

10 Economic assessment

10.1 OBJECTIVES OF THE ECONOMIC ASSESSMENT

One of the objectives of the Regional Forest Agreement is to ensure the long-term ecologically sustainable management of forests and the development of competitive and efficient forest industries. This will be achieved through the provision of secure access to resources for industry while still protecting the environmental and heritage values of the forests by means of a comprehensive, adequate and representative (CAR) reserve system (Commonwealth of Australia 1995) and ecologically sustainable forest management practices.

In line with the agreed goals of the National Forest Policy Statement (Commonwealth of Australia 1992), the economic and social assessments for each RFA seek to answer a number of questions pertaining to the forest resource, forest use and industry development opportunities in the region. This includes assessing the ability of forest-based communities to adapt to change and community response and development plans.

10.2 APPROACH OF THE ECONOMIC ASSESSMENTS

The economic assessments are used to inform the development of policy on issues relating to the economic costs and benefits of varying forest use and industry development within a region. Variations to the existing forest use or industry structure may arise for various reasons such as:

- alternative conservation reserve boundaries and tenures;
- management options for production forests;
- options for conservation of private forests;
- plantation development options; and
- development of industry structure, capacity or product markets.

For the Western Australian RFA, a framework has been developed to assess the viability and impacts of these options for local and regional forest-based industries. Impacts are identified through changes in forest use patterns for wood production and other values, including woodflows and the net returns to specific processing industries. The impacts on regional forest industries are measured through changes in net returns and employment in local wood-based industries and regional forest-use patterns. Broader economy-wide effects are measured through changes in State output and employment.

Western Australian forests have a broad range of commercial uses in addition to timber production and mining. These uses include water catchment protection, recreation and tourism, apiculture, floriculture and seed collection. The analysis of these industries focuses on the likely location and magnitude of change in access to resources resulting from changes in the tenure of a forest from multiple use to conservation reserve. Such analyses need be undertaken only where access changes with forest tenure.

Background data on the nature of the forest resource and the structure of existing industries have been collected to provide a profile of the forest-based industries as a benchmark for assessing alternative resource use and industry development options. These industry development options have been developed after consultation with industry, unions, government and other relevant stakeholders.

Another component of the economic and social assessments is the evaluation of likely social impacts arising from proposed options. Data such as the direct regional income and employment impacts are incorporated from the economic assessments.

10.3 ANALYSIS TOOLS AND METHODS

Direct timber industry impacts

Calculation of the direct economic impacts of varying the processing opportunities or level of resource available to the timber production sector involves quantifying changes to such factors as employment, income (wages and salaries) and the gross value of production. ABARE has previously developed a model—FORUM (Forest Resource Use Model)—to simulate such impacts. FORUM is a regional linear

programming model of production forestry, designed to measure the direct impacts to local or regional timber industries of changes in woodflow.

However, the FORUM model requires estimates of woodflows over the life of the RFA at a detailed, spatially disaggregated level. The level of spatial disaggregation used in FORUM does not match the yield-scheduling systems used in Western Australia where woodflows are analysed at three administrative levels (Swan, Central and Southern forest regions).

Consequently, a spreadsheet-based model has been developed to simulate the interactions between regional timber resources, wood-based forest industries and final product markets. The model enables the development of the wood-processing industry to be simulated, subject to certain assumptions relating to wood resources, industry cost structures and wood markets. The model is used to simulate the development of the wood processing industry and then to analyse the economic implications of changes to resource access.

Information on the gross value of production, employment levels, the net value of the timber production, or the land and tree resource rents, are generated for the 20-year RFA period. In each year, land and tree resource rents are equivalent to the net stumpage value of logs harvested. The stream of land and tree resource rents over the period are discounted to determine the present value of land and tree resource rents. Discounting back to the present value is necessary in order to be able to compare possible different development scenarios which have different time profiles. The model enables estimates to be made of which regions face the greatest changes when wood resources, market conditions or industry structure are varied.

Key data sources include CALM estimates of likely woodflows over the life of the RFA, an economic survey ABARE undertook of the Western Australian sawmill industry and industry development options developed by consultants BIS Shrapnel Forestry Group. The consultants have provided information and data relevant to assess the potential development of a technically feasible and world competitive hardwood-based industry in Western Australia through to 2020.

Model simulations are based on several assumptions concerning wood resource availability, industry cost structure and wood market conditions. Prices and costs are based on constant 1996-97 values, revenue is measured on a pre-tax basis, trade and other policies except where specified are unchanged from those currently in place. Rotation lengths, wood-conversion factors, real prices for end use forest products and real per unit harvesting, processing, transport and investment costs were assumed constant throughout the RFA period unless otherwise stated. Australia is assumed to be a small trading nation in forest products, so that forest product prices are determined by the rest of the world.

