Reinvigorating IA through Complexity Theory

The paper (Banhalmi-Zakar et al. 2018) from which this conference derives its name – Evolution or Revolution – claims that the introduction of environmental impact assessments (EIA) in the United States "was nothing short of revolutionary". But I disagree. A revolution can be defined as 'a forceful overthrow of a government or social order, in favour of a new system'. However, EIA and strategic environmental assessment (SEA) processes were readily adopted with little opposition from political, social and economic institutions. For example, the environmental legislation passed by the US Congress in the 1970s was overwhelmingly supported by both Republicans and Democrats (Turner and Isenberg 2018).

The novelty of introducing a new approach to environmental decision making, or addressing emerging environmental issues, should not be confused with the revolutionary overthrow of existing institutions. Impact assessment has facilitated the evolutionary 'piecemeal engineering' (bottom-up) of institutions, a characteristic of the 'open society', outlined by the philosopher Karl Popper (1945). That contrasts with the revolutionary 'utopian engineering' (top-down) of institutions, which is characteristic of a 'closed society'.

I have worked as a bureaucrat in the Australian Federal Government, administering the impact assessment process for over twenty years. In that role, I have had oversight of hundreds of EIAs in every Australian State and Territory. However I don't recognise the EIA and SEA processes described in academic papers, and taught at universities. While I initially accepted the conventional wisdom of analysing impact assessment processes through their legal frameworks, I soon found that approach to be largely irrelevant. Environmental lawyers and scientists generally analyse impact assessment in a parallel universe to the bureaucrats who administer it. The psychologist Daniel Kahneman (2011) explains our frame of bias in interpreting the world as follows:

> "Unless there is an obvious reason to do otherwise, most of us passively accept decision problems as they are framed and therefore rarely have an opportunity to discover the extent to which our preferences are frame-bound rather than reality-bound."

This paper looks at how impacts to aspects of Australian biodiversity are considered in EIA and SEA – a key feature of Australian Federal environmental legislation. But it analyses impact assessment, as a dynamic adaptive system, through the frame of complexity theory. The concept of 'best practice' only applies to simple systems, not complex systems (Snowden 2010). So the notion of applying 'best practice' to impact assessment is a fallacy.

EIA and SEA are influenced by an array of institutions, which are generally less visible or obvious than the legal frameworks of those processes. Institutions consist of both informal constraints; which include, sanctions, taboos, customs, traditions and codes of conduct – and formal rules; which include, constitutions, laws and property rights. The economic historian Douglass North (1990) defines institutions as follows:

> "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. In consequence they structure incentives in human exchange, whether political, social or economic."

A ‘messy’ array of institutions, both within the impact assessment processes, and external to those processes, drive decision-making. And understanding the institutional settings of EIA and SEA requires a multidisciplinary approach that encompasses economics, psychology, history and politics. However, environmental lawyers and scientists generally have a narrow ‘top-down’ perspective of EIA and SEA processes – displaying a quality that Nassim Taleb calls ‘epistemic arrogance’ (2007). They believe that those processes by their very nature should necessitate certain regulatory outcomes.

EIA and SEA processes have been successful in addressing some environmental issues more than others. For example, those processes encouraged the development of standards for air and water quality; which influences the acceptability of projects that can have a direct impact on human health. However those successes were the ‘low hanging fruit’ of those processes, due to the symmetry of interest of all people on health issues. But very different institutions influence decision-making on impacts to biodiversity. Therefore different approaches are required.

The belief that the legal processes of EIA and SEA should deliver good outcomes for biodiversity, by virtue of being environmental processes, is a tautology. Of course it is possible for good outcomes to occur, but those legal processes don’t generally set legal boundaries on acceptable levels of impacts. Impact assessment is an open-ended process which just provides the legal scaffolding for decision-making. And the claim that EIA and SEA has not achieved the outcomes that some commentators want, supports the thesis that their introduction was not revolutionary.

So what are the explicit and implicit institutions that influence the EIA and SEA processes in relation to impacts on biodiversity? They include a complex mix of government ownership of land, different forms of private land tenure (such as freehold land), mining rights, property easements, land zoning laws, the cultures of the bureaucracies that administer impact assessments and the consultancy firms that produce documents for public review. And the influence of those institutions may vary for different jurisdictions. That has implications for analysing EIA and SEA, which occur under unique baseline conditions (Taleb 2001). The outcomes of a particular process in any jurisdiction may not be readily transferable to another. And it is difficult to disaggregate the relative influence of the ‘messy’ array of institutions to quantify their particular roles within EIA and SEA processes. The social and political theorist, Isiah Berlin (1953) made the following comments in relation to a complex system:

> “… the greater the number of ‘minute’ causes you discriminate, the more appalling becomes the task of ‘deducing’ any consequence of the ‘unhinging’ of each of these, one by one; for each of the consequences affects the whole of the rest of the uncountable totality of events and things; which unlike chess is not defined in terms of a finite, arbitrarily chosen set of concepts and rules.”

