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The Role of the Economist on Resource and Environmental Inquiries

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A number of public inquiries into the management of natural resources and the environment have been conducted in Australia in recent years. Typically, these have involved multidisciplinary teams including economists. An economist on a public inquiry may be required to perform tasks quite different to those on say an externally funded research project, and may face a number of unfamiliar difficulties. This paper reflects on the role of the economist on resource and environmental inquiries, based on experience from Queensland's Fraser Island inquiry.

I Introduction

In recent years, Australia has seen a substantial number of public inquiries into the management of natural resources, e.g. Wesley Vale paper mill (CREA, 1988), wet tropics rainforests, Resource Assessment Commission Coronation Hill and forestry inquiries, Tully-Millstream hydroelectricity proposal (Tully-Millstream Taskforce, 1991), Fraser Island (Commission of Inquiry, 1991), and ecologically sustainable development (ESD Working Groups, 1991). A number of initiatives are now under way to enable a more proactive approach to environmental planning, as evidenced for example by the current RAC Coastal Zone inquiry, Queensland's SEQ2001 project and work on devising state-of-the-environment indicators (Hamblin, 1992).

Recently, the author served as Economic Adviser on the *Commission of Inquiry into the Conservation, Management and Use of Fraser Island and the Great Sandy Region*, on a 70% time basis. This inquiry had a peak staff of about 40 people, ran for more than a year, and resulted in World Heritage Listing of Fraser Island. Some time has now elapsed for reflection on this challenging experience. It is hoped that the impressions reported here may assist in the wider understanding of inquiry processes and avoidance of pitfalls when serving on or dealing with environmental inquiry teams.

The paper first discusses the characteristics of environmental inquiries¹. The role of the environmental economist is then reviewed in general terms, and economic tasks and techniques on public inquiries are examined. Comments are made about difficulties of serving on multidisciplinary teams and other potential frustrations likely to be experienced. Finally, some brief words of advice are offered to others who may face a similar assignment.

II Characteristics of environmental inquiries

Environmental inquiries provide advice for government to assist in decision making for management planning and control purposes of specific resources or regions, in the public interest. They do this by providing technical and socio-economic information of the consequences of following particular management policies, and recommendations for action. By nature any public inquiry is likely to:

Arise out of resource-use controversy: Public inquiries are expensive and attract criticism of waste of public money

and assertions that the government was elected to make decisions and should get on the job. They are usually initiated because there has been controversy about management of the particular resources, perhaps with decisions delayed and uncertainty created. Pre-election promises may be involved, with trade unions and industry groups locked into particular stands (perhaps both pro-development) and conservation groups active in attracting media interest.

Have a variety of motives: There may be a genuine desire to obtain further information before making irrevocable decisions which will affect the livelihoods of many people and the prosperity of regional economies. Government may create an opportunity for groups or individuals with a vested interest or perceived social responsibility to have their views taken into account. Establishment of public inquiries can also reflect a lack of confidence by a government in making difficult decisions, the desire to delay decisions to a politically more opportune time, or a means of deflecting political backlash from implementation of policies unpopular with a large segment of the electorate.

Report to government: The output of a public inquiry is a report to government, typically in a fixed time frame and consisting of several volumes of discussion papers and a set of recommendations for action.

Have terms of reference: The terms of reference set out the issues to be investigated, the inquiry area (though defining the area could itself be a term of reference), the form of advice (policy options or recommendations for legislation), the final date for reporting, and so on. If the

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terms of reference are very broad, this will leave considerable discretion for the inquiry chairman or commissioner².

Utilize a high level of professional expertise:

Typically, a team of experienced professionals is assembled which commands a high degree of technical and socio-economic expertise. The team may conduct substantial in-house research, as well as drawing on government departments administering environmental resources, statistical agencies, universities, research institutes and consultancy firms for briefing papers, submissions and commissioned research.

Focus on wide-ranging community consultation. A wide expression of community views will increase understanding of the political as well as scientific and socio-economic impacts of alternative policies. Many people, including direct stakeholders, local business houses, recreational clubs and school children take the opportunity to express opinions about resource management. Views offered may reflect a high level of technical expertise, such as from retired scientists and senior public servants, or promote narrow interest groups. Information is provided through written submissions and/or public hearings. Direct questioning and written submissions and rebuttals allow clarification of facts and viewpoints.