Over the duration of the RFA, the structure of the industry can change in response to wood resource quality and quantity, markets and the competitiveness of industry. Hence, impacts on the wood processing industry arising through changes to industry structure should be assessed against the industry structure that is likely to exist over that period. This requires modelling the development of Western Australia's wood processing industry through to 2020. The model, in conjunction with the assessment of development options produced by consultants BIS Shrapnel, is used to simulate the hardwood logging and wood processing industries in Western Australia between 1997 and 2020 under the assumption of no change in current access to State forest areas. This baseline provides a benchmark against which the economic implications of changes to wood resources that may occur under a Western Australian RFA are assessed.

Direct mining impacts

Methodology

The methodology used is consistent with the procedure used to examine economic impacts in the timber sector. The direct economic cost of a conservation reserve which affects current or potential future mining in the region is defined as the reduction in the present expected value of net economic benefits associated with known and undiscovered mineral resources in the region due to any resource access restrictions imposed by a new conservation reserve. Given practical difficulties in measurement, generic quantitative models for evaluating the economic costs of conservation reserves that may affect current or potential future mining have not been developed. Rather, a framework is provided and is used to outline the likely nature and extent of economic costs arising from conservation reserves that would constrain existing or potential mining operations within the region. The type of information that would be required to estimate such costs accurately is also discussed. This analysis then provides a basis for examining the issues regarding the manner in which the design of conservation reserves can affect mining and exploration activities. The following is a brief summary of this analysis.

Impact on sovereign risk

One of the key objectives of the RFA process is to deliver greater security of resource access for current and future investments which require access to forested land in Western Australia. However, the process itself is generating uncertainty in the short term. Changes to land access arrangements arising from the RFA which affect current exploration or mining operations have potential to have significant economic costs.

State Agreement Acts are, in effect, contractual arrangements ratified by the Western Australian Parliament and as such, any amendment to them has to be by negotiation with the company concerned. In Western Australia, most major mining projects operate under such agreements. The right of land tenure and access granted under State agreements are an important factor under-pinning the large-scale and long-term investments which have been made in the alumina and coal industries that operate in the RFA area. Any unilateral changes to land tenure affecting current mining activities could raise uncertainty as to the effectiveness of such arrangements for future projects in Western Australia, with potential adverse implications for levels of future investment. The State government, however, would not contemplate changing these rights of land tenure without the agreement of the relevant companies, owing to the sovereign risk which could arise.

Operating mines

The direct economic costs of a conservation reserve which precludes forest clearing in a particular area of a mining lease would depend primarily upon the amount of mineral resources contained in the conservation reserve, and its location in relation to plans for future mining. Consequences could range from a small reduction in output over the life of the mine, through restriction of expansion potential to the extreme case of forcing the operation to close.

In addition to size and location, the type of mining would influence the sensitivity of an operation's production to a proposed land access restriction. Open-cut mining requires initial surface clearing for a pit or mine shaft, after which mining occurs for a relatively long period of time. For these types of operations, any restrictions on land clearing could have implications on production that would otherwise have continued for a number of years. For surface (or strip) mining operations in the RFA area, there is a direct and ongoing relationship between production and surface clearing, as mining occurs at depths of typically less than 10 metres. Restricting access to areas for strip and surface mining operations will affect a shorter period of production than would be the case for a deeper mining operation.

The economic costs to society (both direct and indirect) of a conservation reserve option affecting resource availability are defined as the difference between the net economic benefits to society resulting from the 'business as usual' (or baseline) production profile and the net economic benefits to society associated with the production profile which results from the conservation reserve option in question. The costs of conservation reserve options can be broadly classified into direct costs and indirect costs. Direct costs are defined as the reduction in the present value of the net economic benefits associated with mining, processing and marketing the resource in question. These costs are primarily borne by the companies concerned.

Indirect costs are defined as those costs which occur in other markets as a result of a change in resource availability. For example, the early closure of a currently-operating alumina refinery could be expected to result in increased costs in markets for commodities used in the production of bauxite and alumina (e.g. coal and chemicals) and could have significant implications for regional economies. As discussed below, if time permits, a general equilibrium model may be used to enable estimates to be made of these costs to the Western Australian economy under the various reserve options.

Surface or strip mining

In the case of a surface or strip mine such as bauxite mining, any small conservation reserve which would lead to mine life being shortened but not to any other significant change in the production profile (e.g. the viability of future expansion plans are not affected) is likely to involve considerable direct costs, although indirect costs are likely to be small. It is important to note that the eventual closure of mining operations inevitably leads to costs in related markets, e.g. in markets for inputs to the mining and processing operations and on the regional economy in general. However, given that these adjustments will be made in any case, the relevant cost is the cost of bringing these adjustments forward as a result of the shorter mine life.

