions

In AASB 141, a *biological asset* ‘is a living animal or plant’. This term replaces the so-called SGARA term of AASB 1037 but is essentially the same thing with respect to its application to forest valuation. For clarity and greater specificity, relative to other well-established forestry terminology, we have coined the term *living trees* to apply to the biological asset (previously SGARA) involved in a forest. The other major component of a forestry asset is land, which is a specific *non-current asset* (see definition in AASB 101) under the Property, Plant and Equipment Standard (AASB 116), as are other forms of property, plant and equipment.

‘Fair value’ is defined in AASB 141.8 as follows:

*Fair value* ‘is the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm’s length transaction’.

If an active market does not exist, as is generally the case for many forestry entities, AASB 141.18 specifies the following methods that are to be used wherever market-determined prices and benchmarks are available for the forest or other biological asset, in its present condition:

18. If an active market does not exist, an entity uses one or more of the following, when available, in determining fair value:

<sup>4</sup>The Productivity Commission (2005) report *Financial Performance of Government Trading Enterprises* cites three of the five Australian state forestry enterprises that use present value, another two that use an immediate liquidation approach, one current cost, and one historical cost, all ostensibly under AASB 1037. Herbohn’s (2006) survey suggests a somewhat greater acceptance of present value among commercial forestry entities under AASB 1037, albeit subject to a number of qualifications.

- (a) the most recent market transaction price, provided that there has not been a significant change in economic circumstances between the date of that transaction and the reporting date;
- (b) market prices for similar assets with adjustment to reflect differences; and
- (c) sector benchmarks such as the value of an orchard expressed per export tray, bushel, or hectare, and the value of cattle expressed per kilogram of meat.

For many forestry and other biological assets no active market for the asset exists *and* market-determined prices or sector benchmarks may not exist — for example, many medium and large forestry assets spanning large areas and varied age-classes. Hence AASB 141.20–22 specify:

20. In some circumstances, market-determined prices or values may not be available for a biological asset in its present condition. In these circumstances, an entity uses the present value of expected net cash flows from the asset discounted at a current market-determined pre-tax rate in determining fair value.

21. The objective of a calculation of the present value of expected net cash flows is to determine the fair value of a biological asset in its present location and condition. An entity considers this in determining an appropriate discount rate to be used and in estimating expected net cash flows. The present condition of a biological asset excludes any increases in value from additional biological transformation and future activities of the entity, such as those related to enhancing the future biological transformation, harvesting, and selling.

22. An entity does not include any cash flows for financing the assets, taxation, or re-establishing biological assets after harvest (for example, the cost of replanting trees in a plantation forest after harvest).

The issue of valuation based on estimates of present value has been a matter of debate outside and within the International Accounting Board (see IAS 141: Basis for Conclusions, especially pp. 5–7), especially in relation to biological assets and ‘financial instruments’ that include a wide range of items from cash and trade receivables, to interest and currency options, swaps and other financial derivatives. This debate is partly due to the uncertainty attached to the future values of forestry assets (e.g. volumes harvested and their prices) and financial instruments but also in some cases to reservations held about the use of market-determined prices. The recently approved section 48A of AASB139 ‘Financial Instruments: Recognition and Measurement’ provides a useful basis for elaborating on the key conditions for estimating fair value of financial instruments using the present value of expected cash flows. These conditions appear to us to apply equally well to forestry investments:

48A. The best evidence of fair value is quoted prices in an active market. If the market for a financial instrument is not active, an entity establishes fair value by using a valuation technique. The objective of using a valuation technique is to establish what the transaction price would have been on the measurement date in an arm’s length exchange motivated by normal business considerations. Valuation techniques include using recent arm’s length market transactions between knowledgeable, willing parties, if available, reference to the current fair value of another instrument that is substantially the same, discounted cash flow analysis and option pricing models.