Proceed through a number of stages: Inquiries usually commence with a data gathering stage and progress through analysis and formulation of recommendations. A series of discussion papers or draft reports may be released for public comment, with public submissions and commissioned research programmed to support inquiry stages.

Vary in degree of openness: Some inquiries are very open to community participation, such as the Resource Assessment Commission (RAC) and Industry Commission (IC) inquiries, with public hearings in capital and provincial cities. The RAC also holds public seminars, publishes newsletters and distributes research papers. On the other hand, the Tully-Millstream and Fraser Island inquiries took a less public profile. In the latter, "evidence" was taken in the form of written submissions, public hearings addressing only procedural issues.

Require impartiality, confidentiality and avoidance of controversy: If recommendations of an inquiry are to be accepted by the public, the process needs to be perceived as fair. Views may be expressed or data provided in confidence. Further controversy presents a no-win situation for government.

Have legal status and characteristics: Environmental inquiries are often chaired by barristers, e.g. Mr Justice Stewart chairs the RAC and Mr. G.E. Fitzgerald chaired the Fraser Island inquiry. The inquiry may have the legal power to demand any tax return or profitability data from firms. Where decisions lead to changes in property rights (e.g. termination of mining leases or timber allocations), compensation claims can be expected, perhaps to be settled by litigation; inquiry findings can then be challenged in court proceedings.

Involve an expert review: Often analysis and formulation of recommendations will be assisted or reviewed by a panel of experts, before presentation to government. These experts

provide a further validation and confer greater authority on recommendations.

III Features affecting the role of the economist

Relative to research in a university or government department, environmental inquiries usually have features which constrain or influence the way in which economic analysis can be performed.

Complex decision problems: An inquiry may address a long list of issues which by nature are complex and not amenable to simple solutions³. Issues can include maintenance of biodiversity (protection of ecosystems, preservation of rare or endangered species), commercial versus recreational activities, and traditional Aboriginal land rights. Long-term sustainability of specific managements (e.g. of logging) may not be well understood scientifically. A number of industries and land uses may be involved in a single inquiry, e.g. forests, mining or energy generation, tourism and recreation. Property rights to resources can usually be at stake, so that any decision will result in some people who gain and others who lose.

Concern about sustainable development. Increased priority has been attached to inter-generational equity following publication of the Brundtland Report (WCED, 1987). A balance is needed between "ecologically sustainable development" (Department of the Prime Minister and Cabinet, 1990) and socio-economic sustainability (e.g. Barbier, 1987). Environmental inquiries run the risk of emphasizing inter-

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generational equity at the expense of intertemporal economic efficiency.

Uncertain research territory. Whereas research projects often follow detailed proposals to funding bodies, public inquiries often present much greater uncertainty as to the nature and direction of the investigation. The stages of the scientific method of inquiry become distorted from the outset, e.g. any data which may have relevance tends to be amassed. There is unlikely to be a cut-and-dried methodology to rely upon, or a single economic technique which will provide satisfactory answers to all the questions which arise.

Limitations on in-house research: A public inquiry is by nature a community consultation process, not a scientific and social research program. High media interest places constraints on the way inquiry staff operate, and tight timelines are unlikely to allow in-depth research.

Multidisciplinary team: The economist needs to work co-operatively in a team which could include ecologists, sociologists, planners and lawyers. Substantial interpersonal interaction is involved, akin to economists working in say agricultural research institutes. Frictions will inevitably arise because of differences in methodologies and perspectives of physical and social scientists, and perhaps because of attempts of particular groups to control the agenda.

High pressure environment: Within the fixed reporting time, and schedule of tasks to be completed at various dates, there may be voluminous material to review, including library documents, official statistics, public submissions and consultancy reports. Invariably, multi-volume reports are

produced, an enormous amount of writing being required to report all issues, views, analysis of policy options, and so on. As deadlines approach, it is probable that substantial overtime will be worked. The government will be loath to extend deadlines, for fear of criticism of cost escalation. Criticisms of the inquiry process by media and submitters, and at times tense interpersonal relationships, may further contribute to the "hothouse" atmosphere. Part-time appointees can also be put under pressure by lack of support or unanticipated time demands of their home institutions.

