RE-IMAGINING MINING:
The *Earth Charter* as a Guide for Ecological Mining Reform

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Introduction

Global society faces a deepening ecological crisis that will force profound changes,[1] including a transformation in the consumption and production of goods and services.[2] Current, and especially future, generations of human and other life will fare better if this transformation is actively pursued as soon as possible. At its core is a shift away from a growth-insistent economic model, especially in developed countries, to an economy that operates within the planet's biophysical limits, with much reduced material-energy

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[1] Johan Rockström, Will Steffen, Kevin Noone, Åsa Persson, F Stuart III Chapin, Eric Lambin, Timothy M Lenton, Marten Scheffer, Carl Folke, Hans Joachim Schellnhuber, Björn Nykvist, Cynthia A de Wit, Terry Hughes, Sander van der Leeuw, Henning Rodhe, Sverker Sörlin, Peter K Snyder, Robert Costanza, Uno Svedin, Malin Falkenmark, Louise Karlberg, Robert W Corell, Victoria J Fabry, James Hansen, Brian Walker, Diana Liverman, Katherine Richardson, Paul Crutzen, and Jonathan Foley, 'Planetary Boundaries: Exploring the Safe Operating Space for Humanity' (2009) 14:2 Ecol & Soc 3; Will Steffen, Asa Persson, Lisa Deutsch, Jan Zalasiewicz, Mark Williams, Katherine Richardson, Carole Crumley, Paul Crutzen, Carl Folke, Line Gordon, Mario Molina, Veerabhadran Ramanathan, Johan Rockström, Marten Scheffer, Hans Joachim Schellnhuber and Uno Svedin, 'The Anthropocene: From Global Change to Planetary Stewardship' (2011) 40 AMBIO 739; Will Steffen, Katherine Richardson, Johan Rockström, Sarah E Cornell, Ingo Fetzer, Elena M Bennett, R Biggs, Stephen R Carpenter, Wim de Vries, Cynthia A de Wit, Carl Folke, Dieter Gerten, Jens Heinke, Georgina M Mace, Linn M Persson, Veerabhadran Ramanathan, B Reyers and Sverker Sörlin, 'Planetary Boundaries: Guiding Human Development on a Changing Planet' (2015) January 15 Science 1; Will Steffen, Wendy Broadgate, Lisa Deutsch, Owen Gaffney and Cornelia Ludwig, 'The Trajectory of the Anthropocene: The Great Acceleration' (2015) The Anthropocene Review 1.

[2] Paul Hawken, Amory B Lovins and L Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution* (Little Brown1999).

throughputs and ecological footprints.[3] This will require fundamental changes in the political sphere and many other areas, including economics and law.[4]

In 1987, the Brundtland Commission recommended adopting a "new ethic" and a charter to set sustainability norms.[5] The *Earth Charter*[6] aims to inspire and guide this profound change in how humanity approaches development. If we are to translate ecological values into social change, we need to examine in specific contexts – such as the mining sector – what it would mean for principles such as those of the *Earth Charter* to be implemented, and we need to debate the implications of legal reform grounded in these kinds of principles.[7] Mining is one key component of the current growth-insistent economy,[8] and thus a key part of the transformation needed. This paper is a thought experiment that aims to advance this debate by exploring what guidance the *Earth Charter* provides for a potential transformation of the law of mining.

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[3] William E Rees, 'Avoiding Collapse: An Agenda for Sustainable Degrowth and Relocalizing the Economy' (Canadian Centre for Policy Alternatives 2014). <www.policyalternatives.ca/publications/reports/avoiding-collapse> accessed 1 December 2014.

[4] Thomas Berry, *The Great Work: Our Way into the Future* (Bell Tower 1999); Herman E Daly and Joshua Farley, *Ecological Economics* (Island Press 2004).

[5] Brundtland Commission, 'Report of the World Commission on Environment and Development: Our Common Future' (Annex to UN Doc A/42/427 1987) <www.un-documents.net/wced-ocf.htm> accessed 1 December 2014.

[6] Earth Charter Commission, *The Earth Charter* (2000) <www.earthcharterinaction.org/content/pages/Read-the-Charter.html> accessed 24 April 2014 (*Earth Charter*).

[7] Nicholas A Robinson writes: "Environmental law professors, practicing lawyers and judges will need to more explicitly orient their proposals and advice in light of the Earth Charter. We must test the application of the law against these basic jurisprudential concepts. Where the proposed action or advice is at variance with the core values, they must be revisited and re-examined." Nicholas A Robinson, 'Reflecting on Rio: Environmental Law in the Coming Decades' Chapter 2 in Jamie Benidickson, Ben Boer, Antonio Herman Benjamin and Karen Morrow (eds), *Environmental Law and Sustainability after Rio* (The IUCN Academy of Environmental Law Series, Edward Elgar 2011) 23-24.

[8] Martin Creamer, 'Global Mining Drives 45%-plus of World GDP – Cutifani' *Mining Weekly* (4 July 2012) <www.miningweekly.com/article/global-mining-drives-45-plus-of-world-gdp-cutifani-2012-07-04> accessed 7 May 2014.

Beyond a Growth-Insistent Economy

Challenging the economic growth paradigm is increasingly common. Thinkers who question whether infinite economic growth is possible or desirable on a finite planet include John Stuart Mill,[9] the Club of Rome,[10] Herman Daly,[11] Peter Victor,[12] Tim Jackson,[13] and many more who are converging in the degrowth movement.[14] Brown and Garver propose "a whole earth economy" which "is not necessarily a no-growth economy [but] an economy with other priorities: providing rich and fulfilling lives for both individuals and communities, but without pushing towards extreme wealth and advantages that destroy social and ecological well-being".[15] Science and economics increasingly make clear the need for future development to occur within the limits of a "safe and just operating space".[16] Law is critical in this process. Samuel Alexander argues that "when an economy has grown so large that it exceeds the regenerative and absorptive capacities of Earth's ecosystems, then lawmakers ought to initiate a 'degrowth' process of planned economic contraction".[17]

The Effects of Mining

Mining is understood comprehensively here to include all activities carried out to remove solid material from the earth and seabed (including coal and bitumen) for diverse uses.[18] Materials originating in mining (herein "minerals" or "mined materials") are essential to

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[9] John Stuart Mill, *Principles of Political Economy* (D Appleton and Company 1884).

