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**Agenda for the 21st Century:
What does the future hold for agricultural and resource
economists?**

**Agricultural and resource economists – contributors to improving
the triple bottom line**

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Agribusiness is shifting from ‘produce, then sell’ to meeting consumers’ identified needs. New technologies – including precision agriculture, integrated information systems, and molecular biology - will feature prominently in delivering customised products. The focus on value creation and distribution, tangible and intangible, and away from commodities cements the end of statutory marketing mindsets, towards networks, alliances and different corporate interests, including health, leisure and customer services. The goal of sustainable resource management is an imperative; the challenge is achieving it. Economists will be important contributors to innovation processes through policy analysis, managing adjustment, building capacity, and positioning business in a dynamic environment.

1. The last 25 years – where we have come from

Economists who trained to work in agriculture and resource management in the 1960s, 70s, and 80s trained with the backdrop of an anticipated explosion of world population and an expectation that the key problem of the future would be expanding the capacity for production to avoid recurring cycles of mass starvation. The Club of Rome's *Limits to Growth* (Meadows et al 1972) and Paul Erlich's *The Population Bomb* (1971) influenced both popular and professional interests, with a resulting focus in agricultural economics policy studies on the North-South dialogue and the ways in which an acute shortage of food in the developing world could be addressed. In an atmosphere of crisis, the emphasis was on anticipating demand and finetuning the means of supply of agricultural products, to optimise use of inputs and maximise food production.

Farmers' mindsets, at least in Australia, were focused on production. In many cases responsibility for marketing was passed to a statutory authority as the product left the farm gate, as was any sense of control over the returns that would be received. Not surprisingly, despite repeated warnings that farming had to change from a lifestyle or a set of activities to a business, many farmers continued to focus primarily on their field activities – and maximising responses to water, fertiliser or new varieties or animal breeding lines. The information provided by field based agricultural economists to farmers was also production oriented; gross margins and partial budgets allowed comparisons between input mixes and enterprises but sometimes failed to address questions like whether the business overall was profitable, how the production pattern would affect tax liabilities and the ability to pay tax, or whether the optimum mix for the family income was to work in a seasonal job for half a year and only farm for the other half.

Agricultural economists studied the fortunes of industries as a whole, and were the principal sources of information on market expectations and commentary on the performance of the statutory marketing authorities. The introduction of farm financial counsellors in the 1980s to address the social implications of rural adjustment was seen at the time by some agricultural economists as an unlikely mix of economics, financial analysis and social work. The adjustment problems facing farmers were viewed principally in their industry or climatic context rather than in the context of changing rural communities and regional sustainability.

The off farm effects of farming activities were certainly not high in farmers' decision making framework, and were a relatively small part of the role of professional economists associated with agriculture. In the 1970s, soil conservation was the focus of natural resource management. Problems with water were always about not having enough water; the solution lay in the construction of more dams, or for the more ambitious, in major projects to divert water across Australia or to desalinise water from the oceans. In relation to willingness to invest in soil conservation works, the experience of those working with farmers was that investment only occurred in good seasons, and by those with larger enterprises. In essence, soil conservation was a luxury good that could be purchased when surpluses were available. If banks and financiers were aware of soil conservation at all, it was likely that their advice in that era would have been to minimise spending because returns were both long term and uncertain.

So to sum up, the agenda of agricultural and resource economists included the market prospects of commodities and the annual outcomes of individual enterprises, the economic well being or adjustment issues facing industries, and the economics of specific resource management interventions.

2. The nature of change

Clearly significant changes have occurred in the last 25 years, but not necessarily the changes which were predicted. While accessing adequate food was a daily issue for 790 million of the world's population in 1995/97 and will be a continuing issue as world population grows, the crises on the scale predicted have not occurred. In fact 790 million represents a decline of 40 million compared with 1990/92 (Food and Agriculture Organisation, 1999).

Assuming a future agenda based on extrapolation of today's understanding runs a similar risk of inaccuracy. However, social and government acceptance of the need to measure progress against the triple bottom line – economic, social and environmental outcomes into the future – provide the first level of definition of the future agenda. This paper concentrates on some opportunities emerging from today's reality, where the scale of impacts and the likely immediacy of their effects are high (Aaker, 1995) and where agricultural and resource economists can contribute through insights and advice derived from scholarly economic analysis.