IV The role of the resource and environmental economist

Some comments about the role of economists in general, and resource and environmental economists (REEs) in particular, are appropriate before examining specific tasks in environmental inquiries. Economists would consider themselves well placed to provide input to a wide-ranging inquiry, in that their discipline is a broad and integrating one. They are accustomed to taking an overall policy view, and recognizing alternative management options and resource and technical constraints. They are frequently faced with modelling of systems over time, and not uncomfortable with making assumptions when hard data are scarce. Applied economics is regarded as "conditional normative", or prescriptive but conditional on resource, husbandry, legal and institutional constraints. Quantitative information provided by economists augments existing knowledge, and provides decision support by confirming or challenging present intuition and tentative plans.

Much has been written about the scope and the limits of economics in public policy (e.g. see Datta, 1976; Schultze, 1982; Hamilton, 1992). Stigler (1982) argues that economists have had surprisingly little influence over policy making. Schultze (1982, p. 62) notes difficulties in intragenerational equity comparisons: "there is no objective way to compare large losses concentrated among a few with small losses dispersed among the many". As Waud et. al. (1982, p. 17) point out, resolving economic policy involves making value judgments, and economists have no special claims to skill in this regard. Many economists hold the view that "most of the economics that is useful for advising on public policy is at about the level of the introductory undergraduate course" (Stein, quoted by Hamilton, 1992, p. 62).

Economists have traditionally taken an anthropocentric orientation, in which policy outcomes are viewed in terms of the benefits and costs to society. Animals and inanimate objects are important only insofar as they are judged as such by mankind. The efficiency goal of an economic system is seen as achievement of the highest level of satisfaction of human desires, subject to the limited availability of resources and equity considerations within and between generations.

What training and background do economists need to be well equipped to serve on environmental inquiries? What branch of economics should they belong to? It could be argued that the environment is one of the natural resources, and environmental economics is one branch of natural resource economics (e.g. see James, 1991). On the other hand, any activity of mankind has an impact on the environment, and the

environment may therefore be said to embrace all resources, natural and manmade and rural and urban. In this context, management of natural resources is simply one facet of management of the environment. A background in both natural science and microeconomics is desirable. While environmental science courses have been available in Australia for some time, natural resource economics and environmental economics are relatively new specializations. Agricultural economists have a close affinity with natural resources and the environmental, and a number of agricultural economists have moved to an environmental specialization.

Environmental economics has been concerned with depletion of non-renewable resources, and in particular fossil fuels. The recent emergence of "ecological economics" (Costanza, 1989) has placed greater emphasis on renewable living resources. This has led to questioning of anthropocentrism, with consideration of rights of non-human things and stewardship responsibilities of mankind. However, methodologies to take these goals into account are not yet well developed.

V Tasks of economists in environmental inquiries

Economists' roles will vary greatly between inquiries, and even within inquiries depending on the position to which they are appointed, e.g. research economist, adviser, expert witness, reviewer. The following are some of the tasks an economist may be called upon to perform, based on the Fraser Island experience.

Compilation of background statistical data: Basic data for an inquiry region would include, for example, official statistics on population, labour force, housing, industries, education and infrastructure.

Identification of library items and background reading: Normally, an inquiry will wish to build up its own library or at least catalogue of submissions, reports on the study region and its resources, research techniques, etc. Substantial time may be required for familiarisation with library items.

Identification of information gaps: A major and early task is to determine what information is readily available, what further information will need to be acquired, and how this may best be obtained.

Advice on techniques of analysis: Appropriate methods of economic analysis (discussed below) need to be identified.

Staff recruitment and co-ordination: The economist may assist in identifying skills needed, targeting potential appointees, wording advertisements, and selection interviews for further inquiry staff, as well as suggest expert reviewers and carry out staff supervision and co-ordination duties.

Writing briefing or discussion papers: Normally, briefing papers will need to be written on specific issues of relevance and on techniques of analysis⁴.

Inspections: The effectiveness of the economist is enhanced by familiarisation with the inquiry region, including its land forms, resources, industries, infrastructure, and community and their attitudes.

Interpreting material in submissions: Proponents of industries and conservation often make use of professional

consultants, and their submissions may be highly technical. Secondary benefits are often asserted, hence critical interpretation of regional income and employment multipliers may be required⁶.

Validation of material in submissions: Public submissions can be highly partisan, and include exaggerated claims. Sometimes figures can be checked against independent published data or similar studies. In other cases, external consultancies are needed to validate claims, e.g. of high employment multipliers.