[10] Donella H Meadows and Club of Rome, *Limits to Growth: A Report for the Club of Rome's Project* (Universe Books 1972).

[11] Herman E Daly, *Steady-State Economics* (Island Press 1991).

[12] Peter Victor, Managing without Growth: Slower by Design, Not Disaster (Edward Elgar c2008).

[13] Tim Jackson, Prosperity without Growth: Economics for a Finite Planet (Earthscan 2009).

[14] See Giacomo D'Alisa, Federico Demaria and Giorgos Kallis (eds), *Degrowth: A Vocabulary for a New Era* (Routledge 2015).

[15] Peter Brown and Geoffrey Garver, *Right Relationship: Building a Whole Earth Economy* (Berrett-Koehler Publishers 2009) 26.

[16] Steffen et al, 'Planetary Boundaries' (n 1); Kate Raworth, 'A Safe and Just Space for Humanity: Can We Live Within the Doughnut?' (Oxfam 2012).

[17] Samuel Alexander, 'Earth Jurisprudence and the Ecological Case for Degrowth' in Peter Burdon (ed), *Exploring Wild Law: The Philosophy of Earth Jurisprudence* (Wakefield Press 2011) 293.

[18] Encyclopædia Britannica Online, s. v. "mining," <www.britannica.com.proxy.bib.uottawa.ca/EBchecked/topic/384099/mining> accessed 30 April 2014.

virtually all other industries and have substantial economic and social impacts,[19] contributing to human well-being through goods, services and employment.[20] However, humanity is coming up against the physical limits of the planet in at least two ways that call for a serious questioning of extractive activities: 1) mining causes negative impacts that are ecologically unsustainable; 2) most mined materials are finite and nonrenewable. Extractive activities are compromising ecological integrity locally and regionally, undermining traditional livelihoods,[21] destroying habitats,[22] and leaving an expensive pollution legacy.[23] Mining contributes to the ever-increasing consumption of energy and materials, and the accumulation of wastes and toxic substances.[24] According to UNEP, during the twentieth century "the annual extraction of construction materials grew by a factor of 34, ores and minerals by a factor of 27, fossil fuels by a factor of 12, biomass by a factor of 3.6, and total material extraction by a factor of about eight, while GDP rose 23-fold".[25] As UNEP also notes: "This expansion of material consumption was not equitably distributed and it had profound environmental impacts."[26]

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[19] International Council on Mining and Metals (ICMM), 'Mining's Contribution to Sustainable Development: The Series' <www.icmm.com/minings-contribution>, ch 1, 2; James Otto, 'Mining Royalties: A Global Study of Their Impact on Investors, Government, and Civil Society' (World Bank c2006).

[20] The Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development reckons 30 million people are employed in the mining industry globally. IGF, 'Mining and Sustainable Development: Managing One to Advance the Other' (IGF October 2013) 20.

[21] The Gaia Foundation, *UnderMining Agriculture: How the Extractive Industries Threaten Our Food System* (The Gaia Foundation 2014) <www.gaiafoundation.org/UnderMiningAgriculture> accessed 1 December 2014.

[22] Philippe Sibaud, *Opening Pandora's Box: The New Wave of Land Grabbing by the Extractive Industries and the Devastating Impact on Earth* (The Gaia Foundation 2012) <www.gaiafoundation.org/opening-pandoras-box> accessed 1 December 2014, 33-44.

[23] See for example, Jack Cladwell, 'Giant Mine to Cost Billions to Cleanup and Look After for Thousands of Years' (Mining.com 3 April 2013) <www.mining.com/giant-mine-to-cost-billions-to-cleanup-and-look-after-for-thousands-of-years-63654/> accessed 1 December 2014.

[24] Clive Ponting, A Green History of the World: The Environment and the Collapse of Great Civilizations (Penguin Books 1993) 325-329.

[25] International Resource Panel, 'Decoupling Natural Resource Use and Environmental Impacts from Economic Growth' (UNEP 2011) <www.unep.org/resourcepanel/Portals/24102/PDFs/DecouplingENGSummary.pdf> 7.

[26] Ibid.

Thus, mining contributes directly and indirectly to humanity's overshooting of the carrying capacity of ecosystems[27] and the potential transgression of planetary boundaries.[28]

Control over natural resources is a matter under exclusive state sovereignty. Thus, there is no international law regarding mining, aside from restrictions on mining the seabed,[29] Antarctica,[30] and the Moon.[31] However, international soft law – especially the concept of sustainable development – increasingly influences how mining is regulated,[32] while debates on human rights, development and environmental degradation shape expectations of the sector's behaviour.[33]

How states regulate mining varies considerably, with stricter standards often applied in countries with strong legal systems and active civil societies.[34] Countries generally

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[27] WWF estimates "our demand for renewable ecological resources and the goods and services they provide is now equivalent to more than 1.5 earths" and that "since the 1990s we have reached overshoot by the ninth month every year". R McLellan, L Iyengar, B Jeffries and N Oerlemans (eds), *Living Planet Report 2014: Species and Spaces, People and Places* (WWF 2014) <wwf.panda.org/about_our_earth/all_publications/living_planet_report/> 32, 33 accessed 1 December 2014.

[28] While not explicitly addressed in the planetary boundaries framework, mining directly and indirectly impacts humanity's "operating space": it contributes to biodiversity loss through pollution, and direct and induced habitat destruction; to land use change through displacement of agricultural communities, and forest clearing; to climate change through coal and bitumen mining; to the production of fertilizers disrupting the Nitrogen and Phosphorous cycles. Rockström, et al (n 1).

[29] *United Nations Convention on the Law of the Sea* (adopted 10 December 1982, entered into force 16 November 1994) 31363 UNTS 1833, 1834, 1835 (*UNCLOS*) Part XI art 136.

