

governments and majority voting can lead to serious economic failures. So it is really no solution to place one's trust in either.

Heinz Arndt is Australia's greatest development economist who has done more than any other in this country to advance development studies. It is pleasing to see wisdom and analysis combined in a single volume by a founder and constructive critic of development economics. The collection strengthens the European academic cultural tradition from which so many Australians have drawn inspiration and helps to integrate present economic thought with the past.

### References

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*Clem Tisdell is Professor of Economics at the University of Queensland.*

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## Respecting all Heritages

*Neil Barr and John Cary, Greening a Brown Land: The Australian Search for Sustainable Land Use, Macmillan Australia, Melbourne, 1992.*

*Reviewed by Nick Uren.*

*Greening a Brown Land* provides a carefully woven account of the science and socio-economic factors that have influenced the shape of agriculture as we know it today. It provides a better understanding and more realistic view of what has gone on and why than the picture painted by urban environmentalists: 'Environmental religious fervour . . . is no substitute for facts' (p.286). As well, the book provides a sense of history, which is so often missing among those who are so keen to attack farmers and the results of their labours. Barr and Cary have used plates and historical accounts successfully to illustrate the appearance of land in 1788 when 'The inexperienced would be directing the unwilling to farm the unknown' (p.118). The photographs are generally apt, but the quality of some is poor: for example, the lupins cannot be seen in the one on page 140.

The main theme is the struggle of farmers to make the land productive, and thereby green, and to overcome the dry and infertile soils that characterise it. The

role of scientists in this process is duly acknowledged. Mistakes have been made by both farmers and scientists, some more serious than others, but they have all contributed to the process of adaptation. 'There are many cases where the land use that at one time was unsustainable has subsequently become more sustainable because of the advances in science and technology' (p.283). Serious damage has been caused also by political activists; irrigation appears to have attracted a number of fanatics whose zeal was apparently similar to that of the modern greens.

The book's three parts are about, respectively, grazing, cropping, and irrigation. Although the authors do not define sustainability, the reader derives a feeling for the idea and for the socio-economic and physical factors that influence it.

A good job is done in emphasising that the primary cause of salinisation of irrigated land is the failure to provide adequate drainage. Some, but not all, politicians and engineers were happy to build the dams and the supply channels, but the costly provision of proper drainage was conveniently overlooked. Arguably, had adequate drainage been provided in the first place, then the provision of adequate disposal of the saline drainage water would not be the problem it is today. The authors, and many others like them, need to be more careful when discussing salt in solution because there are quantitative descriptors other than total concentration (usually measured indirectly by electrical conductivity). One of these is the sodium absorption ratio, a measure of the sodium hazard, which has been ignored by all except soil scientists; it is used for gauging the potential damage that saline irrigation water might cause to soil structure and hydraulic properties. The use of 'ES units' (Fig.11.1, p. 225) is to be deplored, since there are many units of electrical conductivity units, some of which differ by up to six orders of magnitude.

The authors claim that 'Much . . . early pastoralism was exploitative' (p.279). Were there any options? In a similar vein, the squatters 'indulged their genteel aspirations by building houses, even mansions' (p.279). Would this be a sensible thing to do for people whose primary purpose is to exploit and leave? Again, 'fruit trees were an essential part of the migrants' re-creation of England in the new land' and were grown 'not for profit, but for luxury' (p.180). What else were they to do? Governor Philip was aware of the need for fruit to prevent scurvy – hardly a luxury.

Likewise, the authors seem keen to perpetuate the nonsense that the imposition of European-style agricultural practices has degraded the land. In seeking an intelligent remark on this, one might ask, 'Where does subterranean clover come from?' Or, 'Who invented superphosphate?' Or, 'Which civilisations were the first to cultivate soil or to irrigate land?' One might also ask why it is so important to blame one's heritage for one's mistakes; it is a waste of time, achieves nothing and avoids the issue. And why doesn't the heritage of Europeans, for example, deserve the same respect as that given to the heritage of the aborigines?

The authors convincingly show that the aborigines were effective in deforestation by their frequent use of fire. But one might argue that some of the plains were treeless for other reasons (e.g. subsoil salinity) than frequent burning by aborigines. One cannot believe that the influence of the aborigines was always benign. The claim that the aborigines created a new and more productive landscape than the one

they found is debatable. Fires lead to losses of nutrients in smoke and possibly in the erosion of ash. Such losses for each event are small but over 60,000 years they are likely to be considerable and significant, particularly for soils that are already poorly endowed with nutrients. Further, the aborigines' practice of burning was carried out to encourage the growth of grasses, but it led to deforestation — exactly the crime of which the early settlers have been accused.

The authors are correct in saying that nutrient exhaustion was a major cause of yield decline in the early years of cropping. But to imply that the extent of nutrient removal was quantitatively large is probably incorrect. It is wrong to imply that our subsoils have ever been well-endowed with phosphate (p.30) and that phosphate is mobile (p.46).

The oft-quoted Robertson, who had settled an area generally free of trees, reported in 1853 signs of salinity that suggest that the removal of trees was not the cause and that the over-grazing of the land with sheep simply exposed areas of saline discharge that had always been there. The authors tell us (p.17) that Robertson had between 8000 and 10,000 sheep on 11,810 acres, i.e. a stocking rate of a little under one sheep per acre, which was high enough at the time to cause over-grazing. Today, stocking rates in the region are about four times that figure and are believed by some to represent under-stocking. The increase in carrying capacity has been achieved by the use of superphosphate and introduced pasture species. This increase in production will be accompanied by greater water use; and providing the salts are not removed in produce, then the discharges may have become more saline over time. The message is clear: the discharge areas must be protected from livestock at times when they are most prone to damage, i.e. when they are saturated.

I believe that the authors are unduly pessimistic about soil acidification. They weaken their case with such nonsensical statements as 'continuing acidification destroys soil structure' and 'continued nitrate leaching leads to a crystalline transformation of the soil structure' (p.141). Further, their comment that 'Even more serious is the poor growth of ley pasture in acid soils' suggests that there is poor growth on *all* acidic soils: which is incorrect. In the 1912 publication on lime referred to by the authors, the Victorian Department of Agriculture said that any soils that were acidic (as determined with litmus paper!) needed to be limed. Farmers were reluctant to apply it. History has vindicated their reticence, since there was little point in adding lime in the presence of deficiencies of phosphorus, nitrogen, sulphur and in some cases molybdenum. With the introduction of acid-tolerant species and cultivars and with the correction of deficiencies, particularly molybdenum, it has been possible to farm successfully all but the most strongly acidic soils. Many farmers are still reluctant to apply lime; could they prove to be justified yet again?

Barr and Carey have stripped away much of the rhetoric associated with the current debate on the influence of agriculture on the environment. They have added some much-needed perspective and, one hopes, have cleared the way for more objective discussion of greening a brown land than has hitherto been possible.

*Nick Uren is Reader in Soil Science at La Trobe University.*