Conceptualization, structuring and generating scenarios: A good deal of time will be spent "brainstorming" on what is to be covered in reports to government, how the volumes and chapters will be arranged, and what management options will be evaluated.

Liaison with government departments: Usually, the best source of technical information is Commonwealth and State government departments and statistical bureaux, hence it is necessary to identify key people in these departments, establish rapport, and find out what data they can provide.

Compiling registers of economic consultants: It is desirable to identify in advance consultants with skills to carry out specialized analyses, who are available at short notice. Experts on input-output analysis and contingent valuation surveys are few in number and earn large rents. Account needs to be taken of sensitivities in that consultants will vary in environmental empathy, and may be undertaking work for conservation or industry groups.

Managing consultancies: Writing consultancy briefs, comparing consultant's proposals, monitoring progress and interpreting and summarizing consultant's reports can be a major task.

Text generation: Amount of draft report material is likely to be seen as a measure of progress during an inquiry, and there may be an imperative to generate large quantities rapidly. Writing style need not be critical, in that editors usually are employed to convert text into a form comprehensible to the general public.

Commenting on draft text: Text review can involve looking for gaps, inconsistencies, misinterpretations and lack of economic logic.

Debunking unsound economics: From time to time, proposals will be put forward, perhaps with a good deal of enthusiasm, which do not stand scrutiny on economic grounds. For example, the question of user-pays arises frequently in relation to funding of conservation policies, and collection and compliance costs are often overlooked. Also, claims may be made that World Heritage Listing will bring about a large increase in tourism revenue, which overlooks the number of World Heritage areas in Australia, the essentially zero-sum nature of domestic tourism and the influence of other factors on numbers of foreign visitors.

Interpreting economic information for the media: When reports are released to the press, questions are likely to arise as to the meaning of economic concepts such as net present value, producer surplus and community willingness-to-pay.

VI Applicability of economic techniques

Techniques of economic analysis need to address the complexity of environmental issues, such as long-term management of a range of resources and emphasis on externalities, equity and uncertainty. Alternative management scenarios need to be compared in terms of both national and regional impacts. A range of economic techniques of varying sophistication are employed by economists for environmental policy analysis, some of which are now reviewed.

Social cost-benefit analysis: CBA is the most widely accepted analysis framework for economists to compare resource management policies, and this is almost invariably performed in environmental inquiries (e.g. see Bennett, 1990). Measures of producer and consumer surplus from production of goods and services for particular management scenarios can be estimated, based on market or shadow prices, and expressed as present values. Estimates may be made of environmental and social costs, or else these treated as intangibles against which to compare measurable costs and benefits. Choice of a discount rate always presents problems, and sensitivity analysis with respect to the rate is recommended (Department of Finance, 1991). While a wide-ranging CBA may not be feasible, this technique provides an integrating economic framework.

Inter-industry input-output analysis: Regional output, income and employment impacts (as amounts and multipliers) may be estimated for cessation of present activities (e.g. logging), or commencement of new activities (e.g. woodchipping, mining, construction, power generation,

processing firms). Specialist skills and access to regional inter-industry tables are required, which are not widely available. "Type 4" multipliers may be needed which recognize that extra jobs can lead to only marginal increases in effective income relative to social security benefits (Mangan, 1990). Industry sectors in official tables may need disaggregation, e.g. of agriculture, forestry and fisheries. Synthetic industry vectors are needed to estimate coefficients for industries not currently operating in a region. Often it is asserted that if a particular industry is discontinued, there will be compensating greater activity elsewhere, e.g. in tourism. Since tourism is not an industry according to the Australian Standard Industrial Classification (ASIC), multipliers must be derived as proportions of coefficients for other sectors. Even then, typical employee profiles may reveal difficulties; retrenched loggers do not make ideal multilingual hotel receptionists! Unlike CBA, input-output analysis does not measure economic surplus or overall social gain or loss; its main use is for indicating likely adjustment costs (Industry Commission, 1992, p. 86).