[30] *Protocol on Environmental Protection to the Antarctic Treaty* (adopted 4 October 1991, entered into force 14 January 1998) 5778 UNTS (no v no.) art 7.

[31] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (adopted 27 January 1967, entered into force 10 October 1967) 8843 UNTS 610 art 11.

[32] George Pring, James Otto and Koh Naito, 'Trends in International Environmental Law Affecting the Minerals Industry' (1999) 17 J. Energy & Nat. Resources L. 39 (part I) and (1999) 17 J. Energy & Nat. Resources L. 151 (part II); cf generally Alexander Gillespie, *The Illusion of Progress: Unsustainable Development in International Law* (Earthscan Publications 2001).

[33] See for example, Ramsey Hart and Catherine Coumans, 'Evolving Standards and Expectations for Responsible Mining: A Civil Society Perspective' (MiningWatch Canada 2013).

[34] See for example, Günter Tiess, Legal Basics of Mineral Policy in Europe: An Overview of 40 Countries (Springer c2011).

encourage mining, while imposing measures to limit its negative impacts on people and the environment.[35] Legal frameworks vary, but they often include these elements: arrangements for access to the resources and the land, usually linked to taxes and royalties; requirements for prospecting and exploration activities; provisions for compensation of affected landowners and communities; requirements of environmental impact assessment for large projects; worker health and safety rules; obligations regarding effluent and waste treatment, storage, and disposal; noise and air pollution standards; monitoring and reporting requirements; and mine closure provisions, which may include reclamation plans and financial warranties.[36]

Additionally, voluntary industry standards[37] and market-based instruments[38] are increasingly gaining traction, while a number of international initiatives have bearing on mineral extraction, for example, by requiring environmental and human rights assessments as conditions for financing.[39] These measures are aimed at ensuring projects respect human rights, communities, and the environment, but industry insiders admit that "despite good intentions at the strategy level and examples of good practice, the complexity of situations at the mine site means implementation across the sector is highly variable".[40] Critics posit that "sustainable mining" is the "emperor's new clothes" and that nothing has changed for communities affected by mining.[41]

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[35] Marta Miranda, David Chambers and Catherine Coumans, 'Framework for Responsible Mining: A Guide to Evolving Standards' (Center for Science in Public Participation & WRI/WWF, 2005).

[36] Ibid 54.

[37] Hevina S Dashwood, 'Sustainable Development and Industry Self-Regulation: Developments in the Global Mining Sector' (2014) 53:4 Business & Society 551; ICMM, '10 Principles' <www.icmm.com/our-work/sustainable-development-framework/10-principles> accessed 6 February 2014.

[38] For example, Institute of the Environment, "Getting Biodiversity Offsets Right: A Research Agenda for Canada" (IE, 15 October 2014) <www.ie.uottawa.ca/article1010> accessed 6 December 2014.

[39] See list of ten major international mining initiatives in Abbi Buxton, 'MMSD+10: Reflecting on a Decade of Mining and Sustainable Development' (International Institute for Environment and Development 2012) 13.

[40] Ibid 2.

[41] Andy Whitmore, 'The Emperor's New Clothes: Sustainable Mining?' (2006) 14(3) Journal of Cleaner Production 309.

Ultimately, despite legal and voluntary frameworks, local environmental impacts are often substantial and sustainability, even "*sensu lato*," is not the norm.[42] For example, in Canadian tar sands surface mining, an "overburden" of approximately 75 meters is normally removed before mining the bitumen deposits (typically 40-60 meters thick) causing a loss of boreal forest intactness of approximately 90.6 percent in the mined area.[43] Additionally, these operations use a net volume of 2.4 barrels of freshwater (a total between 7.5 and 12 barrels including recycled water) to extract and upgrade one barrel of bitumen, and waste water is stored in tailings lagoons as it cannot be reincorporated into the water cycle due to its high toxicity.[44] Many affected Aboriginal communities are seeking judicial remedies and a halt to tar sands expansion.[45]

We need to transform mining to avoid further disrupting the Earth's ecosystems and deepening inequities with respect to poor and marginalized people, and to future generations of humans and other species. Because the *Earth Charter* sets out principles for a deep transformation of society centered on ecological integrity,[46] it is a good place to start in imagining what rules would govern mining in an ecologically sustainable world.

The Earth Charter as a Guide for Ecological Legal Reform

The *Earth Charter* is a call for a world of peace, equity, and sustainability based on new and long-held ideas from many different disciplines, including law, ecology, theology and ethics. Despite the recommendation of the Brundtland Commission to create a charter setting

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[42] Jaime M Amezaga, Tobias S Rötting, Paul L Younger, Robert W Nairn, Anthony-Jo Noles, Ricardo Oyarzún, Jorge Quintanilla, 'A Rich Vein? Mining and the Pursuit of Sustainability' (2011) 45 Environmental Science & Technology 21.

[43] David Poulton, 'The Alberta Oilsands: Considerations for Offsetting' (14 February 2014) <www.ie.uottawa.ca/tiki-calendar_edit_item.php?viewcalitemId=54> 10, 12 (citing Thomas J Habib, Daniel R Farr, Richard R Schneider, Stan Boutin, 'Economic and Ecological Outcomes of Flexible Biodiversity Offset Systems' (2013) 27(6) Conservation Biology 1313, 1316).

[44] Pembina Institute, 'Oilsands: Water Impacts' <www.pembina.org/oil-sands/os101/water> accessed 26 February 2014.

[45] 'Alberta Oilsands Facing Aboriginal Legal Onslaught in 2014' (The Canadian Press January 2, 2014) <www.cbc.ca/news/politics/alberta-oilsands-facing-aboriginal-legal-onslaught-in-2014-1.2481825> accessed 10 February 2015.