An analysis of the institution of the bureaucracy illustrates the complex nature of institutional influences on EIA and SEA processes. Just consider the following subset of bureaucratic influences:

a) How the primary administrative function of the bureaucratic institutions that administers the EIA and SEA processes, influences those processes – administrative functions include planning, environmental or major project facilitation functions

b) Contrast the percentage of time bureaucrats spend engaging with proponents, consultants and other bureaucrats, with the time they spend directly engaging with the public
c) Consider the effectiveness of different methods of bureaucratic engagement – face to face meetings, telephone or letters – and which parties use those different methods
d) Consider how bureaucratic structure influences the manner in which assessment processes are managed. The separation of the assessment function of EIA and SEA from the post-approval function limits the bureaucratic field of vision. Managing both assessment and post-approval requirements creates a feedback loop which facilitates learning. That encourages bureaucrats to look beyond the assessment of each project, which facilitates experiments with innovative methods to address similar impacts.

All the above matters shape bureaucratic cultures, and influence the effectiveness of EIA and SEA in addressing impacts to biodiversity. But they are '*supposedly irrelevant factors*' which are largely ignored in policy decisions (Thaler 2015).

EIA and SEA are complex non-linear systems that are usually analysed by environmental lawyers and scientists as simple linear systems. That reflects the path dependence of their historic frames of analysis. However, both EIA and SEA have the potential for wide bandwidths of outcomes. And although past EIA and SEA decision-making doesn't constrain or determine future decision-making, the processes are usually managed to replicate the most recent assessments with similar impacts.

Decision-making on EIA and SEA processes is usually based on limited data sets obtained at points in time; which can constrain the rigour of assessments which are managed under statutory timeframes. And assessments are mostly administered as one-off events, rather than as a dynamic series of events that can be adaptively used to experiment with different approaches and innovations (Axelrod 1999). Bureaucrats can focus on assessing each discrete project, or they can use EIA and SEA processes to adaptively achieve strategic goals. For example, approval decisions can require every project to contribute to relevant research; so stronger links can be developed with research institutions which can then influence the evolution of those processes.

Constraints are a necessary feature of EIA and SEA processes, or those processes would become chaotic. And mention has been made of the formal and informal constraints of different institutions. It is also important to reflect on how different types of constraints influence EIA and SEA outcomes. The philosopher Alicia Juarrero (1999) describes constraints as 'governing constraints' and 'enabling constraints'. Environmentalists and academics generally lobby to introduce governing constraints into assessment processes, which they think will prevent certain impacts. However, decision-makers never have perfect knowledge, and cannot foresee unintended consequences. Whereas enabling constraints allow new institutions to emerge to conserve biodiversity. That is, enabling constraints promote Karl Popper's piecemeal engineering within an open society: a property that is described as emergent within complexity theory (Holland 1998).

When environmentalists don't succeed with their goals through EIA, they invent new institutions, such as SEA to replace it. That is, they focus on scaling the process up, without analysing or understanding the dynamics of the system they operate in. They expect new large scale processes to be administered as 'governing constraints'; although that is unlikely. Those scaled up processes are less likely to achieve the same outcomes on a pro rata basis, due to their scaled up consequences and the greater influence of a range of non-environmental institutions. Elinor Ostrom

(1990) has listed the variables which consistently influence the outcomes of collective actions, including symmetry of interests.

Environmentalists endeavour to impose their values relating to the conservation of biodiversity by influencing decision-makers. They can play a zero sum game, and seek to maximise their gains at the cost of proponents. Alternatively, they can accommodate proponent's objectives to optimise the gains for both – a non-zero sum game. Robert Wright (2000) asserts that cultural evolution is shaped and directed by 'non-zero sumness'. This raises a key issue of how both EIA and SEA processes address the issue of reciprocity (Ostrom 2003), when parties with asymmetric interests deal with impacts to biodiversity.

Failure to acknowledge the perspective of others engenders tribalism (Fukuyama 2018). The psychologist Jonathan Haidt (2012) stated the following about our righteous moral positions:

> "Morality binds and blinds. It binds us into ideological teams that fight each other as though the fate of the world depended on our side winning each battle. It blinds us to the fact that each team is composed of good people who have something important to say."