If there is a valuation technique commonly used by market participants to price the instrument and that technique has been demonstrated to provide reliable estimates of prices obtained in actual market transactions, the entity uses that technique. The chosen valuation technique makes maximum use of market inputs and relies as little as possible on entity specific inputs. It incorporates all factors that market participants would consider in setting a price and is consistent with accepted economic methodologies for pricing financial instruments.

Periodically, an entity calibrates the valuation technique and tests it for validity using prices from any observable current market transactions in the same instrument (i.e. without modification or repackaging) or based on any available observable market data.

AASB 141.24 acknowledges that, in some cases, cost may approximate fair value, one of the specific examples being that of an immature plantation. AASB 141.18–24 outlines, but does not specifically prescribe, a hierarchy among the methods to be used where an active market does not exist because, as the international Accounting Standards Board puts it in the discussion of the IAS 41 (IASB 2005), ‘... a detailed hierarchy would not provide sufficient flexibility to appropriately deal with all the circumstances that may arise ...’. Even so, the IAS 41 discussion makes it clear that whatever method is used, account must be taken of all available market-determined prices and values. The ACFA Standard for valuing forests prescribes the reporting of such comparative information in independent valuations.

The estimation of the present value of forestry assets is further complicated by the fact that they are effectively ‘combined assets’.

### Combined assets

Regardless of the ownership of the living trees (the biological asset) and land on which they stand, forests represent a combined asset in the sense that the trees cannot exist without the land. This has major implications for the valuation of forestry assets. AASB 141.25 recognises that forestry and other biological assets may be combined assets and states:

25. Biological assets are often physically attached to land (for example, trees in a plantation forest). There may be no separate market for biological assets that are attached to the land but an active market may exist for the combined assets, that is, for the biological assets, raw land, and land improvements, as a package. An entity may use information regarding the combined assets to determine fair value for the biological assets. For example, the fair value of raw land and land improvements may be deducted from the fair value of the combined assets to arrive at the fair value of biological assets.

In the case of large and medium-sized forestry entities (other than those involving a ‘forestry right’ restricted solely to the current living trees), the planning horizon for expected cash flows from the going concern needs to be set to the same future year (i.e. planning horizon) across all stands. If the planning horizon is not set to the same future year across all age classes, it is not possible to optimise the future wood flows (and hence net revenues to the combined asset) with industry demands and future development, as is typically used in business planning and in evaluation of purchase prices. To do otherwise, in a plantation

estate with a range of age classes up to that of final harvest, would lead to a progressively diminishing wood flows over time as the wood supply from intermediate thinnings progressively ceases, as a result of no replanting after final harvest.

The methods used for business planning and the evaluation of purchase (or sales) price for large and medium forestry entities are well established. The forest is divided into a set of stands (generally according to age, site productivity and location) for which inventory estimates are available as to the current characteristics. Computer-based models founded on empirical data and subject to field checking are used to forecast stand growth, mortality and the expected yields by log assortment classes at any given age. These are embedded in mathematical programming or simulation models that optimise the present value mathematically or iteratively by matching the possible future wood flows of the array of different log assortments against industry demands and future development over a fixed planning horizon. The length of that horizon varies from 10 to 50 y (or more) according to the predominant log assortments (e.g. pulpwood versus sawlog), growth rate of the species concerned, stand treatment (pruning, thinning etc.) and legal requirements (e.g. sustainable yield). The individual stand computations may extend beyond the planning horizon to the year of final harvest of the current crop or infinite series thereof (after Faustmann) and then discounted back to the planning horizon, or there may be an assumption of liquidation at the end of the horizon. In either case, the present or terminal value of the combined asset in the stand at the end of the planning horizon is effectively included as revenue at that time.

Assuming fair value is calculated on the above basis, the present value of the living trees can be calculated from the same cash flow data by segmenting those data to include only those costs and revenues relating to living trees at the time of the valuation. To put this another way, the fair value of the biological asset is based on a present value calculation for the current crop of living trees.

