CONCLUDING COMMENTS

Canopy leaves: *E. delegatensis*, Bago State Forest, southern NSW. Photo: Heather Keith.

In considering the role of natural forests in the climate change problem, we must avoid the temptation to take a reductionist approach in which all we see is a measure of carbon with a fungible, market value. Much of what distinguishes natural forests from industrialized forests cannot be measured let alone assigned a market value. We are just beginning to understand the powerful ways in which micro-evolutionary processes enable local adaptations in very dynamic ways and over what were previously considered to be ecological time scales (Bradshaw and Holzapfel 2006). Molecular analyses are also revealing the extraordinary complexity, persistence and geographic patterning of coevolutionary relationships between populations and across communities (Thompson 2005). Indeed, it is these elusive biological, ecological and evolutionary attributes that underpin the qualities that make green carbon in natural forests a more reliable and resilient stock compared with the brown carbon of industrialized forests. Green carbon is not analogous to the grey carbon of coal; it emerges from and is part of complex, adaptive ecosystems.

Carbon accounting models must be calibrated specifically with appropriate ecological field data before they can generate reliable estimates for natural forests. Default Intergovernmental Panel on Climate Change (IPCC) values and accounting tools developed for industrialized forests will not generate reliable estimates for natural forests. Green carbon accounting for natural forests is needed, based on reliable estimates of: 1) the carbon carrying capacity; 2) current carbon stocks; and 3) the carbon sequestration potential. With these data, it is possible to evaluate the carbon uptake from, or emission to, the atmosphere from changing land-use activities and land cover. Our approach to green carbon accounting enables these essential calculations to be undertaken. It addresses the IPCC's call for the need for forest-based mitigation analyses that account for natural variability, use primary data and provide reliable baseline carbon accounts.

Forest degradation should be defined from a climate change perspective to include any human land-use activity that reduces the carbon stocks of a forested landscape relative to its carbon carrying capacity. The climate change imperative demands that we take a fresh look at our forest estate. The carbon impacts of all land uses, including commercial logging, must be brought explicitly into our calculations in terms of their direct and indirect effects on forest degradation.

The remaining intact natural forests constitute a significant standing stock of carbon that should be protected from carbon-emitting land-use activities. There is substantial potential for carbon sequestration in forest areas that have been logged commercially, if allowed to regrow undisturbed by further intensive human land-use activities.

As the world community begins the difficult and complex task of negotiating the terms for the post-2012 commitment period under

the United Nations Framework Convention on Climate Change (UNFCCC), various mechanisms are being proposed to provide the incentives and investments necessary for forest protection, particularly in developing countries. The international regulatory framework being developed to help reduce emissions from deforestation and degradation needs to be based on a scientific understanding of natural forests and the ecological differences between natural forests and industrialized forests, especially monoculture plantations. Protecting existing natural forests from deforestation is important because it prevents the increase in atmospheric carbon dioxide levels that will necessarily result. The imperative to protect what is left of the world's natural forests (in addition to their intrinsic and other non-market values) comes from recognising their role in the global carbon cycle and the need to keep intact an essential component of Earth's life-support systems. The green carbon stored in natural forests is a significant component of the global carbon cycle, and about 18 per cent of annual greenhouse gas emissions come from deforestation.

More reliable estimates of baseline green carbon will enable the contribution of natural forests to the global carbon cycle to be valued properly. Our analyses show that in Australia and probably globally, the carbon carrying capacity of natural forests is underestimated and therefore misrepresented in economic valuations and in policy options. Scientifically, it is important to reduce emissions from deforestation and forest degradation in all forest biomes—boreal, tropical and temperate—and in economically developed as well as developing countries. Green carbon accounting and forest protection of all natural forests in all nations must become part of a comprehensive approach to the climate change problem.

E. regnans in Styx valley, Tasmania (1300 t C ha^{-1} of biomass carbon). Photo: Geoff Law.