

A price on the priceless

Methods developed by academic economists for measuring the value of natural beauty are affecting mining in Australia and oil companies in America

AT THE heart of environmental economics lies a dilemma. Economists are most comfortable when measuring people's preferences as revealed by their behaviour in the market. But the environment is rarely bought or sold. So some way has to be found to give a monetary value to clean air or the continued existence of the elephant before rational decisions can be made about protecting them.

Ludicrous, say environmentalists. "What am I bid for one ozone layer, slightly depleted?" they jeer. Economists retort that even the ozone layer has a calculable value. Humanity would not willingly pay the world's entire GNP to prevent further depletion. So the ozone layer is demonstrably worth less than \$21.2 trillion annually.

Several economists have developed special techniques to measure environmental value. Thus an unpolluted river has a value to people who like water sports. But even people who do not visit the river may value its purity. To find that "non-use" value, which may be much higher than the use value, economists frequently employ contingent valuation, a technique first used in 1963. They ask people in a public-opinion survey what they are willing to pay for a benefit, or what they would accept in compensation for its loss.

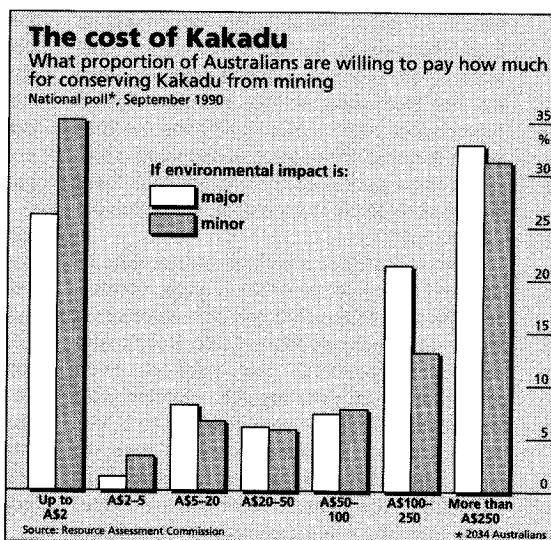
Such calculations have been used, mainly in the United States, to estimate the benefits of some environmental policies in a way that can be set against the cash costs. Their application has now spread. Contingent valuation was employed by Australia's Resource Assessment Commission to help the government decide whether to allow mining on the edge of Kakadu National Park (the stomping ground of Crocodile Dundee).

In the case of Kakadu, just over 2,000 people were interviewed in Australia at large, and a further 500 in the Northern Territory, where the mining would have occurred. Respondents were asked which of several specific amounts they would pay to protect the site. Half were given a version of the environmentalists' assessment of the damage that mining would do (called "major impact" in the chart) and half were given the mining industry's assessment. Richard Carson, an expert from the University of California, helped

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to design the survey.

The results indicated that, even if the impacts of mining were as minor as the industry described them, Australians were willing to pay at least A\$647m (\$826m) a year to prevent mining. That sum exceeded the value of minerals thought to be in Kakadu. Australians who were told the impact would be "major" would have cheerfully paid much more. But people in the Northern Territory, who



would gain from jobs in the mines, were willing to pay considerably less.

The survey was attacked, predictably, by the mining industry and by other critics who argued that it put a value on a hectare of wilderness that was a hundred times that of plots in downtown Melbourne. But land in public use is often differently valued from land in private use, replied Mr Carson: that, indeed, is why New York's Central Park is not sold off for skyscrapers. Critics also drew attention to an American study, which found that the price people would pay to preserve clean air in the Grand Canyon fell from \$90 to \$16 when they were asked, not just about the canyon, but also about paying for the competing claims of cleaner air in Chicago and the eastern United States as well.

The survey did not decide the fate of Kakadu. When Bob Hawke, Australia's prime minister, turned down the mining proposal in June, he said it was because the area is considered sacred by the

Jawoyn aborigines. The survey may have been more important as an indicator of public feeling against mining than for assigning a cash value to Kakadu.

When America's courts decide what civil damages Exxon must pay for the 1989 Exxon Valdez oil spill in Alaska's Prince William Sound, the amount will be partly based on three rival contingent valuations: one each by the Federal government and the state of Alaska, both of which are suing Exxon; and one by Exxon itself. Criminal penalties may also be based on the studies. Almost every American expert in the technique is now employed by one litigant or another.

The amounts at stake could be vast. Pilot work for the state's survey reportedly found the American public valued the protection of the sound at \$3 billion—or nearly three times the \$1.1 billion that Exxon agreed to pay in a deal struck

by the three litigants in February but subsequently thrown out by the courts. Contingent valuation has been cited in legal cases only since the mid-1980s; and only last year did the Court of Appeals approve the validity of the technique, though no judgment has yet been based on it. Most cases have been settled out of court. The three surveys in the Exxon case will therefore be state-of-the-art: designed by psychologists, sociologists and philosophers as well as economists. Together they may cost over \$6m, a huge sum for such research.

This means that litigation is now advancing techniques for measuring natural-resource damage, just as it spurred new thinking on competition policy in the 1970s, when antitrust cases shaped academic work and academics in turn helped to devise legal definitions of concepts such as market share. Differences among the three Exxon studies will be eagerly examined in universities, as well as in court.

One by-product may be an explanation of why questions that ask people what they would be willing to accept for the loss of a natural resource always produce much larger numbers than questions that ask what people would be willing to pay to preserve it. In the June issue of the *American Economic Review*, Michael Hanemann, who is on the Alaska team, argues that people reply to the first question not in terms of prices, but of quantities of substitutes. If the good in question has no substitutes (Kakadu or the respondent's own life), the amount a respondent would be willing to pay might, at the limit, equal his entire (finite) wealth; the amount they would accept as compensation could well be infinite.