3. New boundaries for economic activity

Moving away from commodity and statutory marketing mindsets

One long-term trend about which there can be no debate is the tendency for the price of commodities to be driven down over time, resulting in producers of commodities facing an increasing cost price squeeze and eventually, social distress. As noted above, the historical response of farmers was to produce more volume, preferably more cheaply. A treadmill of continually improving efficiency continues to be one option for survival. Increasingly, another response to the declining value of undifferentiated commodity products in developed countries is for farmers and agribusinesses to add value to their products by differentiation (a treadmill of innovation). This may include creating a unique product by changing the colour, taste, shape, food value or keeping quality of the product, or changing the services associated with the product – including when, in what quantities, and what form a product is supplied. Systems supporting innovation (including R&D providers and funders) through industry levies have traditionally focused on generic issues affecting all producers of a relatively uniform commodity. Future systems may need to support sources of differentiation inherently more proscribed commercial benefits.

Increasing specification and industrialisation

The capacity to produce to specification will be greatly enabled by new technologies. Kaku (1997) identifies three great science based revolutions - the quantum, computer and biomolecular revolutions, which he argues will underpin economies of the next 25 years. In agribusiness, technical developments – from the application of electronic and communication technologies to molecular biology technologies to precision agriculture and bioengineering – are already enhancing the capacity to produce to specification and offer reliable value propositions to consumers, with scope for further exploitation of new technologies. For the buyer the value of a product delivered against specification lies in a reduction of transaction costs and reduced costs of handling product which is outside specification; the producer also gains from reduced transaction costs related to marketing, and from the knowledge of a certain market and basis for price.

The commercial value of these technical developments suggests that economists might usefully develop an increasing interest in the production, value, and management of intellectual property. Industries will be networked around flows of information or intellectual property or controlled by the requirement for access to a technology (for example, a source of

uniform genetic material), rather than formed through common production of a commodity product. Again this suggests that many ongoing industry or commodity questions addressed by agricultural economists – around the value of production, trends in markets and trade – may require analysis of systems with new commercial boundaries.

Changes in market demand

Western consumers show a continuing trend to demanding food combined with services, in the form of convenience meals and food items for household and restaurant meal assembly (Hughes, 1994; Creed, 2001), albeit with high health and naturalness qualities! The growth in domestic demand for these products, combined with rapidly increasing demand for convenience meals resulting from the rising spending power of the middle class in many Asian countries, suggests the proportion of products which will be supplied to specification and perhaps value added by at least first level processing, will grow. A recently released study (Foreign Affairs and Trade, 2001) documents the rapid expansion of multi-national corporations in agribusiness in Asia, using the opportunity afforded by the Asian crisis when the asset valuations and currencies of Asian countries were low. Within this expansion is a significant entry by major retail corporations, incorporating their Asian operations into agribusiness systems that source products globally.

Major impacts on the demand for agricultural products can be expected as they are required to be purpose built as food ingredients for industrial scale food preparation. The significance of Australia's first commercially traded cloned calves (J Walker, 2002) is the relative ease of designing a machine to produce identical steaks from identical beasts instead of the complexity and waste of creating identical steaks from a wide diversity of beasts.

Significant changes in product demand are also expected in Asia, where real growth in demand for food product will occur. Even in parts of Asia previously facing problems of food security, increasing production of rice and other staples is shifting the focus of the rural production from food for sustenance to generating income to acquire the next staples – education and health care. With the value of rice dropping, it makes sense for a Vietnamese farmer to add value by converting excess rice to pork, or replacing paddy with vegetable production. Using an index of the net production quantities of each commodity weighted by

