Member's Comment

ONE FOREST, ONE STEWARD, ONE TREASURER

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Your recent editorial† on a "national forest system" questioning the bizarre distinction in New Zealand between "indigenous" and "exotic" species allows a comparative newcomer to release his long-suppressed puzzlement without fear of instant professional assassination!

The newcomer needed to be a mental gymnast to assimilate the oddity of the bush/pine dichotomy; for example, if planting eucalypts among red and silver beech was "enrichment", did this mean rearing young kauri under a nurse crop of Japanese larch would be "impoverishment"? If the maritime pine in Abel Tasman National Park grew so much faster than in its million hectare Gascony homeland, was it treasonable to calculate the opportunity loss in not only not cultivating its fortuitous presence, but also in weeding it out under the anti-exotic National Parks legislation? Why was the stigma "exotic" so painful in the Pinaceae, so gentle in the Graminaceae? How had the adjective "selection", naively associated by the newcomer with a sensitive form of management in polycyclic, polyspecific forest, somehow been invested with an aura of opprobrium? And how on earth did "sustained yield" come to be a term reserved for indigenous management, to the extent that the Forest Service's otherwise absorbing compendium of statistics contains no table linking annual volumetric increment with annual roundwood removals in *exotic* forest? Did one dare ask precisely *what* was to be sustained — volume increment, value increment, market demand, or whatever the argument required?

Perhaps the foremost difficulty lay in reconciling the economics of the two forest types. Discounted Cash Flow (DCF) Analysis had clearly been enthroned as the sovereign technique for silvicultural profitability analysis by the time of a special Economics issue of the *N.Z. Journal of Forestry Science* in 1972. In the final paper included in that issue Dr Fenton concluded (not surprisingly) that the interest rate was the most sensitive variable (Fenton, 1972). Amazingly, no one took up the cudgels at that time, although debate on the "appropriate" value of the discount

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rate raged fiercely outside these shores, and indeed by the end
of the decade an important article on the economics of forestry
in New Zealand (Grant, 1979) could wholly omit to define the
term "profitability", since its meaning would be universally in-
terpreted as DCF-derived profitability.

The appearance of an article on kauri forestry (Barton and
Horgan, 1980) in the same issue as your editorial is most op-
portune, since, like your editorial, the startling feature is not the
patent truth of the theses debated, but the remarkable lateness
of their appearance. Although one would have supposed most
foresters to have been entirely familiar with the manner in which
an arbitrary rise in the discount rate can seriously prejudice
long-term projects such as forestry, education, research, and cer-
tain vulnerable public works such as soil and water conservation
projects *vis-a-vis* shorter-term activities, yet the authors present
quite elementary explanations of this vital feature and proceed to
raise the dusty decade-old debate on the question of the "approp-
riate" discount rate. No doubt but right is on their side, but to
what avail are more papers on "social time preference" ignoring
sociologically verifiable observations at variance with the theory,
or further probing of "social opportunity cost" whilst ignoring
practical policy constraints which partially extinguish the "oppor-
tunities" — *e.g.* Indigenous Forestry Policy?

Kauri silviculture is an *intermediate* example between indi-
genous and exotic forestry because it has the long-rotation charac-
teristic of the former and the "tabula rasa" (bare-ground) as-
sumption of the latter. Foresters' profitability analyses inevitably
commence from the outset of the rotation — *i.e.*, the bare ground,
or cut-over — and assume the discount rate remains constant,
year by year, until the end of the rotation. The mutability of the
discount rate is well-known (Nash, 1973), and an investor hold-
ing a bond yielding 7% which matures in 5 years' time knows
that if a comparable instrument appears yielding 10% then the
market value of his own bond falls below its face value; by con-
trast a forester who originally assessed the worth of his radiata
pine plantation, now 20 years old, using a 7% rate, need not
fear the wealth built up in his trees will be similarly dissipated
if his masters raise the discount rate to 10% at that juncture!