Valuation of non-market goods: The total economic value of amenity resources (to be factored into CBA) can be divided into user, option and existence value (Pearce and Turner, 1990). The travel cost method (TCM) is reasonably well accepted for measurement of user value. Option and existence values potentially are much larger than user value, and their inclusion brings the economic calculus closer to the political calculus. Measurement of community willingness-to-pay for conservation by the contingent valuation method (CVM) is

costly, requires specialized skills, and is subject to a number of potential sources of bias. Difficulties can arise in defining the "environmental good" when various use intensities over a number of natural resources are possible. Also, there is a risk that if non-user values are included in CBA, and biodiversity arguments are treated as intangibles, conservation benefits will be double-counted. CVM has been employed widely in the USA, driven by the need for dollar valuations in environmental litigation. Two Australia-wide surveys came up with values of the order of \$600m per year (Hundloe et. al., 1990; Imber et. al., 1991), and have not been well accepted. Given the present status of CVM in Australia, it would be a courageous economist who staked their reputation on this technique in an environmental inquiry.

Multi-objective programming: A substantial literature exists on the application of multi-objective decision models to natural resource management, e.g. see Romero and Rehman (1987). These techniques allows management scenarios to be compared, subject to resource and environmental constraints, on the basis of the various economic and non-economic goals of government, e.g. conservation status, revenue from industry, jobs created, fiscal neutrality. Specifying goals as "soft constraints" facilitates comparison of policies and estimation of trade-offs. This kind of framework is widely used informally, and more systematic application has been considered, perhaps as an alternative to CBA (RAG, 1992).

Spreadsheet modelling: Packages such as Lotus 1-2-3, Excel and Quattro Pro are useful for estimating costs and

revenues from particular policies, and calculation of net present values and cost-benefit ratios.

Other approaches: Techniques such as econometric and simulation modelling, knowledge-based systems and game theory models also have a potential role in environmental decision support (Harrison and Tisdell, 1992). Geographical information systems (GIS) and simulation or process models offer great potential for both formulating management scenarios and predicting future production and ecological quality (Sharma and Harrison, 1991).

VII Potential sources of difficulty

Working in a multidisciplinary team on a public consultation process about politically sensitive issues in a high pressure atmosphere can give rise to a number of difficulties and frustrations.

Different disciplinary perspectives and methodologies: Practitioners in different disciplines have their own technical languages, views of the world and research methodologies. The reductionist approach to research, with increasing depth but narrowness of scientists (including social scientists) has been aptly described as "the spread of specialized deafness". Few experts are well versed in a range of disciplines, and there is likely to be a degree of incompatibility between approaches. The anthropocentric orientation of economics, received paradigms and orientation towards industry rather than nature can limit the scope of economic thinking. Even very knowledgeable physical scientists may not be good communicators or integrators of ideas. Lawyers

tend to limit attention to "the facts", and regard information gathered by an inquiry as "evidence". They are trained to study precedents and to apply logical reasoning, and primary data collection such as community surveys can appear an unnecessary source of expense and controversy. Sociologists like to facilitate meetings of local communities to identify social problems and solutions, on the grounds that communities will not accept ownership of "parachuted in" solutions. Serving on an inquiry team provides a very different experience to working within a group of economists who share a common philosophy and methodology. There is a real danger of "a failure to communicate", not so much at the data gathering stage but when management scenarios are being examined and recommendations generated.

Negative views of other disciplines about economics:
Professionals in other disciplines often view economists with a good deal of suspicion. Economics now tends to be viewed as a "technologically optimistic" science, and it is ecologists who are "dismal" about endangered life-support systems (resource depletion, reduced assimilative capacity of the environment, global warming). Other disciplines tend to regard conservation as a "good thing" or motherhood issue, and view industry as exploiting resources, desecrating the landscape and cultural heritage, and depriving future generations of an abundant and healthy environment. The economist tends to be regarded as the "gung ho" developer or Darth Vader of the inquiry team. There may also be negative views by association with "what the out-of-touch economic rationalists in Canberra are doing to the Australian economy" (regardless of party in

power). As a result, the advice tendered by economists can be unpalatable to ecologists and other scientists, who may have more empathy with nature than with cash flows, present values and employment multipliers. This problem can be exacerbated when the media becomes preoccupied with estimates of the millions of dollars of revenue foregone, this being easier to comprehend than ecological criteria.