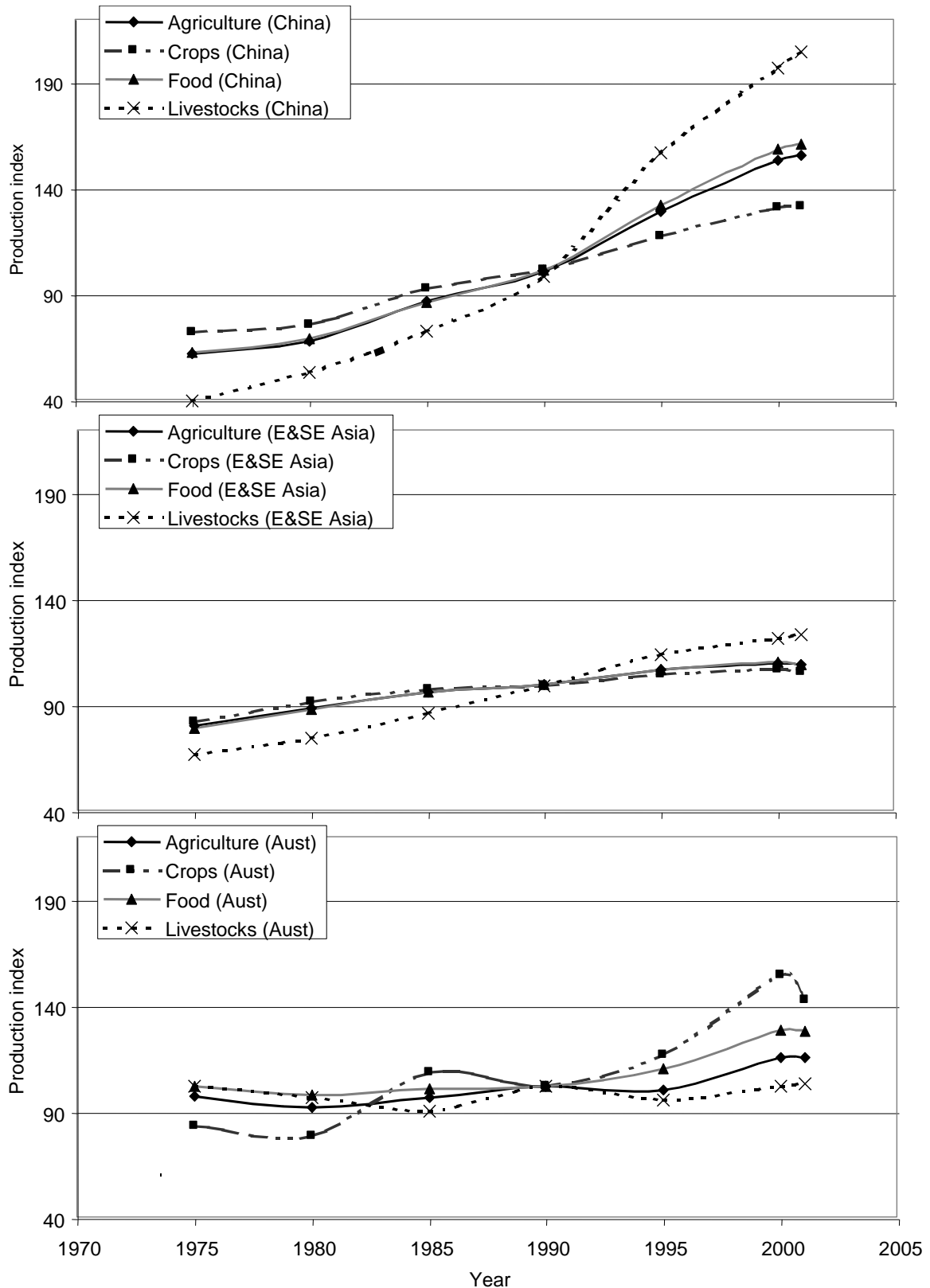


Figure 1 Changing production emphases 1970-2000: comparison of China, East and South East Asia, and Australia.

Extracted from FAOSTAT (2001a)

1989-91 average international commodity prices, summed for each year and divided by the average aggregate for the base period 1989-91 (FAOSTAT, 2001), Figure 1 illustrates the scale on which the shift towards livestock production is occurring in China and East and South East Asia, compared with Australia, a net exporter. Monitoring these major swings and identifying how the rate of change in both production and market demand will affect prospects for Australian businesses will be an important role of economists into the future.

Evaluating new risks and developing strategies for their management

Existing experience from the intensive production of chickens and pigs suggests that creating homogeneous animals to specification has the potential to greatly increase the risks of catastrophic disease outbreaks (with potential to affect both domestic and native animal populations), as well as concentrating the impacts of animal waste products. Perhaps another role of agricultural economists into the future will be evaluating the tradeoffs in production of such conveniently identical plants and animals, the externalities which may result, and the extent to which governments might choose to regulate or would be able to regulate significant concentration or prevent reduction in genetic diversity in major industries. Of course, concentration of animal production could also be advantageous if the wastes can be efficiently utilised –to generate energy, to manage and minimise their detrimental greenhouse gas contribution, to recycle wastes as a substrate for further industrial use, or simply for soil amelioration.