[46] Klaus Bosselmann, 'The Rule of Law Grounded in the Earth: Ecological Integrity as a *Grundnorm*' in Laura Westra and Mirian Vilela (eds), *The Earth Charter, Ecological Integrity and Social Movements* (Routledge 2014) 9.

sustainability norms,[47] during the 1992 Rio Earth Summit states adopted the non-binding *Rio Declaration on Environment and Development* instead.[48] Civil society took on the task of producing this charter,[49] and after nearly a decade of international consultations to which over 5,000 people contributed, the *Earth Charter* was officially launched in 2000. It is a "soft law instrument that provides an ethical foundation for the ongoing development of environmental and sustainable development law",[50] not a binding international convention. It has not been adopted by states, but thousands of organizations including UNESCO and the IUCN have formally endorsed it.[51] In its fifteenth anniversary, it remains relevant because, as Klaus Bosselmann writes: "As a declaration of principles for a just, sustainable, and peaceful world, the [Earth] Charter reflects the fundamental importance of sustainability as an ethical and law-generating principle."[52] It may be an instrument whose time has come given the urgent need for new rules to avoid social-ecological collapse.[53] We may have entered a new geological era defined by our species' impact on the planet – the Anthropocene –, which demands a governance transformation for planetary stewardship.[54] The *Earth Charter's* emphasis on shared global responsibility offers an anchor for this new global governance.[55]

There is a wide gap between what the Brundtland Report meant by "sustainable development" and how states have interpreted it.[56] Fundamentally, this gap derives from the failure to recognize ecological sustainability as a prerequisite for social and economic

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[47] Brundtland Commission (n 5).

[48] *Rio Declaration on Environment and Development*, (UN Doc A/CONF 151/26 vol I 1992) <www.un-documents.net/rio-dec.htm> accessed 1 December 2014.

[49] Earth Charter Initiative, 'Background History of the Earth Charter Initiative' <www.earthcharterinaction.org/content/pages/History.html > accessed 23 April 2014.

[50] Earth Charter Initiative, 'How Can the Earth Charter Be Used?' <www.earthcharterinaction.org/content/pages/FAQ.html> accessed 23 April 2014; Klaus Bosselmann, 'In Search of Global Law: The Significance of the Earth Charter' (2004) 8(1) Worldviews: Global Religions, Culture, and Ecology 62.

[51] Earth Charter Initiative, "Endorse," <www.earthcharterinaction.org/content/pages/Endorse.html> accessed 24 April 2014.

[52] Klaus Bosselmann, The Principle of Sustainability: Transforming Law and Governance (Ashgate 2008) 74-75.

[53] Bosselmann, 'The Rule of Law Grounded in the Earth' (n 46) 10.

[54] Steffen et al, 'The Anthropocene' (n 1).

[55] Bosselmann, 'In Search of Global Law' (n 50).

[56] Jim MacNeill, 'Brundtland Revisited' (Canadian International Council, 4 February 2013) <http://opencanada.org/features/the-think-tank/essays/brundtland-revisited/> accessed 24 April 2014.

sustainability: not to be balanced with social and economic interests, but prioritized over them, because social and economic systems are embedded in and dependent on the Earth's systems.[57] The *Earth Charter* proposes "interdependent principles for a sustainable way of life as a common standard by which the conduct of all individuals, organizations, businesses, governments, and transnational institutions is to be guided and assessed".[58] These principles have been a guide for all kinds of organizations, businesses, and education initiatives.[59]

Similarly, the *Earth Charter* can provide guidance for legal reform.[60] As awareness grows of the need to transition to an economy that respects ecological limits, a parallel need for changes in legal and policy frameworks must also emerge.[61] The *Earth Charter* is a good starting point, not because it is the last word on what is required for a transition to sustainability – even some of its longstanding advocates underscore that it is meant to evolve.[62] It is a good lens for considering transformative legal reforms towards sustainability because it seeks to overcome some of the key flaws of environmental law.[63] It underscores the interconnectedness of life, rejecting the "core falsehood that we humans are separate from our environment and that we can flourish even as the health of Earth deteriorates".[64] Also, it prioritizes ecological limits, thus "challenging the dominant paradigm of endless economic growth based on ever-increasing consumption of energy and resources".[65] The preeminence of growth over ecological limits within current environmental law is why it has been critiqued as "treating the symptoms, not the causes, of the problems".[66] Environmental law before and since the *Earth Charter* has developed many principles (for example,

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[57] Bosselmann, The Principle of Sustainability (n 52) 2.

[58] *Earth Charter* (n 6) Preamble.

[59] See some examples in Westra and Vilela (n 46).

[60] Robinson (n 7); Bosselmann, 'In Search of Global Law' (n 50) 9; Ronald Engel and Brendan Mackey, "The Earth Charter, Covenants, and Earth Jurisprudence" in Burdon (n 17) 313.

[61] Geoffrey Garver, 'The Rule of Ecological Law: The Legal Complement to Degrowth Economics' (2013) 5 Sustainability 316 <doi:10.3390/su5010316>.

[62] J Ronald Engel, 'Summons to a New Axial Age–The Promise, Limits and Future of the Earth Charter' in Westra and Vilela (n 46) xxv.

[63] See for example, David R Boyd, 'Sustainability Law: (R)Evolutionary Directions for the Future of Environmental Law' (2004) 14 J Env L & Prac 357.

[64] Cormac Cullinan, *Wild Law: A Manifesto for Earth Justice*, (2nd edn Chelsea Green Pub c2011) 44.

[65] David R Boyd, Unnatural Law: Rethinking Canadian Environmental Law and Policy (UBC Press c2003) 276.

[66] Ibid 277.

sustainable development, polluter-pays, public participation, etc.[67]) and rules protecting certain spaces and species (such as protected areas designations[68] and endangered species laws[69]) or prohibiting environmentally harmful practices (for example, hazardous waste trade restrictions,[70] air pollution[71] and toxic substances control measures,[72] etc.).[73] These are valuable tools to build upon. However, in contrast to environmental law, "the Earth Charter […] is in its entirety designed around the concept of ecological integrity".[74]

Yet how can the aspirations of the *Earth Charter* lead to concrete changes in the laws and activities of current societies? This requires expanding our thinking to include radical possibilities, such as imagining how activities like mining might be approached under the *Earth Charter*. This paper is just such a thought experiment.

