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The use of aggregate complaints data as an indicator of cumulative social impacts of mining: A case study from the Hunter valley, NSW, Australia

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ABSTRACT

Generally speaking, there is a greater amount of quantitative data available to measure and model the cumulative environmental or economic impacts of mining than the social impacts. In part, this is because social impacts are often inherently more difficult to quantify, but historically there have also been fewer regulatory drivers for companies or state agencies to invest in collecting such data. Regulators in some jurisdictions are now starting to require resource companies to report on aspects of their social performance, but companies and regulators are still struggling to identify appropriate metrics, particularly in regards to cumulative impacts. This paper describes an innovative quantitative approach to tracking how communities experience and respond to increased mining activity, using data from the complaints registers maintained by mines located in the Upper Hunter Valley in New South Wales, Australia. In this study, complaints lodged with five separate mines adjacent to the township of Muswellbrook over several years were aggregated and trends analysed. The aggregated set showed that complaint frequency increased with the increase in mining activity but then decreased as individual complaints were addressed. However, when complaints from near-neighbours were removed, it emerged that the proportion of complaints that came from the town itself steadily increased over time. Further analysis indicated that this increase was closely associated with the amount of mine-disturbed land that could be seen from the town over time, as measured using a combination of remotely sensed data and a digital elevation model. This is persuasive evidence of a cumulative social impact that is more than just the sum of the local impacts of individual mines.

Introduction

The literature on indicators of environmental and economic cumulative impacts is extensive. By comparison, that on cumulative social impacts is not, even though their importance has been clear for some time (Therivel and Ross, 2007; Franks et al., 2011). Partly this is because some social impacts are more inherently difficult to quantify, but there has also been a dearth of relevant time series data available for analysis. This paper seeks to address this gap by utilising multi-year data from the complaints registers of several mines located near the town on Muswellbrook in the Upper Hunter Valley in New South Wales, Australia, to assess whether increased mining activity in the surrounding area had a cumulative impact on the amenity of town dwellers; that is, the perceived livability of the community. By way of corroboration, research findings are presented showing a strong link between the number and proportion of complaints emanating from the town and the extent of visual exposure to mining. Complaints data were selected for analysis, firstly because they represent a tangible expression of community concern about mining activity and, secondly, because they are routinely and continuously recorded. Cumulative impacts assessment at the regional level has made significant the use of measurable environmental and economic indicators. Further, simulation models (Carlson et al., 2010) combined with scenario analysis (Francis and Hamm, 2011) have become the preferred tools for cumulative effects assessments. This has led to calls for social scientists to likewise develop and make available social indicators that can be quantified and for which cause and effect relationships can be defined, for potential inclusion in such models. Mitchell and Parkins (2011) brought together the necessary expertise through a workshop approach to develop a prioritised list of some 30 indicators. The task of finding such indicators is assisted in part by the fact that some economic variables, e.g., personal, group or regional income (e.g., Force and Machliss, 1997), can double as social indicators. Their advantage is that modelling of cause and effect with an acceptable level of analytical precision is somewhat easier than many of the more subjective social indicators, such as self-assessed quality of life (Mitchell and Parkins, 2011).

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Parkins (2011) uses the term technocratic, i.e., driven by science and technology, to refer to the use of analytical methods to map, model and forecast relationships as the basis for decisions regarding management of cumulative impacts. Some social scientists resist this approach on the grounds that social indicators need not meet the same requirements as ecological variables to be useful in their own right and can be interpreted on a different, but equally valid, basis. Others have preferred to develop *ad hoc* lists that purport to reflect local community priorities, as established through consultative mechanisms such as workshops and surveys, in order to facilitate participative decision making (Atkinson and Canter, 2011; Brereton et al., 2008). Mitchell and Parkins (2011) used an expert workshop to identify and prioritise social indicators amenable to modelling. This exercise generated 30 potential indicators (subsequently distilled to a 'top five') and another eight that were excluded on the grounds that they would be very difficult to model. Parkins (2011) concluded that such a pragmatic approach to determination and use of social indicators of cumulative effect was preferable to either the technocratic outlook or, indeed, to a politically-driven approach to decision making (which he termed 'decionistic').