New models of attaining production scale

Meeting market demand for industrialised product competitively requires scale. (The aim of reducing transaction costs will inevitably result in buyers preferring larger suppliers and the number of points of supply being reduced.) Already in the Australian banana industry, 20% of growers supply all the bananas sold through the major food retailers in Australia; the remaining 80% of growers compete for the 20% of bananas sold through local shops, markets, and other independent outlets (Loydell, 2001).

Monitoring business innovations and identifying ways in which large quantities of suitable product can be amassed, quality controlled, and sold represent new models of business organisation of which economists will need to take account, and to which economists can contribute. There are interesting related policy issues. Should those who end up outside the major networks of supply (those who suffer adverse effects of adjustment) be assisted and if

so, how? Should government agencies facilitate the processes to achieve scale, and if so how? Would such facilitation constitute unfair government support for Australian exports? What is the fit between the horizontal co-ordination required to attain scale and existing application of the concepts of collusion and restrictive trade practices? What will be the role of industry organisations as the lines of business move away from production industry towards business networks? What will be the benefits and costs to Australia if trade liberalisation and further international business integration see most of these activities being controlled by multinational corporations based outside Australia?

In summary, industrialisation and standardisation of agricultural products will provide significant opportunity for economists to analyse the tradeoffs, ownership, control and power in markets, and to contribute to building capacity and developing policies which provide the conditions for Australian agribusinesses to be competitive players in the major supply chains of the 21st century.

Realising impacts from use of computers and the internet

Farmers' level of education has increased, and farm financial counsellors and training in farm business management have increased the support for farmers making decisions about the financial strength of their overall business. Access to data processing capacity (which is essential to improve internal business management) can be expected to continue to expand rapidly in the next decade. The 1999-2000 Agricultural Commodity Survey found that at June 2000, 58% of Australian farms with an estimated value of agricultural operations of \$5000 or more used a computer (up 17% since March 1999), and access to the internet grew over the same period from 18% to an estimated 34% of farmers at June 2000 (ABS, 2001). (By comparison, across all small businesses (excluding agricultural businesses) with fewer than 5 employees, computer usage grew from 55% at the end of June 1998 to 69% at the end of June 2000 and internet access grew over the same period from 24% to 50%.) Assisting farmers through training and computing tools to analyse key decisions at farm level and streamlining access to information about external conditions facing agribusinesses should figure on the agenda of economists working at the farm or business chain scale for some years.

The rise of e-commerce

Using a business classification called *internet commerce active* to reflect the sale or purchase of goods or services over the internet, only 6% of Australian businesses were classified as

internet commerce active at the end of June 2000 (ABS, 2000). Gloy and Akridge (2000) quote 68% of farms with annual sales over \$US100 000 having computer access and 43% with internet access (from the 1999 National Agricultural Statistics Service). From their own survey of US agribusinesses selected from this population, they found around 7% of respondents using online sales or purchasing. In both the Australian and the US surveys, larger businesses were moving more quickly to e-commerce and so were more intensive businesses.

The precise implications of a move to e-commerce by farmers and agribusinesses on the agenda of agricultural and resource economists are not clear, but it is reasonable to guess that one effect will again be on the boundaries of activity and therefore analysis. By comparison with past practice where sales were channelled through central mechanisms, there are opportunities for fragmentation through direct sales, both domestic and export. There are opportunities to gain efficiencies through integration between businesses in the chain (as favoured by greater product specification) with sharing of inventory systems, quality systems, and product integrity systems. Integrated systems will require analysis. The ability to collect business and /or industry data will be complicated on the one hand by commercial confidences within established business relationships and on the other hand, by the flexibility available to Australian agribusinesses choosing to deal direct with customers. Policy development will have to account for a situation with less clarity in the jurisdiction of national governments, and rapid, ongoing innovation in products and services.

New product mixes

E-commerce and the capacity to produce to specification will enable the development of networks, alliances and new corporate interests, combining primary products with health (for example, functional foods), leisure (recreational industries such as the horse industries) and customised services (the delivery to a food service company of products with guaranteed cooking qualities and customised flavours through the addition of herbs and condiments). Once again, the effect on economist's agenda will be to blur the boundaries. Perhaps there will no longer be a logic for many agricultural economists, but instead for more people like food industry economists and leisure industry economists.

