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The cumulative dimensions of impact in resource regions



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ABSTRACT

The development of mineral and energy resources worldwide has placed pressure on regional environments, economies and communities. The cumulative impacts, or cumulative effects, arising from overlapping development have stretched political systems that have traditionally been geared toward the regulation and management of individual resource developments, presenting challenges for policy makers, resource developers and civil society actors. An equally challenging task has been realisation of the potential development dividends of mineral and energy resources in the areas of business development, infrastructure, human development or the management of resource revenues. This paper introduces a special issue on 'Understanding and Managing Cumulative Impacts in Resource Regions'. The special issue interrogates the effectiveness of new and traditional policy responses, explores methods and strategies to better respond to cumulative impacts, and details practical examples of collaborative and coordinated approaches. Papers cover a range of environmental, economic and social issues, geographical regions, commodities, and conceptual approaches. This introductory paper introduces the cumulative impact issues that have manifest in resource regions, critically appraises current conceptions of cumulative impacts, and details management and policy responses to address the cumulative dimensions of impact.

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Introduction and background

Many papers have been published on the general theme of cumulative impacts and cumulative effects. In formulating this special issue we set an objective to situate cumulative impacts within a regional context. Young and Matthews (2007) used the term resource regions in stating the importance of differentiating them from metropolitan/city/urban concentrations but they failed to provide a clear definition. The term "resource region" has been used more precisely to refer to regions where resource-based industries dominate the economy. More particularly Doloreux et al. (2008), in studying knowledge-intensive industries in the Quebec region of Canada, defined resource regions as, "remote from metropolitan influence and where the leading economic activity and employment are resource-based and/or natural extraction and transformation."

The target for this special issue is resource regions in which extraction of minerals and/or energy are significant activities in the area. Therefore, they are *per force* defined primarily by geology, that is, there must be past or current mineral or energy resource extraction activities and/or future prospectivity. We do not restrict these resource regions in terms of proximity to population centres

or other economic activities. In rural areas they may be alongside or intermingled with high value silviculture, agriculture or aquaculture. They may likewise be associated with manufacturing areas. In remote areas resource regions are often economically dominated by resource extraction activities. Resource regions tend to have either multiple extraction activities because of their geological prospectivity or, at least, very large operations that have developed over time as a result of multiple decisions to undertake expansions. Some resource regions may be relatively compact such as the Hunter Valley in New South Wales, Australia and others spatially extensive such as the Atacama region of Northern Chile spreading to Southern Peru. Each paper in the special issue has been titled to provide a clear indication of the resource region(s) in focus.

The nature of cumulative impacts in resource regions depends on the extent to which resources extraction is dominant and also the degree of commodity homogeneity. Often mineralisations or sedimentary deposits create a situation where extraction is more-or-less homogeneous (what Canter and Kamath, 1995, called homotypic impacts) and therefore the impacts are often manifest as a result of magnification of effects that would arise from a single operation. They are also related to whether or not there is significant value-adding associated with the extraction, e.g., metal refining often adds additional air quality considerations to a region beyond the dust emissions from extraction activities. When resources extraction is undertaken in regions of larger populations

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the issue of human exposure to emissions becomes increasingly significant. Also, the competition for supporting infrastructure, e.g., housing or labour can lead to value shifts.

Further, resource regions are also subject to the volatility (boom/bust) inherent in the sector and therefore significant valuation fluctuations can occur over short timeframes (Petkova-Timmer et al., 2009). Literature on cumulative impacts in resource regions has focused on understanding and managing the implications of growth. However, a cumulative impact approach is potentially just as relevant to the other end of the project life cycle. When operations close, this may lead to fewer pressures on the receiving entity (e.g. reduction in emissions, reduced water draw down) and enable some recovery in systems. (These are effectively ‘reverse impacts’). Conversely, closure may also trigger a new set of impacts, particularly in the social and economic domain, where multiple closures trigger significant reverse multipliers. Another under-theorised area in the cumulative impact literature relates to business, infrastructure, employment and human development opportunities that arise as a result of development, although one recent study by Sachs et al. (2011) has explored the idea of infrastructure corridors in resource regions.

