

Trade-Offs by Whom for Whom? A Response to Calow

We welcome Calow's (2019) critique of our recent manuscript (Chiapella et al. 2019) and the opportunity to elaborate a few key points. Calow's argument that governance must come to terms with trade-offs between health risks and "benefits from industrial and agrichemicals and pharmaceuticals in terms of lifestyle, food supply, and health," has already been the key logic underpinning the current regime of toxic chemical governance. This framing has resulted in extreme inequities in exposure to chemical risk and in the distribution of their benefits.

Focusing on the need for improved CBA, while welcome, does not address our more substantive claim: that toxic chemical governance failure has resulted from the failure of socio-technical imagination (e.g., Jasanoff and Kim 2015). We restate the need for achievable, albeit major changes in how we imagine and enact the possibilities of a society that can live prosperously and equitably without poisoning itself or its environment. Calow's statement that "there would also have to be restrictions on what alternative scenarios could reasonably be addressed by the USEPA in the cost-benefit analyses" would perpetuate this fundamental failure. Contrary to Calow's assertion, applying a modified version of the precautionary principle has already been shown to increase innovation and productivity, while reducing the direct and indirect costs of polluting industries and infrastructures (Plouffe et al. 2011, Wallace 2017).

We agree that social values are embedded within governance. Our claim that toxic chemical governance in the United States has failed (which Calow does not appear to disagree with) calls into question the value systems of "existing authorities" and the logic of regulation. Such failures cannot be addressed through methodological tweaks to existing agencies and regulations given their path dependency, capture, and inability

to prevent the stifling of alternative production methods (Woodhouse 2006). Insisting on the possibility of objectively determining "trade-offs" is in and of itself a value proposition, favoring a technocratic style of decision-making that fundamentally circumscribes the definition of costs, risks, and benefits, even if paired with some form of postcase deliberative forum.

Our framework therefore does explicitly address trade-offs—in that *the definition and evaluation of risks, costs, and benefits* are a key site of political struggle. While "properly and deliberately executed CBA" could aid in public debate about the larger scale trajectory of toxic chemical governance, doing so requires addressing long standing issues of power in deliberative fora (Purdy 2016, Brisbois et al. 2019). For example, using exposure-response as the means for assessing "tolerable risks" suffers from a fundamental moral indefensibility: Who decides what is a tolerable amount of risk? It is exactly this type of risk assessment that has consistently been used to deny justice to communities affected by toxics exposure. The logic of CBA also suggests the direct comparability of costs, which begs the question: Are all costs the same to all affected parties? How does one equate the cost of childhood lymphoma with the increased marginal economic costs of production? Given that, within the United States alone, there are over 30 million cases of "rare" diseases documented by the National Institute of Health (NIH 2019), many of which are connected to exposure to toxic chemicals, we would be wise to think more carefully about the pervasive, systemic, and intergenerational nature of toxic chemical risk (eg., Alavanja et al. 2004, Ritz et al. 2016, Ou et al. 2019).

In contrast to calling for improvements to predetermined methodologies for weighing risks, costs, and benefits, such as exposure-response studies and CBA, our approach highlights the value-laden nature of science itself. Understanding methods as value laden is a key part of building up

the capacity of a discipline to understand and evolve its own philosophical and moral frameworks (e.g., see Foucault 1972, Cartwright 1999, Latour 2004, Lather 2005), especially as they pertain to theories of accountability for social harms (Weber 1999). Fortunately, the environmental sciences were some of the first to explicitly embrace their social context, including the need to engage with multiple ways of knowing, in order to increase their effectiveness for social transformation instead of supporting the interests of powerful state and corporate actors (e.g., Backstrand 2003).

We urge the discipline to continue to evolve and expand on its understanding of toxic chemical risks as pervasive and intergenerational in order to transform the complex suite of regulations currently permitting the use or production of toxic chemicals and by-products. From our point of view, TSCA's larger failure was its inability to enact a governance system that matched its ambitions: the elimination of toxic chemical risk produced by human systems. TSCA cannot, and will not, succeed as a system for permitting the production of toxic chemicals without emphasis on this original goal. The complexity of this task requires clearly articulated goals and systemic approaches that understand cross sector relationships and the capacity for system wide innovation to meet related social goals (e.g., addressing climate change and food security through pollution reductions; Shindell et al. 2012). While the costs of transition may appear insurmountable for established industries, as a society, we must evolve our thinking and the systems producing toxic chemical governance or else pay the ultimate price.

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