In many cases in the literature, the search for appropriate social indicators appears to be mostly a matter of selecting or proposing what might be measured in terms of baselines for ultimate assessment via analysis of time series of changes. Franks et al. (2011) provide a description of social impact types and a range of approaches for their assessment and management. In that work, the relationship between an impact on individuals and/or groups is asserted to exist given certain changes in measured variables. In a critical appraisal of accepted social impact indicators, Vanclay (2002) articulated the important point that many, if not most, of the variables in common use were more a reflection of social change than social impact. He separated the two by declaring that social impacts are those that are experienced by humans as individuals or groups in a physical or cognitive sense.

Building on Vanclay's conceptual distinction, there is a need to find and/or develop variables that do represent indications of social impacts, as distinct from just measuring change. Further, it would be particularly useful if those indicators could be applied retrospectively, rather than just prospectively, to measure changes that have already occurred in a community and to track and model trends. Finally, if the severity of the impact could be discerned then that would also be helpful in designing mitigation measures and in assisting with decisions regarding the acceptability of adding to that impact.

The most direct way to measure whether a community is experiencing amenity impacts from increased mining activity is to survey residents at regular intervals, using standardised questions that are repeated in each survey. Questions could range from the general (e.g. 'overall, how would you rate community X as a place to live in terms of the quality of the environment'?) through the quite specific (e.g. 'on how many occasions in the last month did you feel or hear blasts from mining operations?'). However, in practice panel surveys of this kind have rarely been undertaken; individual mining companies may conduct and repeat local community perception surveys from time to time, but it is highly unusual for companies operating in the same area to pool resources to undertake standardised, tracking studies. Governments have also shown little interest in supporting such studies, except perhaps in the specific case where there have been major public health concerns (for example, in relation to dust and its effects). As an alternative to collecting time series data, it would be possible to ask respondents in one of the surveys or interviews if they have detected significant changes over some defined period (e.g. 'the last few years' or 'the last 12 months'). However, the limitation of this approach is that people's recall of what the actual situation may have been at some earlier time may not be very accurate and may be overly influenced by recent events.

Here, we hypothesise that data on complaints made to individual mines can provide an alternative and potentially powerful indicator of whether a community is cumulatively experiencing adverse amenity impacts from increased mining activity. We test this hypothesis by

1. aggregating the complaints data from five mines adjacent to a town in the Hunter Valley of New South Wales, using broadly comparable categories to provide an overall picture of complaints trends and patterns in the community,
2. Distinguishing between localised effects (manifested as complaints from 'near neighbours') and cumulative effects (measured in terms of the 'background' level of complaints in the community as a whole), and
3. correlating the changes over time in the proportion of 'background' vs. localised complaints with an objective measure of increased mining activity; the extent of visual exposure in the town to land disturbed by the mining process.

Method

Study region

The town of Muswellbrook in the Hunter Valley in NSW, Australia, was the focus of the study. The examination of complaints was part of a broader study of cumulative impacts of mining in this region (Brereton et al., 2008).

The Shire of Muswellbrook, is located west of Newcastle in the Upper Hunter Valley of NSW, and includes the townships of Muswellbrook, Denman and Aberdeen. The shire covers an area of 3046 km^2 and is home to rural industries, horse studs, vineyards, olive groves, light industry and mining operations. The New England Highway, a major arterial road-transport link between the east coast and the western NSW inland areas, runs through the centre of the town of Muswellbrook, linking it with Singleton to the south and Scone to the north. The township is located on the Hunter River, a major source of water for agriculture, viticulture (wine) and mining. The neighbouring shire of Singleton also contains a significant number of coalmines.

In 2011, the township of Muswellbrook had a population of just under 12,000 people out of the 17,000 in the Muswellbrook local government area. In the period from 2001 to 2011, the population of the town increased by around 20%, with a slightly higher rate of growth in the latter part of this period Muswellbrook was traditionally a rural-based economy, but power generation, mining and mining-related businesses are now major industries. According to the 2006 census, 12.6% of the employed workforce in Muswellbrook Shire worked in mining and 10.7% in rural sector (wine production, horse, beef cattle and dairy farming) (Brereton et al., 2008: 19). By 2011, mining employees accounted for 21% of direct employment and the rural sector only 7% (ABS, 2011).

At the time this study was conducted in 2006, there were five main mines surrounding the town; the mine leases and location of the town are shown in Fig. 1.

The earliest coalmine was opened in Muswellbrook in 1907, indicating that the community of Muswellbrook has had a long exposure to coal mining operations. More recently, the concentration of mining activity in the region—and the close proximity of some mines to the town of Muswellbrook—has resulted in considerable prominence being given to environmental amenity issues (noise, blasting disturbance, dust, and visual impacts). For the larger study, interviews and focus groups were conducted with