4. The social bottom line

From agricultural adjustment to rural development

Assuming that future governments will not provide support to keep current numbers of farmers in their existing businesses, it is clear that issues of adjustment will continue to face farming people (as they do people throughout the Australian community). In areas of closer population opportunities exist for adjustment through off farm employment while retaining a farming operation. Australian farm families are already well integrated into the broader economy; during the second half of the 1990s, off farm (non-agricultural) income in the commercial broadacre farm sector comprised just under 28 percent of farm cash household income (three times greater than in the early 1980s) (Gleeson et al 2002). The proportion of off farm income was inversely proportional to the size of the farm income. Adjustment strategies such as this lessen the risk of social disruption through rapid depopulation and decline of rural communities, but the question remains of the effect of further adjustment on the viability of rural communities and landscapes as the concentration of agribusiness transactions and firms continues.

I believe that adjustment policy and infrastructure planning need further integration, between the historical central focus on agricultural industries, the future of rural communities and effects on wider Australian society (as proposed by Sher and Sher, 1994). Such a shift would recognise that a reducing proportion of regional economies is based on agriculture and that future returns from agriculture will not provide the means for the fulfilment of the aspirations of a significant number of farm people. The argument for a focus on rural development and rural communities rather than sectoral or resource based policy is not new (see, for example, Wright, 1983) and has been taken up in rural policy initiatives in Europe. The resulting changes could include farmer training programs, such as Farmbis, encouraging development of skills oriented to earning off farm income, while assessments of the effects of adverse conditions affecting agriculture (known in Australia as ‘exceptional circumstances’) would overtly take into account non-farm sources of income when evaluating the need for special support measures for farm families.

Re-conceptualising institutions

It follows that the assumptions which underpin institutional arrangements will need to be reviewed. Shaffer (1994) proposes that *sustainable community economic development is less of a natural/physical/ biological phenomenon and more of an institutional phenomenon*

(p270). He argues that developing policies, behaviours and institutions which are necessary to achieve sustainable development in practice, requires reconsideration of assumptions relating to growth, the extent to which the market or the state involves itself in development, and how the needs of marginalised groups are accommodated.

To demonstrate how emerging problems and their solutions may require capacities to be linked in new ways, broad scale agro-forestry and retaining remnant vegetation represent practical ways in which to better manage rising water tables and their salt burden, as well as protecting biodiversity values. However, the formation of business and legislative frameworks to make growing trees financially viable has been relatively slow. Existing institutions reflect entrenched assumptions: farm values are based on crops and pastures rather than trees; timber comes from large plantations or native forests rather than farm plots; protecting native vegetation may not qualify for rates concessions designed to support sustainable management; future tree harvests may be restricted by public resistance. New institutions – for example to oversight ecosystem services – are slow to develop.

Impacts of globalisation

Australia is a highly urbanised country, but in recent years, the political consequences of people in rural communities feeling powerless and unable to influence changes affecting their livelihoods have been profound. We have seen a lasting change in the policy positions taken by both sides of politics on a range of issues.

The impact of globalisation will impose much greater forces of adjustment in our major trading partners of south-east and east Asia, where population growth will be higher and where the proportion of people living in rural areas and working in agriculture remains high. FAO projections (Figure 2) show the urban population of China, East Asia and South East Asia growing rapidly to equal rural population soon after 2020. If these projections are realised, the scale of urban expansion required and the transfer of people and skills from rural areas will be enormous. The accompanying social pressures, and the need for new institutional models, as well as the practical issues of providing food and water will offer challenging opportunities for economists to contribute.