Ecological absolutes: The concept of substitution which pervades economic thought is not shared by ecologists. Certainly, there may be some forms of natural capital for which no close substitutes exist; Grey and Marlow (1991) suggest that old growth forests are in this category. Resource and husbandry constraints can be used in economic models to take account of no-go areas, sustainable extraction rates and safe minimum standards. Conservationists and ecologists often appear to believe that the environment is beyond value, and natural resources have no substitutes. Any form of resource use is considered to place ecosystems or species at risk, perhaps including as-yet undiscovered microscopic species. There is a fear that invaluable genetic and pharmaceutical resources may be lost. Any risk of not only global but local species extinctions is unacceptable. Sufficiently large examples of ecosystems should be maintained to ensure survival and demonstrate diversity, and more than one such example should be preserved for comparison purposes. Local exploitation of resources would destroy the integrity of regional ecosystems. Preservation of large and replicated samples and integrity constraints curtail the "feasible region

of production" to the point where available resources may be insufficient for viable industry.

Lack of control over the research agenda: An inquiry gains its own direction and momentum, which is not easy to control closely, and may necessitate desperate steps to meet deadlines. The contributions of different disciplines vary depending on the stage of the inquiry process: ecologists identify development constraints early on, planners provide guidance on how management scenarios are best introduced, while lawyers are responsible for formulating legislation when recommendations are being finalized. Work of the economist is probably more uniformly spread throughout the inquiry. The economist often has little control over the inquiry agenda, and is forced to progressively adapt to changing imperatives, with limited ability to initiate and plan data collection and analysis. This problem can be exacerbated by the submission-driven nature of an inquiry, time and budget constraints, and perhaps fluidity in inquiry methodology and research directions as different groups or individuals gain ascendancy. It may not be possible to seek answers to the questions judged most important, symptoms rather than causes of resource misuse being addressed. Effects of macroeconomic policy will probably be outside the ambit of the inquiry, as may some areas of microeconomic policy. For example, logging pressure on native hardwood forests is exacerbated by lack of alternative timber sources, in turn due largely to low stumpage (royalty) rates charged by state forest services as price leaders, yet resource pricing may be deemed outside the terms of reference.

Inability to assimilate all relevant information: Given the various inquiry stages and deadlines, it probably will be impossible for an economist to read more than a small fraction of library documents, public submissions, consultancy reports, briefing papers, newspaper clippings and so on, or even text generated by the inquiry.

Hidden agendas and policy expectations: Even when well insulated from political influence, inquiry staff will wonder whether there are hidden agendas behind establishment of a public inquiry. What recommendations would the government like to see? What recommendations would they definitely not like to be handed? If mining or logging of an area was terminated after a previous inquiry, but leases or log allocations remain, would resumption of mining or logging have more chance than "a snowflake in hell"? It has to be accepted that "good economic advice may test the limits of what is politically feasible, but it does not fly in the face of political reality" (Hamilton, 1992, p. 63). No appraisal can be carried out in a vacuum; it will be influenced for example by previous conservation decisions, pre-election promises, stances of pressure groups and fiscal considerations⁶.

Lack of research capacity: Particularly if coming from an academic institution with a "publish or perish" ethic, it takes time to accept that an inquiry has limited in-house research capability. Copy deadlines have to allow for editing and report production. The need to refrain from contact with proponents of particular views (private hearings) to avoid controversy hampers access to data and informed opinion. Identification and subsequent evaluation of specific

management packages may be avoided or delayed for fear of appearing to endorse those policies. When external consultants are used it is possible to report on, but dissociate from, their findings. Apart from budget constraints, use of consultants will be limited by time delays in securing approvals, preparing briefs, obtaining proposals and selecting consultancy groups. As well, consultancy reporting dates need to allow for analysis of findings and public comment, so that the actual time available to perform a consultancy may be severely compressed, and the opportunity for follow-up work nonexistent.

Potential biases: It is probably impossible for a public inquiry to be totally free of bias. The approach adopted and advice tendered by any individual will depend on that person's background, work experience, beliefs, value systems, political leanings, and so on. The experience with public inquiries in Australia is that findings have favoured conservation; this has been true for example of the Wesley Vale, Coronation Hill and Fraser Island inquiries. The fact that a public inquiry is established reflects a mounting level of public opposition to current resource use. Further, people who are attracted to serve on environmental inquiries may have conservation leanings (even when screened for membership of conservation groups), and the publicity created typically leads to increased visitation rates and enhancement of conservation values. A "green" outcome will diffuse controversy and prevent further political damage, especially if accompanied by a regional adjustment package.