So what would be required for revolutionary changes to occur in EIA and SEA processes? The social activist Naomi Klein wrote a book entitled 'Shock Doctrine' (2007). In that book she noted that the economist Milton Friedman (1962) stated that "only a crisis – real or perceived – produces real change". She was critical of his advocacy of pushing through unpopular economic measures in the wake of wars and natural disasters. However, in her recent book 'This Changes Everything' (2014) she advocates for the same approach, taking advantage of the 'crisis' of climate change to promote a broad social agenda. The notion of using crises to achieve broad revolutionary objectives is analogous with Karl Popper's 'utopian engineering'. But that approach would require an authoritarian Hobbesian government (Hobbes 1668), as it could only achieve its objectives at the expense of existing institutions that have evolved over decades or even centuries in an 'open society' (Hayek 1974).

Analysing the decline of biodiversity from the heuristic (Lewis 2017) of a scientific or legal bias is inadequate. In order to develop effective conservation strategies, we must understand EIA and SEA processes as complex adaptive non-linear systems, which are influenced by a 'messy' array of institutions. Those processes can be used to promote innovation and test different approaches to conservation through 'piecemeal engineering'. Alternatively, environmentalists can take a risk and gamble on biodiversity loss through large scale processes. It is a choice between trial and error versus central planning in problem solving (Pinker 2018).

Bibliography

- Axelrod, Robert M. and Cohen, Michael D. 1999 *Harnessing Complexity: Organizational Implications of a Scientific Frontier* New York, The Free Press
- Banhalmi-Zakar, Z., Gronow, C., Wilkinson, L., Jenkins, B., Pope, J., Squires, G., Witt, K., Williams, G. & Womersley, J. 2018, Evolution or revolution: where next for impact assessment?, *Impact Assessment and Project Appraisal*, 36:6, 506-515, DOI: 10.1080/14615517.2018.1516846

- Berlin, Isaiah 1953, *The Hedgehog and the Fox: An Essay on Tolstoy's View of History* London, Weidenfeld & Nicolson
- Friedman, Milton 1962, *Capitalism and Freedom* Chicago, Chicago University Press
- Fukuyama, Francis 2018, *Identity: The Demand for Dignity and the Politics of Resentment* New York, Farrar, Strauss and Giroux
- Haidt, Jonathan 2012, *The Righteous Mind: Why Good People are Divided by Politics and Religion* New York, Pantheon Books
- Hayek, Freidrich 1974, The Pretence of Knowledge, Lecture to the memory of Alfred Nobel, December 11, 1974
- Hobbes, Thomas 1668, *Leviathan* Indianapolis: Hackett Publishing Company, edited with introduction and notes by Edwin Curley (1994)
- Holland, John H. 1998, *Emergence: From Chaos to Order* Reading, Massachusetts, Helix Books
- Juarrero, Alicia 1999, *Dynamics in Action: Intentional Behaviour as a Complex System* Cambridge, Massachusetts, The MIT Press
- Kahneman, Daniel 2011, *Thinking Fast and Slow* New York, Farrar, Strauss and Giroux
- Klein, Naomi 2007, *The Shock Doctrine: The Rise of Disaster Capitalism* Toronto, Alfred A. Knoff Canada
- Klein, Naomi 2014, *This Changes Everything: Capitalism vs. The Climate* Toronto, Alfred A. Knoff Canada
- Lewis, Michael 2017, *The Undoing Project: A Friendship that Changed our Minds* New York, W. W. Norton & Company
- North, Douglass C. 1990, *Institutions, Institutional Change and Economic Performance* Cambridge, Cambridge University Press
- Ostrom, Elinor 1990, *Governing the Commons: The Evolution of Institutions for Collective Action* New York, Cambridge University Press
- Ostrom, Elinor 2003, 'Toward a Behavioural Theory Linking Trust, Reciprocity and Reputation', in *Trust and Reciprocity: Interdisciplinary Lessons from Experimental Research*, eds Ostrom, Elinor and Walker, James New York, Russell Sage Foundation
- Pinker, Steven 2018, *Enlightenment Now: The Case for Reason, Science, Humanism and Progress* New York, Viking
- Popper, Karl 1945, *The Open Society and its Enemies* London, George Routledge & Sons
- Snowden, Dave 2010, *The Cynefin Framework* [accessed 2019 March 30] https://www.youtube.com/watch?v=N7oz366X0-8
- Taleb, Nassim Nicholas 2001, *Fooled by Randomness: The Hidden Role of Chance in the Markets and in Life* New York, Texere
- Taleb, Nassim Nicholas 2007, *The Black Swan: The Impact of the Highly Improbable* New York, Random House
- Thaler, Richard H. 2015, *Misbehaving: The Making of Behavioural Economics* New York, W. W. Norton & Company
- Turner, James and Isenberg, Andrew 2018, *The Republican Reversal: Conservatives and the Environment from Nixon to Trump* Cambridge, Massachusetts, Harvard University Press
- Wright, Robert 2000, *Non Zero: The Logic of Human Destiny* New York, Pantheon Books