Three *Earth Charter* Rules for Mining

What basic rules would govern mining if the *Earth Charter* guided law? While all of its principles offer guidance, this paper focuses primarily on its two explicit references to natural resources.

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[67] Rio Declaration on Environment and Development (n 48) Principles 4, 10, 16.

[68] For example, the *Convention for the Protection of the World Cultural and Natural Heritage* (adopted 16 November 1972, entered into force 17 December 1975) 15511 UNTS 1037.

[69] For example, the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (adopted 3 March 1973, entered into force 1 July 1975) 14537 UNTS 993.

[70] For example, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (adopted 22 March 1989, entered into force 5 May 1992) 28911 UNTS 1673.

[71] Trail Smelter Arbitration (United States v. Canada) Arbitral Trib., 3 U.N. Rep. Int'l Arb. Awards 1905 (1941) (Trail Smelter); Convention on Long-Range Transboundary Air Pollution (adopted 13 November 1979, entered into force 16 March 1983) 21623 UNTS 1302.

[72] For example, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (adopted 10 September 1998, entered into force 24 February 2004) 39973 UNTS 2244; and the Stockholm Convention on Persistent Organic Pollutants (adopted 22 May 2001, entered into force 17 May 2004) 40214 UNTS 2256.

[73] See also Pring, Otto and Naito (n 32); Jeremy P Richards (ed), *Mining, Society, and a Sustainable World* (Springer 2009); 'The Future We Want' (UNGA Resolution A/RES/66/288, 11 Sep 2012, Annex) <www.uncsd2012.org>.

[74] Bosselmann, 'The Rule of Law Grounded in the Earth' (n 46) 9.

Under the theme of "Respect and Care for the Community of Life," Principle 2 provides that we should "[a]ccept that with the right to own, manage, and use *natural resources* comes the duty to prevent environmental harm and to protect the rights of people".[75] The other reference to mining occurs under the theme of "Ecological Integrity", where Principle 5 – *"Protect and restore the integrity of Earth's ecological systems, with special concern for biological diversity and the natural processes that sustain life"*[76] – specifically provides that we must *"[m]anage the extraction and use of non-renewable resources such as minerals and fossil fuels in ways that minimize depletion and cause no serious environmental damage".77*

Three key rules derive from these two *Earth Charter* principles:

1. *Prevent environmental harm* or *cause no serious environmental damage;*
2. *Minimize depletion*; and
3. *Protect the rights of people*.

As noted, these rules build upon existing principles and concepts of environmental and sustainable development law, policy and scholarship, which the *Earth Charter* aims to anchor to ecological integrity and justice.[78] Also, as overarching rules, their application to different types of mining, materials and contexts will have varying implications and may require different approaches. For example, applying these rules to minerals used (such as rare earths) or consumed (such as coal) in energy production requires considering their impacts on the environment and the climate change context.[79]

Rule 1: Prevent Environmental Harm or Cause No Serious Environmental Damage

The distinctions between preventing environmental harm and causing no serious environmental damage could be debated, but in this paper they are treated as equivalent.

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[75] *Earth Charter* (n 6) Principle 2(a) (emphasis added).

[76] Ibid Principle 5.

[77] Ibid Principle 5(f) (emphasis added).

[78] See also Heinrich Böll Foundation (ed), 'Resource Politics for a Fair Future' (Heinrich Böll Foundation 2014) (deriving similar rules for resource governance) 34-35.

[79] Damien Giurco, Benjamin McLellan, Daniel M Franks, Keisuke Nansai and Timothy Prior, 'Responsible Mineral and Energy Futures: Views at the Nexus' (2014) 84 Journal of Cleaner Production 322.

While there is no single definition of environmental harm or damage in environmental law, it has been conceived predominantly as a function of harm to people or property.[80] In contrast, the meaning of "environmental harm" and "serious environmental damage" should be understood through the increasingly recognized concept of "ecological integrity", one of the core *Earth Charter* themes. The green movement has long advocated that ecology should be at the forefront of decision-making.[81] The concept offers an important tool for environmental management,[82] and it has been proposed as a rule to constrain the use of property[83] and a "*grundnorm*" for international environmental law.[84] The Global Ecological Integrity Group[85] suggests that a standard of ecological integrity requires functional, life-sustaining ecosystems, with whole reproductive and regenerative capacities.[86] The Panel on the Ecological Integrity of Canada's National Parks states that "[i]n plain language, ecosystems have integrity when they have their native components (plants, animals and other organisms) and processes (such as growth and reproduction) intact".[87] Thus, a

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[80] *Trail Smelter* (n 71); see also for example, José Juan González, 'Towards a New Theory of Environmental Liability Without Proof of Damage' in Benidickson, Boer, Benjamin and Morrow (n 7) 179-195; Albert C Lin, 'The Unifying Role of Harm in Environmental Law' (2006) Wis L Rev 897, 977-983.

[81] Heinrich Böll Stiftung Foundation, 'Ecology' <www.boell.de/en/topics/ecology> accessed 20 January 2015.

[82] GA De Leo and S Levin, 'The Multifaceted Aspects of Ecosystem Integrity' (1997) 1(3) Conservation Ecology 1.

[83] Joseph H Guth, 'Law for the Ecological Age' (2007-2008) 9 Vt J Envtl L 431.

[84] Rakhyun E Kim and Klaus Bosselmann, 'International Environmental Law in the Anthropocene: Towards a Purposive System of Multilateral Environmental Agreements' (2013) 2 Transnational Environmental Law 285 doi:10.1017/S2047102513000149.

[85] Jack Manno, 'Why the Global Ecological Integrity Group? The Rise, Decline and Rediscovery of a Radical Concept' in Laura Westra and Agnès Prudence Michelot (eds), *Confronting Ecological and Economic Collapse: Ecological Integrity for Law, Policy and Human Rights* (Taylor and Francis 2013) 10-20.