The limits of economics: Some of the important issues arising in environmental inquiries are not well handled by economic logic or methods. Absolute ethical decisions may be needed - for example with respect to preservation of a sacred site or a species - where it is not realistic to talk of substitution rates and optimal quantities. For example, Hamilton (1991, p. 15) raises the "uncomfortable but real question" of whether a trade-off rate can be expressed between logs harvested and koalas killed. It is difficult to deal with intragenerational equity issues which arise when conservation policies would result in substantial losses to firms and employees locally, with more dispersed gains nationally. Discounting at any non-zero interest rate places negligible weight on costs and benefits to future generations, and hence has severe limits for "very long run" analysis. Only limited progress has been made on factoring welfare of non-human living things and stewardship responsibilities of mankind into economic evaluations. Non-market valuation techniques are imprecise, not well accepted even by economists, and difficult to apply when a complex set of "environmental goods" are involved.

VII Some words of advice

While recognizing that the best way to learn is from personal experience, some tentative words of advice are offered for those who may find themselves serving as economists on environmental inquiries.

Don't think it is a typical research project. Inquiries are driven by community consultation and text generation, and

may analyse views but not originate or own them. One has to live with constraints on in-house data collection and analysis.

Avoid getting sidetracked. An endless list of issues may be raised, and a massive amount of information collected. It is not possible to get on top of everything, hence the need to avoid getting involved outside one's area of expertise, trust in hunches, and be selective but thorough.

Tackle the difficult economic issues. Economists are well received when they preach what others want to hear (1982, p. 13), and it is tempting to use economics to justify the recommendations which others favour. However, if economists do not identify the costs of inefficient resource use, or of conservation decisions, then no-one will.

Concentrate on pointing out trade-offs. Economic analysis cannot answer all questions, and the major contribution is likely to be estimation of the opportunity costs of particular resource management policies, e.g. revenue and employment foregone if national parks are created. Knowing these costs helps governments make more informed decisions.

Be positive. A healthy degree of cynicism and questioning of assumptions does not go astray, but requires subtlety. One must come across as positive, enthusiastic and not dismissive of other disciplines. This may require a good deal of patience; it is essential to keep the dialogue going.

Be co-operative: While it is essential to maintain "intellectual honesty and detachment" (Aaron, 1982, p. 60), it is also necessary to attempt to understand the *modus operandi*

of professionals in other disciplines, and attempt to accommodate them within an economic framework.

Be definite. Economists are notorious for providing qualified opinions: this reputedly led President Truman to say he would like to have a one-armed economic adviser (Weinstein, 1992). Get second opinions from economist friends and mentors if necessary, but make definite statements about what work needs to be done; equivocal or half-hearted suggestions will most likely be ignored. Keep dated copies of anything written. By demonstrating that a particular consultancy or activity was recommended say five times in the last two months, it may be possible to gain an eventual go-ahead.

Document all information sources. Record sources of all facts and opinions, and insist consultants do likewise. It is frustrating to have sound economic material denigrated as unsubstantiated assertions. Too much documentation can be edited out of reports; too little can lead to rejection of text.

Win some and lose some. Don't expect all advice to be accepted; outcomes of inquiries are not necessarily optimal on economic grounds. Inevitably there will be decisions reached which go against the economic grain. If economic advice is ignored repeatedly, or professional integrity is on the line, then the proper course is to resign from the appointment!

VIII Concluding comments

Environmental inquiries allow a high degree of community consultation, and an opportunity for decisions based on the

widest possible information and analysis. Economists can make an important contribution to environmental decision making by serving on these inquiries. This task differs radically from typical economic research, with additional constraints, limited control of the agenda and many frustrations. However, the opportunity to promote more rational decisions in the public interest, to interact with people in other disciplines, and for "total immersion" in resource and environmental economics can be a most rewarding experience.

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1. For brevity the term "environmental" will be used in relation to both natural resource management and environmental conservation.
 2. The terms of reference for the Fraser Island inquiry included formulating management options for both the island and the mainland Great Sandy Region, as well as recommending

dispute resolution procedures for environmental disputes throughout Queensland.

3. For example, the initial discussion paper of the Fraser Island inquiry identified 128 separate management issues (Commission of Inquiry, 1990a).

4. There is a danger here of "reinventing the wheel"; a surprising number of briefing papers have been written on social cost-benefit analysis and willingness-to-pay surveys.

5. A notable feature of submissions to the Fraser Island inquiry was the number of input-output multipliers quoted in submissions, for logging, sand-mining, tourism, fishing and conservation.

6. For example, World Heritage listing is attractive to State governments in that management costs are transferred to the Federal government.