The "tabula rasa" assumption it is which prevents orthodoxy
from applying DCF analysis to old-style indigenous logging,
since, for as long as felling revenues exceed logging costs, virgin
forest exploitation yields an infinite internal rate of return. The

superficial absurdity of this conclusion disguises its excellent explanation of why nations, despite the warnings of resource managers, persist in logging their heritage to the bitter end before venturing into expensive plantation forestry. When the algebra is over, forestry is profitable when there are trees to fell (a necessary but not sufficient condition) and conversely unprofitable when there are none (a sufficient but unnecessary condition!).

If I.R.R. has no real meaning for virgin forest exploitation, it may still be possible to use DCF analysis to determine the present value of the forest given that there exists a real choice between complete logging *now* (extinguishing the possibility of further harvests within, say, 80 years) and managing the forest, by whatever silvicultural means, to yield its own increment in perpetuity.

Let the yield from total logging be D and the "sustained" yield be S, and the two will be related by the increment z:

$$S = zD$$

Where unit values are constant, the capitalised present value of the stream of future yields S_1 .... $S\infty$ (taken, *ex hypothesi*, in perpetuity) will simply be:

S/d, where d is the discount rate.

This is the opportunity cost of the complete logging choice, and equal to:

$$zD/d$$

Thus, only when $z = d$ will it be equally profitable to decide upon sustained yield, and given that typical indigenous forest increments are likely to be low, and contemporary discount rates high, this confluence is most improbable.

It seems that the management of virgin forest may not be amenable to DCF analysis, but a unified forest system *must* have a unified method of economic appraisal. Moreover, it is in vain that lower discount rates are sought in an inflationary age. The manner in which lenders seek to compensate themselves for the inflation-geared depreciation of their principal by raising their interest rates has been well outlined in a series of Reserve Bank articles (White, 1979 *et seq.*). The discount rate is a not-quite-perfect mirror image of the "market" interest rate, insofar as social time preference is commonly agreed to display less impatience than its private analogue. Thus the discount rate for public project appraisal has, over the past two decades, trod like a modest oriental spouse a few digits behind the private interest rate. The difference may be called the "altruistic gap".

Recently a measure of disillusionment with DCF analysis has become apparent in the general business world. Heukensfeldt-Jansen (1977), working with examples from chemical engineering, has demonstrated that DCF-determined profitability for year N of a project is quite consistent with bankruptcy in year $N/2$, and the technique compels the analyst to make unlikely assumptions on the fate of working capital; in effect, it artificially isolates projects from the enterprise as a whole. Clearly, the unified economic theory for the unified forest must differ rather radically from its predecessors.

One final feature of a situation largely engineered outside the forestry profession requires illumination, namely, artificial division of the forest leads to another division among lobbies attacking the supposed positions of forestry institutions — *i.e.* an "environmentalist" pose in the indigenous element, and a land use/energy/foreign capital stance in the exotic. Clichés from these lobbies are powerful enough to serve as unconscious axioms, and a curious example occurs in an earlier article in your journal on *optimal pricing policy* (for podocarps) (Bertram and O'Brien, 1979), in which the authors assume (p. 265) that, with selection logging, the social value of the forest automatically *falls*. An imaginary parallel situation in which a pair of German authors were examining some polycyclic system for a natural forest in (say) the *Allgemeine Forst-und Jagdzeitung* would doubtless consider that selective logging would *raise* the social value of the forest. (One is reminded of the waggish definition of a "school of thought" as "a collection of thinkers with the same *a priori* prejudices"!) The writer's early years in forestry were largely spent in production thinning of long-neglected stands, and he can recall only one instance in which the forests were not greatly improved in all respects — commercial, environmental, and social — by the foresters' harvesting operations. The unproven premise of conventional wisdom that man at work in nature is always an incorrigible vandal is neither fitting as an economic axiom nor as a social ideal.

A national forest system demands a more "outward-looking" and less jingoistic assertion of any "uniqueness" we may suppose we perceive in our forests; it requires a means of economic appraisal freed from spurious manipulation of discount rates for latent motives; and it needs a more energetic *apologia* from its hitherto diffident stewards.

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