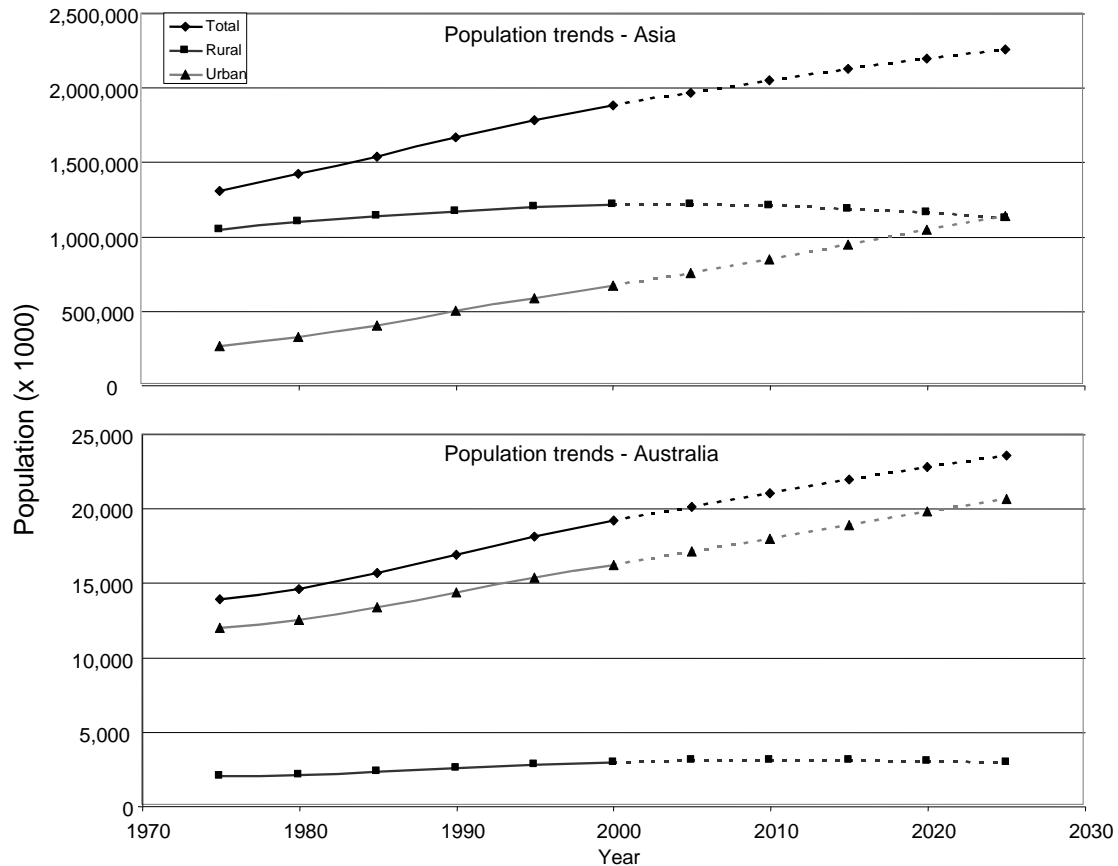


Figure 2 Population growth and distribution: comparison of north and east Asia (China, East and South East Asia), and Australia. Figures shown are estimates of actual population to 2000, and projected population 2000-2030.

Extracted from FAOSTAT (2001b)

5. The environmental bottom line

If the environmental issues on the agenda at the beginning of the 21st century are viewed in the context of human development (rather than in relation to physical or biological resources), it would be no coincidence that awareness of the environment and of ecological sustainability have risen at the same time as issues of resource use conflict and growing evidence of resource degradation. In a policy sense environmental awareness is fundamentally related to our need to use resources to survive, but the future agenda needs to recognise that the issues and the interest arise not from a *people-thing* interaction (people using the environment) but from a *people-people* interaction (people negotiating or competing over resource use) (Röling, 1996). The role of economic and scientific experts is not just to understand the environment and the functioning of natural systems; work on these issues must inform and add to the processes of negotiation between people about their use of and relationship to the

environment. Once again a key issue will be the changing boundaries of the systems and problems that we study. For example, waste streams from agribusiness (a potential cause of environmental degradation) will increasingly be cleaned to deliver additional useful products (often specialised food ingredients with specific biological or manufacturing properties) and to recycle energy and water resources for future use.

While environmental issues will clearly vary from place to place, water is likely to dominate the agenda, not least because of population growth and its concentration in urban centres as identified above. Within research and development institutions several trends may adversely affect reaching integration between different areas of intellectual skills and different perceptions of priority in environmental outcomes. Short funding cycles do not fit problems of resource management which will be inherently slow and difficult to address. The use of commercial models within institutional structures can result in a focus on intellectual property where it will not be helpful in achieving real outcomes, while distracting from developing more effective approaches to achieving non-commercial public good outcomes. Finally in seeking to manage risk, R&D decision makers must avoid rewarding proposals which are conservative and reflect definitions of systems which were useful in the past, at the expense of those which are anticipatory and creative.

6. In conclusion

This paper has aimed to raise opportunities for economists to contribute to issues emerging at the beginning of the 21st century. It has emphasised that the boundaries of analysis will change, and that professional labels may be recast as institutions evolve to deal with new issues, or are replaced by new groupings of skills and interests. Economists will play a key role in building capacity to analyse and implement new systems which deliver progress against the triple bottom line.

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