AASB 141.26 requires that the change in fair value of the living trees must be included in the profit or loss for the relevant period, whereas the changes in the values of non-current assets are not. Land improvements (buildings etc.) that do not have living trees but are potentially saleable separately from the combined asset of land and living trees can be valued independently of the combined asset.

The issue taken up in the next section is how to address the principle of valuing according to highest and best use, a principle which underpins all forestry valuations of a combined asset.

### Valuing highest and best use

From the accounting standard's perspective for a going concern, the valuation of an asset is based on the premise of using the highest and best use as the benchmark, as the Australian Guidance Note G2 to AASB 116 sets out:

... The fair value of an asset is determined by reference to its highest and best use, that is, the use of the asset that is physically possible, legally permissible, financially feasible, and which results in the highest value ...

The independent valuation of land normally rests on appraisals based on market evidence by professionally qualified valuers. This is clearly a component relevant to the determination of highest and best use. When dealing with the value of a combined asset such as land and living trees, however, it is not the only consideration.

The appropriate comparison in determining the highest and best use is between the present value of the combined asset and that of the best alternative use or uses of the separate components. Among other things, the present value of the best alternative use depends on when it would be most opportune to harvest or remove the living trees, less the cost of rehabilitating the site, which varies considerably depending on age and the fair value of the land. If all the trees were very young, immediate clearing of living trees may be appropriate. For large estates, progressive harvesting of age classes over a number of years may be needed in order to best realise the potential value of the living trees. Thus, assuming there is no legal or other barrier to the opportunity to change uses (see AASB 116.G2), the present value of the best alternative use is the optimum discounted salvage value of the living trees *less* the costs of rehabilitation *plus* the value of the land in the best alternative use, as and when that land is expected to become available.

If the present value of the combined asset exceeds or equals that of the best alternative use, the highest and best use is to maintain the combined asset and value it accordingly. If less, the present value of the alternative use is the appropriate valuation. Having established how the principle of highest and best use might best be applied, we now turn to examine how valuation practices might be framed consistently across all forms of ownership but avoiding the difficulties posed by AASB 141.25. We will confine our initial analysis to that of plantation estates where the entity owns both land and living trees. We later address ownership under forestry rights (legal ownership of living trees but not the land) and leased land before describing the operational method, its application to commercial native forests and the choice of discount rate.

### Single ownership of land and living trees

The problem relates to the general application of the wording of AASB 141.25 that '... the fair value of raw land and land improvements may be deducted from the fair value of the combined assets to arrive at the fair value of biological assets' by consultants undertaking independent valuations. The underlying issue is that living trees and similar long-lived plant crops are seldom separable physically from the land until final harvest without incurring a considerable decrease in product value. Separating them into the respective values of the living trees (the biological asset) and 'raw land' (the non-current asset), and then treating the two components as though they are independent, is confounding the principle that the combined asset should be valued on a fair value basis in its highest and best use, consistent with the valuation of other property and assets.

Clearly, a separate complementary entry of the present value of 'future rotations' is needed to ensure the values of land and living trees sum to the fair value of the combined asset (after appropriate separate recognition of land improvements). This is the only mechanism that can ensure that the calculation of the biological

asset value plus the present value of future rotations is consistent with the fair value of the combined asset as determined by present value calculation.

As noted earlier, land improvements (e.g. buildings) that are separable should continue to be valued independently of the present value calculations and shown separately as non-current assets under property, plant and equipment on the balance sheet.

## Forestry rights

In managing a forestry right involving an existing large or medium-sized plantation, the entity uses both land and living trees as a combined asset, notwithstanding the different ownership of land and living trees. In arm's length transactions between knowledgeable and willing parties, the purchase price for a forestry right is almost invariably based on the present value of the expected cash flows. The same method also generally forms the basis for later annual valuations.