The papers accepted for this special issue traverse a wide range of cumulative impact topics and issues. This introductory paper first summarises, with some critical assessment, the current state of conceptual development of cumulative impact/effect. The papers in the issue are then individually introduced. One apparent overarching conclusion is that the papers appear to draw on only one consistent central tenet of cumulative impacts and that is the concept of aggregation or accumulation. We interpret from this that there is merit in revisiting the conceptual territory and go on to propose that the idea of the cumulative *dimensions* of impact may be a useful way to integrate the different viewpoints. This idea leads into a range of significant management and governance implications, which form the basis of a brief discussion. The paper concludes with a reflection on what we feel are important lessons and key insights that can be drawn from the current status of the cumulative impact literature.

Current concepts of cumulative impact/effect

Practitioners and theorists of cumulative impacts (and the synonymous term cumulative effects) have conceptualised

cumulative impacts in a number of different ways (Duinker et al., 2013). Debates about the definition of cumulative impacts can have ramifications in policy terms. In this context, it has been argued that poor definitions are a feature of much cumulative impact practice (Gunn and Noble, 2011).

Definitions of cumulative impacts are based on different emphases of one of four different perspectives or units of analysis: (1) the actor (2) the action (3) the impact, or (4) the receiving entity.

Perhaps the most common conception of cumulative impacts is that they result from the presence of multiple projects, i.e., two or more different *actors*. This definition has been used by authors such as: LaGory et al. (1989), Gilpin (1995), Canter and Kamath (1995), and Canter and Ross (2010). A multiple project approach recognises that many of the challenges of addressing cumulative impacts arise as a consequence of the organisational boundaries that exist between project proponents. Further, a relatively clear distinction can be drawn between project-specific effects and cumulative effects, and legislation in some jurisdictions has codified this particular view (see for example the Canadian Environmental Assessment Act Government of Canada, 1992). The disadvantage, however, is that such a definition does not offer a model of impact generation and interaction that is useful for measurement and understanding.

The oft-cited United States Council on Environmental Quality (1978) based their definition of cumulative impacts on the activities causing impact. According to their definition, cumulative impacts are the “impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”

Building on earlier literature, Franks et al. (2010a, 2010b, 2011) advanced an alternative position that places the *impact* at the centre of analysis (Fig. 1). According to their definition, “cumulative impacts are the successive, incremental and combined impacts (both positive and negative) of one or more activities on society, the economy and the environment”, where cumulative impacts “result from the aggregation and interaction of impacts on a receptor and may be the product of past, present or future activities.” Loxton et al. (2013) adapted the Franks et al. framework in the context of forestry and added a strong emphasis on governance and policy processes and feedbacks.

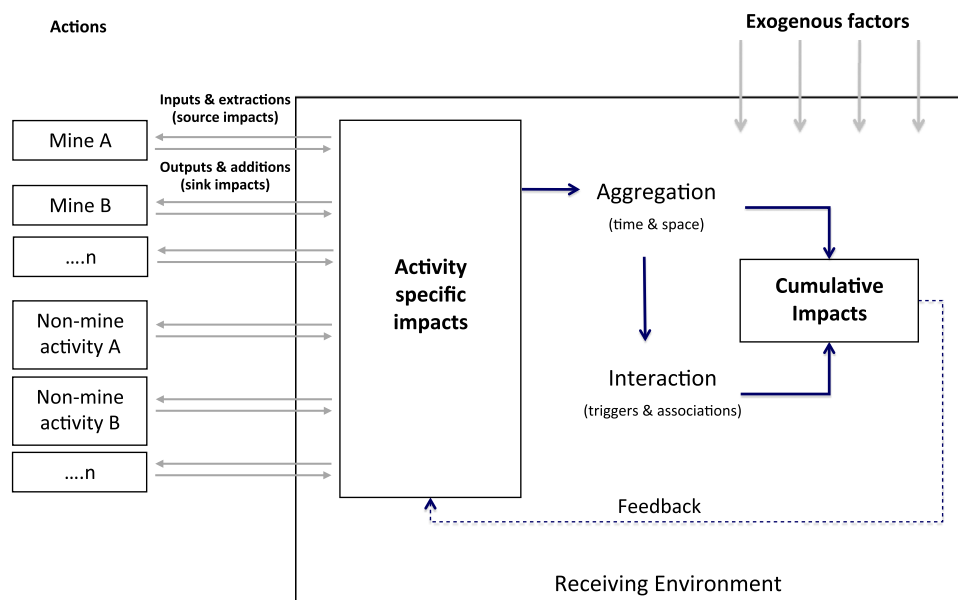


Fig. 1. A conceptual framework of the cumulative impacts of mining.

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