Should any proposed conservation reserve contain sufficient bauxite to affect the viability of future expansion plans (or the viability of current refineries) then direct costs are likely to increase substantially. In addition to the direct economic costs, any reserve option which would involve significant reduction in

the use of labour and capital may involve significant costs in other markets and the Western Australian economy.

Open cut mining

In the case of an open cut mine such as coal mining in the Collie Basin, the relatively inflexible nature of the mining operations would be expected to mean that any conservation reserve option which would impact on current operations is likely to involve significant direct costs and may also involve substantial indirect costs. There would be a reduction in direct costs by locating any conservation reserves away from areas which are required for mining developments in the foreseeable future.

Potential future mines

In the case of undiscovered resources, economic benefits cannot be known until they are defined in terms of location, quality and grade and found to yield economic benefits. A large proportion of the South-West Forest Region has been assessed to have high mineral potential (see Chapter 8). Accordingly, it is likely that, through exploration, such resources will be identified and new mines developed. As such, there will be a positive expected value to society from maintaining the option to explore and develop mines within the region.

To calculate this expected value would require a number of estimates and assumptions. Assumptions regarding the probability of various mineral deposits lying undiscovered within the region would be required. Specifically, for each deposit type, this would require estimates of the probability distributions of potential deposit sizes, grades and the number of deposits. Without extending the available geoscientific assessments of the region to include estimates of probabilities of resource occurrence, it is not possible to estimate quantitatively the expected value of undiscovered mineral resources within the region.

However, even if such a quantitative geoscientific assessment of the RFA region was available, further economic assumptions would be required to extend the geoscientific assessment of undiscovered resources to estimate the expected economic benefits from allowing exploration. Estimates of the likelihood of finding deposits through time (perhaps based on expected exploration effort) and the benefits of finding a deposit for all possible future discovery dates would underlie any such valuation.

Although there are practical difficulties in estimating the option value to society of allowing exploration (and the possibility of mining subject to environmental constraints) within an area, it is clear that such values are likely to be significant in some cases.

While the dollar value of such options has not been estimated, the right to explore for these resources is of significant value and therefore important in considering resource management options for possible reserves. Rather, it needs to be recognised that, for a number of reasons it has not been feasible to place a dollar value on undiscovered mineral deposits in the region. Accordingly, assessments of mineral potential need to be taken into account in considering reserve location and classification.

Undeveloped resources

The values associated with undeveloped resources (which are currently identified) are of a similar nature to those associated with undiscovered resources. While undeveloped resources are not producing any economic benefits at present, there is the possibility that they will be developed at some future date. There are numerous examples of changes in mining or processing technology, commodity prices or production costs leading to previously uneconomic deposits becoming economically viable over time.

Indirect economy-wide impacts

Any direct economic impacts in the timber, wood products and mining industries will have linkages to other sectors of the economy, at regional, State and national levels. To assess these effects, two methods are to be used. Input-output tables provide a first approximation to the magnitude of indirect impacts upon employment, output and income that flow through to the broader economy as a result of changes to the timber, wood-based and mining and mineral processing activities in the region. State-based input-output employment and income multipliers for Western Australia are available for use (Clements and Qiang 1995). However, input-output tables involve a range of assumptions, including assumptions of excess capacity in all sectors of the economy in all regions. As a result, inferring State or nationwide impacts from input-output based multipliers can over-estimate economic impacts.

General equilibrium models, in theory, provide more accurate estimates of the flow-on effects of changes in output or income from forestry-based and mining industries to other sectors of the State or national

economy. Spillover effects from one sector of the economy to another are captured through wage and price adjustments resulting from one sector's expansion or contraction in response to a policy change. For example, the effects of alternative wood supply options on the timber industry will have flow-on effects to other downstream wood users through changes in woodflows and prices. They will also have flow-on effects for other industries such as retailing and transport, because of the effect on prices of intermediate inputs and primary factors that affect other industries' costs of production and market demands. This also means that a policy change affecting the forest industry can indirectly affect the international competitiveness of other sectors through changes in the exchange rate and changes in the costs of production of export and import competing industries.

The Centre of Policy Studies at Monash University has been commissioned to provide a computable general equilibrium model of the Australian economy. The model is based on the centre's existing MONASH-MRF model (Peter et al. 1996) and will be available for use at the end of 1997. If time permits, it will be used to estimate the impact of different resource options on the State and national economies.