If the forestry right covers only the harvest life of the youngest living trees, then the present value of the living trees is simply confined to the living trees. Any harvest of future crops subsequent to the harvest life of the initial set of living trees confers no value because the valuation of a biological asset is restricted to the living trees. The subsequent crop may, of course, confer costs if replanting is a legal requirement of the forestry right, but that will have been factored in calculating the price to be paid for the forestry right.

If the duration of the forestry right extends beyond the harvest life of the youngest living trees, the present value of future rotations should be accounted for as in the preceding section. The proposed method of valuation for forestry rights is therefore consistent with that proposed for single ownership of land and living trees.

## Leased land

Under AASB 117.15, because land has an indefinite life and title does not normally transfer to the lessee at the end of the lease, it is treated as an operational lease and expensed<sup>5</sup>, unlike buildings which may be treated as a finance lease or an operating lease, depending on the conditions on the lease. Similarly, leases in which the lessor effectively retains much of the risks and benefits pertaining to the land, such as certain types of sharing and joint venture<sup>6</sup> arrangements, are treated as operating leases. These do not appear as assets or liabilities in the balance sheet of the lessee because the lessee does not effectively own the assets. For these, the minimum annual lease payments are recognised as a direct expense, as are contingent rents<sup>7</sup>. Thus, it is appropriate to value

the present value of the living trees (i.e. biological asset) and that of the present value of future rotations (if applicable) in the same manner as above.

Many of the questions posed to the ACFA Forest Valuation Sub-Committee about the interpretation of AASB 141 relate to the forest value being perceived to be different on leased land to that on owned land because of the practices adopted to date.

We now detail an operational method for valuation of forestry assets that is consistent across all types of ownership, based on the principles developed in the preceding sections.

## Operational method

The following method conforms to the provisions of AASB 141 and the analogy with AASB 139.48A noted earlier and provides a more appropriate and accurate valuation method for medium to large forestry entities where no active market for the forestry asset exists. The choice of the discount rate to be used is taken up in a later section.

1. Optimise the present value of the combined asset by mathematical programming or simulation to determine the best schedule of wood flows over an extended uniform planning horizon for both current and future tree crops and the present value thereof (i.e. the fair value of the combined asset).
2. Segment those cash flows in (1) that relate solely to the living trees at the time of valuation and calculate their present value (i.e. the value of the biological asset, as defined in the AASB 141 standard). This value is used to calculate the annual change in value of the living trees which goes to the income statement and thus to profit or loss.
3. Determine the value of land improvements from independent data to the above and bring to account as a non-current asset under property, plant and equipment.
4. Deduct the value of land improvements from the present value of the combined asset (i.e. No. 1 above) to derive the present value of living trees plus future rotations.
5. Deduct the value of the living trees (i.e. No. 2) from the present value of the adjusted value of the combined asset (i.e. No. 4) and bring to account this present value of future rotations as a non-current asset under property, plant and equipment.
6. Where the land is owned by the reporting entity, periodic revaluations of land in the best alternative use should be disclosed in notes to these estimates but not shown as a non-current asset under property, plant and equipment, to avoid double counting of assets.

## Native and other forests

In principle, the valuation of medium to large-sized commercial<sup>8</sup> native forest entities using even-aged silviculture is exactly the

<sup>5</sup>We acknowledge the assistance of an anonymous referee in clarifying this point.

<sup>6</sup>Joint venture in forestry practice sometimes involves complete control by the lessee and therefore does not qualify as a 'joint venture' under AASB 131 but in some cases control is shared jointly.

<sup>7</sup>Contingent rent is that portion of lease payments that is not fixed in amount but is based on the future amount of a factor that changes with the passage of time (e.g. percentage of future sales, amount of future use, future price indices, future market rates of interest) — see AASB 117.

<sup>8</sup>AASB 141 is limited to 'Agricultural activity' which is defined as 'the management by an entity of the biological transformation of biological assets for sale, into agricultural produce, or into additional biological assets.' While there may be some ambiguity inherent in the last phrase, the intent of the definition is clearly to exclude non-commercial forest uses, among others.

same as that recommended above, although the planning horizon may be much longer.