[86] David Pimentel, Laura Westra and Reed F Noss (eds), *Ecological Integrity: Integrating Environment, Conservation, and Health* (Island Press 2000) 20-21, 99. See also Guth (n 83) (proposing a tort of "ecological degradation" where "'ecological degradation' is intended to mean the biotic impoverishment and decline in the self-sustaining and self-renewing capacity of the biosphere") 496; Geoffrey Garver, 'A Complex Adaptive Legal System for the Challenges of the Anthropocene' (forthcoming) 5-6.

[87] Parks Canada Agency, 'Unimpaired for Future Generations: Protecting Ecological Integrity with Canada's National Parks: A Call to Action' (2000) <http://publications.gc.ca/collections/Collection/R62-323-2000-1E.pdf> accessed 24 April 2014, 2.

significant loss of intactness of an ecosystem's native components and processes determines "serious environmental damage".

The *Earth Charter* emphasizes avoiding serious impacts, while existing legal requirements and voluntary commitments seek to *minimize* and *mitigate* environmental harm, but rarely to *prevent* it or to *refrain* from causing it.[88] Because of the nature of extractive activities, this difference is significant: it could mean that under the *Earth Charter* only a reduced number of projects may be considered viable. Currently, environmental damage is regularly allowed, if later mitigated or compensated. In contrast, *preventing* or *causing no serious environmental damage* imply that serious harm to the environment in the short term may not be justified by expectations that the damage may be corrected in the long term. Although minimization of harm may include some prevention, mitigation of effects and compensation are not the equivalent of prevention.[89]

Principle 6 of the *Earth Charter* further links protection, prevention and precaution: "*prevent* harm as the best method of environmental *protection* and, when knowledge is limited, apply a *precautionary* approach".[90] The *Earth Charter's* precautionary approach has four elements. The first builds on the precautionary principle,[91] requiring action "to avoid the possibility of serious or irreversible environmental harm even when scientific knowledge is incomplete or inconclusive".[92] The second relates to responsibility and calls for placing "the burden of proof on those who argue that a proposed activity will not cause significant harm, and [for making] the responsible parties liable for environmental harm".[93] The third element concerns the temporal and spatial scope of precaution, and requires "ensur[ing] that decision making addresses the cumulative, long-term, indirect, long distance, and global consequences of human activities".[94] Finally, the fourth element builds on the basic principle of prevention,[95]

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[88] See for example, Mining Association of Canada (MAC), 'Toward Sustainable Mining Guiding Principles' <http://mining.ca/sites/default/files/documents/TSMGuidingPrinciples_0.pdf> accessed 9 December 2014.

[89] 'Prevent' means 'stop from happening or doing something; hinder; make impossible'. Della Thompson (ed), *The Concise Oxford Dictionary of Current English* (9th edn Clarendon Press 1995) *SV* 'prevent'.

[90] *Earth Charter* (n 6) Principle 6 (emphasis added)

[91] Philippe Sands, Jacqueline Peel, Adriana Fabra and Ruth MacKenzie, *Principles of International Environmental Law* (Cambridge University Press, 2012) 217.

[92] *Earth Charter* (n 6) Principle 6(a).

[93] Ibid Principle 6(b).

[94] Ibid Principle 6(c).

and calls for "prevent[ing] pollution of any part of the environment and allow[ing] no build-up of radioactive, toxic, or other hazardous substances".[96]

Thus, the *Earth Charter's* precautionary approach also incorporates avoidance, in contrast to that of the *Rio Declaration*, which only provides that "lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".[97] Also, the *Earth Charter* does not make cost-effectiveness a pre-condition of preventive action. Applying this to mining may require foregoing extraction of a particular mineral, for example, due to its toxicity; or in certain places, such as biodiversity hotspots. The mining proponent would have to prove the activity will cause no significant environmental harm, considering "cumulative, long-term, indirect, long distance, and global"[98] impacts, and would be liable if any such harm occurred. Currently, examples of environmental concerns preempting harmful economic activities appear to be few.[99] The norm is that activities are allowed to proceed under certain conditions, sometimes numerous and strict but often not properly implemented, effectively monitored or adequately enforced.[100]

Having defined the *cause no serious environmental damage* standard, to apply it to mining, one needs to consider what is mined, where, and how.

What to Mine?

Markets, technology and access to mineral deposits usually determine what materials are mined. Whether the material may cause serious environmental damage at the mining stage or in its life cycle is not a threshold consideration, but a technical issue. Applying this

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[95] Sands, Peel, Fabra and MacKenzie (n 91) 200.

[96] *Earth Charter* (n 6) Principle 6(d).

[97] Rio Declaration on Environment and Development (n 48) Principle 15.

[98] Ibid Principle 6(c).

[99] Research for this paper did not include a comprehensive review of environmental assessment decisions. However, at the federal level in Canada, for example, among the mining projects listed as completed under the Canadian Environmental Assessment Agency (CEAA) registry since 2012, one project was denied approval on the basis of environmental concerns (twice), four were authorized, and one was authorized despite a determination that it may cause serious environmental harm. CEAA, 'Browse Projects, Environmental assessment completed' <www.ceaa-acee.gc.ca/050/navigation-eng.cfm?type=2&id=2> accessed 29 April 2014.

[100] Miranda, Chambers and Coumans (n 35) xi.

criterion alone would mean a major departure from current practice, which generally approaches risk through minimization and mitigation, rather than avoidance.[101]

Mining for extremely toxic or hazardous minerals (mostly metals and radioactive materials), and mining with highly damaging processes both carry very high risks of serious environmental damage. In order to *cause no serious environmental damage*, and "prevent pollution of any part of the environment and allow no build-up of radioactive, toxic, or other hazardous substances"[102] the use and extraction of these materials would have to be eliminated. Life-saving uses – such as certain radiation-based medical diagnostic procedures, cancer treatments, and sterilization of medical equipment[103] – may justify exceptional extraction until substitutes are found, and provided their recovery from other processes or wastes is not possible.