For a medium- to large-sized native forest entity in which uneven-aged forests are harvested under selection, gap or group selection silviculture, the present value would be calculated over successive cutting cycles to a fixed and long-distant planning horizon, but the process is otherwise similar in principle.

The accounting treatment of coppice rotations following the first or later rotations of coppicing species is nominally more complicated because the coppice remains a 'biological asset' after harvesting and thus the value of the living trees (the biological asset or SGARA) is tied to the number of coppice rotations expected until the coppice is removed and new seedlings are planted. In all other respects, the recommended method holds for coppice.

A number of other lesser issues arise in the interpretation of the provisions of AASB 141 and these are taken up in ACFA (2007). However, one issue concerning the choice of discount rate is of greater importance and demands review here.

### Discount rates

AASB 141.20 states that a 'current market-determined pre-tax rate be used' in determining the fair value through an analysis of the present value of expected cash flows. Nevertheless, some uncertainty appears to exist among standard-makers as to the appropriate approach regarding pre-tax or post-tax discount rates because, in discussing general principles on fair value measurement, the IASB (2006) discussion paper notes that '... after-tax cash flows should be discounted using an after-tax discount rate'.

Any due diligence concerning sale or purchase of a forest asset is normally carried out on a post-tax basis. Most valuers of forests use some variant of the weighted average cost of capital across both debt and equity in such valuations and in annual financial valuations. In doing so, taxation is implicitly recognised, as the differences between discount rates relating to debt versus those relating to equity are clearly not solely a matter of risk, but rather of both risk and taxation treatment. A generic sector approach to the treatment of cash flows net of taxation based on present and expected future rates of taxation would be appropriate to the evaluation of the fair value of the combined asset. Fair value measurement is an evaluation made in the hypothetical setting of a transaction between a willing buyer and a willing seller and does not recognise the taxation circumstances of the particular entity. However, pre-tax is presently the mandated basis for determination of the fair value of the biological asset.

The argument has been made that if taxation rates are stable, the AASB 141 Standard reference to pre-tax is of no consequence because the effects would be the same for successive valuations and thus be cancelled out in the calculation of gains and losses and the consequent impact on the income statement. This is not so. The discount rate plays a pivotal role in determining the optimum set of future wood flows in the planning models described earlier. The wood flows or resulting expected cash flows will differ between evaluations of present value using pre-tax and post-tax discount rates. Furthermore, the present value

of expected cash flows over the relatively long planning horizons that typify most forestry investments is very sensitive to the value of the discount rate.

The post-tax approach outlined above for an independent valuation needs to be distinguished from the pre-tax approach generally used in the preparation of an entity's financial report. The latter is necessary because financing and related tax considerations may affect deferred tax assets or deferred tax liabilities. In our view, however, an independent valuation of the living trees and future rotations should consider sector or generic financing considerations consistent with the assumptions underlying the post-tax discount rate. These considerations may differ from those used by the entity. The valuer's approach on these matters should always be guided by the need for an objective and unbiased assessment of fair value in the context of the sector or generic class of investment.

As noted earlier, the choice of discount rate is critical to the estimation of fair value using a present-value approach. The use of a pre-tax discount rate may result in a material underestimate of fair value using a present-value approach. Hence an independent valuation should be based on a post-tax discount rate and post-tax cash flows.

We recommend that post-tax discount rates be applied to post-tax cash flows when estimating the fair value of a medium to large forestry going concern based on a present net value approach.

### Future changes to standard

The method outlined above is pragmatic in nature because of the need to adhere to existing accounting standards. We have therefore sought to adhere to the AASB 141 Standard and to provide a consistent and accurate basis of valuation, not just of the living trees (the value of the biological asset or SGARA) but also for the other components of the combined asset: one that can be applied to all types of forests and ownerships.