In the case of mined fossil fuels (coal and bitumen), given the increasing damage from climate change,[104] *causing no serious environmental damage* also requires halting their extraction beyond the amount that can be safely consumed without exceeding systems thresholds for catastrophic climate change, taking a precautionary approach. In fact, the International Panel on Climate Change and others have called for keeping about two-thirds of proven fossil fuel reserves underground.[105]

Eliminating the extraction and use of hazardous materials is not unprecedented. For example, the elimination of mercury – which is extremely toxic and persistent – is in progress. According to UNEP, primary mining of mercury is taking place in only a few of the

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[101] MAC (n 88).

[102] *Earth Charter* (n 6) Principle 6(d).

[103] World Nuclear Association, 'Radioisotopes in Medicine' (July 2014) <www.world-nuclear.org/info/Non-Power-Nuclear-Applications/Radioisotopes/Radioisotopes-in-Medicine/> accessed 16 September 2014; Teach Nuclear, 'Medical Applications' <http://teachnuclear.ca/contents/cna_nuc_tech/med_app_intro/> accessed 16 September 2014.

[104] See for example, Jianchu Xu, R Edward Grumbine, Arun Shrestha, Mats Eriksson, Xuefei Yang, Yun Wang, Andreas Wilkes, 'The Melting Himalayas: Cascading Effects of Climate Change on Water, Biodiversity, and Livelihoods' (2009) 23(3) Conservation Biology 520.

[105] 'Synthesis Report of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)' (adopted at the 40th Session of the IPCC, 1 November 2014, Copenhagen) 66-67; International Energy Agency, 'World Energy Outlook 2012' <www.iea.org/publications/freepublications/publication/English.pdf> accessed 29 April 2014, 3.

countries where mercury occurs.[106] An important milestone was the signing of the *Minamata Convention on Mercury*, which "includes a ban on new mercury mines, the phase-out of existing ones, control measures on air emissions, and the international regulation of the informal sector for artisanal and small-scale gold mining [which uses mercury]". [107] Implementation challenges are not negligible, however, especially in the context of artisanal small-scale mining.[108] Amalgamation with mercury is a simple and fast technology for gold recovery, while poor artisanal miners often cannot afford alternative methods and require assistance in adopting safe practices or transitioning to other more ecologically and economically sustainable livelihoods. [109]

Finally, while the *Earth Charter* is clear about avoiding radioactive materials, it does not explicitly oppose nuclear energy. The question is whether this should be treated as an exceptionally acceptable use of radioactive materials due to increasing climate change risks from carbon based energy sources. The toxicity of radioactive materials, their extraction through highly damaging processes, and the legacy issues involved point strongly against it. However, given the alarmingly increasing climate change risks, whether alternative renewable energy sources will permit avoiding this trade-off is hotly debated.[110] A planned timetable leading from reduction to elimination of both sources of energy in favour of more sustainable sources may be required. The *Earth Charter* would, however, clearly prevent the ongoing expansion of bitumen mining and would at least require that expansion of nuclear energy would be conditional on eliminating bitumen and coal extraction.

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[106] UNEP, 'Mercury – Time to Act' (2013), <www.unep.org/PDF/PressReleases/Mercury_TimeToAct_hires.pdf> accessed 29 April 2014, 15.

[107] *Minamata Convention on Mercury*, (adopted 10 October 2013, 128 signatories and 9 parties, as of 9 December 2014) <www.mercuryconvention.org/Convention/tabid/3426/Default.aspx> accessed 9 December 2014.

[108] See for example, Sue Blaine, 'Illegal Mining in Roodepoort Despite State's "Action"' (Business Day Live October 24 2012) <www.bdlive.co.za/national/science/2012/10/24/illegal-mining-in-roodepoort-despite-states-action> accessed 11 February 2015; Martin J Clifford, 'Future Strategies for Tackling Mercury Pollution in the Artisanal Gold Mining Sector: Making the Minamata Convention Work' (2014) 62 Futures 106.

[109] Alliance for Responsible Mining, 'Fairmined® Gold and Mercury Use by Artisanal Miners? ARM's Position: No Contradiction' <www.communitymining.org> accessed 23 February 2015.

[110] See for example, R M Harrison, R E Hester (eds), *Nuclear Power and the Environment* (Royal Society of Chemistry c2011) <DOI:10.1039/9781849732888> Preface; cf Kristin Shrader-Frechette, *What Will Work: Fighting Climate Change with Renewable Energy, Not Nuclear Power* (Oxford Scholarship Online 2012) <DOI:10.1093/acprof:oso/9780199794638.001.0001> ch 6, 7.

Where to Mine?

By definition, mining disturbs terrestrial and aquatic ecosystems.[111] Even a project with minimal land disturbance and a comprehensive restoration plan aimed at achieving a net benefit to biodiversity – the objective of some biodiversity offset mechanisms[112] – cannot guarantee that no serious short to medium term environmental harm will be caused, or that restoration efforts will not fail. This puts certain areas off limits under the *cause no serious environmental damage* norm. Building on international law and policy aimed at protecting special sites, WWF suggests off-limits areas include the following:

- *Highly protected areas (IUCN categories I-IV, marine category I-V protected areas, UNESCO World Heritage sites, core areas of UNESCO biosphere reserves, and Natura 2000 sites in European Union countries);*
- *Proposed protected areas within priority conservation areas selected through ecoregional planning exercises;*
- *Areas containing the last remaining examples of particular ecosystems or species even if these lie outside protected areas; or*
- *Places where mineral activities threaten the wellbeing of communities including, particularly, local communities and indigenous people.*[113]

Agricultural lands are also emerging as an alarming example of "places where mineral activities threaten the wellbeing of communities". Extraction of lower grade mineral reserves is increasingly taking place on, or adjacent to, agricultural lands, directly removing soil, consuming and polluting water needed for agriculture, and increasing air pollution that affects crops and animals.[114] A recent report advocates that "[a]gricultural and food

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[111] See for example, 'Mining: Adding Up the Costs of a Hole in the Ground' in *Soil Atlas: Facts and Figures about Earth, Land and Fields* (Heinrich Boll Foundation and Institute for Advanced Sustainability Studies, January 2015) 32-33.