Two possible changes to AASB 141 would alleviate further concerns we have about its use in forest valuation:

#### 1. Recognition and materiality of future crops<sup>9</sup>

Under AASB 141, the focus placed on valuing the living trees (the biological asset) is presumably because they are assets for which 'future economic benefits will eventuate' and 'can be measured reliably', whereas those associated with future crops are not viewed as having those properties. Yet in assessing the present value of a going concern of a medium or large forestry entity, one has to make a whole array of predictions of future growth, mortality, prices and costs over a long period. A one-year-old stand of trees is recognised but, for a going concern, is it materially different from one which is yet to be planted the year following the current final harvest? The assumptions made regarding future values of living trees are no different to those

<sup>9</sup>Thanks are due to another anonymous referee for assistance in clarifying this section.

for subsequent crops and the discrimination therefore seems arbitrary and does not match established practice in estimating fair value for purposes other than general-purpose financial reporting.

This benign neglect of future crops in the AASB 141 Standard has other implications that are undesirable. Many consultants simply assume that future crops are present value neutral — implying that they contribute no material (see AASB 1038) value. In our experience, while the values of future crops on some specific areas may not be material, others can be materially positive or negative. Manley's (2002) survey of effective discount rates used in New Zealand valuations shows an increasing trend with stand age for valuations involving predominantly immature forest compared with those for predominantly mature forest. This indicates that many predominantly immature or 'greenfield' plantations could not pass the economic test set by the choice of discount rate for mature plantations — a point that is explicitly made by Colley (2002) and based on valuations carried out by his company, and Liley (2002). This suggests to us that consultants are factoring in differences in risk for the two situations in ways that are inappropriate to the valuation of both.

The IASB's (2006) *Fair Value Measurement: Discussion Paper* suggests that a hierarchy may be established regarding the reliability of input data used in present calculations and also notes that techniques such as stochastic modelling and certainty equivalents are suitable options for the recognition of risks, in addition to the widely used risk-adjusted discount rate. These changes might, if approved, enable recognition of the value of future crops in a manner different to that proposed here, while maintaining consistency with the value of the combined asset.

## 2. Unrealised gains or losses

When calculated according to AASB 141, the value of the biological asset does not reflect only the value of the living trees — it also reflects the inherent contribution of the land to the time of final harvest because the biological asset is inseparable from it over that period. True, whatever the contribution of the land, it is netted out in calculating the annual gains or losses to be brought to account in the income statement and profit or loss, which provides some comfort for the resulting estimate. However, Ferguson and Houghton (1996), Dowling and Godfrey (2001), the Productivity Commission (2005) and Herbohn (2006), among others, have expressed concerns because the annual change in the values of the biological asset is not a realised value in the context of a going concern, yet it is treated as one by incorporating it in the income statement. This creates two potential problems for users of these financial statements:

1. '... users may develop unrealistic expectations of distributable profits, creating pressure for entities to declare and pay dividends, when no funds are available' (Herbohn 2006)
2. an increased volatility of earnings (Dowling and Godfrey 2001).

Mindful of the potential for misinterpretation, Forestry Plantations Queensland, a government trading enterprise, has created a special 'Plantation Growing Timber Unrealised Revenue Reserve' to show the annual changes in value of the biological asset. This

ensures that any such gains shown in the income statement and profit or loss are clearly understood *not* to be available for distribution. We recognise that current practice accords with current accounting trends to try to 'mark to market' all values in the balance sheet and support that goal. That is a different matter, however, to protecting the unsuspecting stakeholder from confusing an as-yet unrealisable value with a realisable value. Valuation would be better based on the present value of the combined asset, with the annual change brought to account solely in an appropriately labelled unrealised reserve under non-current assets.

## Acknowledgements

The authors wish to acknowledge the considerable contribution of two anonymous referees to this paper.

The senior author is a non-executive director of two plantation entities and a former chair of another. Both authors have been consultants to various plantation and native forest entities. However, the views expressed in this paper are solely those of the authors.

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