[112] Business and Biodiversity Offsets Program, 'To No Net Loss and Beyond: An Overview of the Business and Biodiversity Offsets Program (BBOP)' (ForestTrends 2013) <www.forest-trends.org/documents/files/doc_3319.pdf> accessed 23 May 2014.

[113] Nigel Dudley and Sue Stolton, 'To Dig or Not to Dig?: Criteria for Determining the Suitability or Acceptability of Mineral Exploration, Extraction and Transport from Ecological and Social Perspectives' (WWF International and WWF-UK 2002) <www.wwf.org.uk/filelibrary/pdf/to_dig_or_not_to_dig1.pdf > accessed 23 May 2014, 3.

[114] The Gaia Foundation (n 21) 10-14.

producing areas, and the water systems they depend on" should be off-limits for mining in order to protect food security.[115]

Along with the parameters proposed by WWF, *causing no serious environmental damage* requires that decisions about mine sites also consider larger scales: from the impact on the carrying capacity of the ecosystem, to the potential contribution of a mine to transgressing planetary boundaries, especially the boundary for biodiversity loss (given the global extinction crisis).[116] Building on best sustainability assessment practices[117] and broadening the scope of assessment when considering impacts are crucial to avoid causing serious environmental harm, as mining operations have effects beyond the immediate site, and contribute to cumulative, regional and global human impacts on the environment.[118]

How to Mine?

The bulk of existing laws, regulations and best practices relate to the different stages and many complex aspects of a wide variety of mining methods.[119] Standards normally focus on imposing measures to minimize and mitigate the environmental impacts of operations without compromising any specific project.[120] Maintaining ecological integrity – the focus of the *Earth Charter* – is not the priority. To *cause no serious environmental damage* in accordance with the principles of the *Earth Charter*, all the different stages of mining (of acceptable minerals, in appropriate places) must be executed under standards based on ecological integrity.

There is no shortage of constantly evolving knowledge in the mining sector regarding best practices to prevent environmental damage.[121] Under the *Earth Charter*, practices that are consistent with the objective of ecological integrity would be strictly applied; those that do not

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[115] Ibid 7.

[116] Rockström et al (n 1) 14-15.

[117] See for example, Alan Bond, Angus Morrison-Saunders and Richard Howitt (eds), *Sustainability Assessment: Pluralism, Practice and Progress* (Routledge c2013) 3-17.

[118] Steffen et al, 'Planetary Boundaries' (n 1) 2-3.

[119] Myer Kutz, Environmentally Conscious Materials and Chemicals Processing (John Wiley & Sons c2007) 1-32.

[120] Miranda, Chambers and Coumans (n 35).

[121] See for example, F G Bell and Laurance J Donnelly, *Mining and Its Impact on the Environment* (Taylor & Francis 2006).

would be upgraded to meet that objective. While the focus for determining how to mine is on specific operational practices, the benchmark should be the ecological integrity of the ecosystem. In addition to controlling the impacts on the site and its vicinity, cumulative impacts must be monitored as a key reference for making adjustments to operational constraints. The most appropriate practices will vary depending on the site and other factors, so local knowledge and flexibility (about means) are critical in determining what standards must be followed, but the clear objective of preserving ecological integrity must remain constant. Certain methods of mining – some increasingly prevalent like large-scale surface mining[122] and mountaintop removal[123] – are so destructive that they may no longer be permissible under ecological integrity standards. Notably, Costa Rica banned open pit metal mining in 2010, and other communities are following suit.[124]

Rule 2: Minimize Depletion

Taken seriously, this rule would be even more transformative of the law and justice of mining. *Minimizing depletion* should be understood in the context of ecological justice and, in particular, intergenerational equity.[125] The extraction of non-renewable resources would be based on the reasonable needs of living generations (equitably considered) without jeopardizing the ability of future generations to enjoy similar access to those resources. The *Earth Charter* states that "[f]undamental changes are needed in our values, institutions, and ways of living" and calls for the realization "that when *basic needs* have been met, human development is primarily about being more, not having more".[126] *Minimizing depletion* would thus require answering questions about *basic needs*, and about the use and distribution of non-renewable resources to ensure sustainability and equity.

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[122] Ibid 290.

[123] James Wickham, Petra Bohall Wood, Matthew C Nicholson, William Jenkins, Daniel Druckenbrod, Glenn W Suter, Michael P Strager, Christine Mazzarella, Walter Galloway and John Amos, 'The Overlooked Terrestrial Impacts of Mountaintop Mining' (2013) 63(5) BioScience 335.

[124] Marcel Evans, 'Costa Rica Upholds Ban on Open-Pit Mining' (Costa Rica Star 8 February 2013) <http://news.co.cr/costa-rica-upholds-ban-on-open-pit-mining/21901/> accessed 23 April 2014; Sandra Cuffe, 'Territories Free of Mining on the Rise in Honduras' (5 January 2015) <www.beaconreader.com/sandra-cuffe/territories-free-of-mining-on-the-rise-in-honduras?ref=profile> accessed 16 February 2015.

[125] Klaus Bosselmann, 'Ecological Justice and Law' in Benjamin J Richardson and Stepan Wood (eds), *Environmental Law for Sustainability: A Reader* (Hart Pub 2006) 150.

[126] *Earth Charter* (n 6) Preamble (emphasis added).

Minimizing depletion would be a major societal undertaking, and would likely involve the following elements in some form (Figure 1). First, society would need to agree that *basic needs* should be the benchmark for establishing limits on mining. It would also need to agree on what constitutes *basic needs*. Many thinkers have explored and critiqued this question.[127] In the context of minimizing depletion of minerals, a concept such as Tim Jackson's "bounded capabilities" offers a helpful conceptual frame, as it qualifies Amartya Sen's notion of "capabilities for flourishing"[128] by noting that "capabilities are bounded on the one hand by the scale of the global population and on the other by the finite ecology of the planet".[129] Second, society would need to determine which uses of minerals (deemed acceptable under the *what to mine* rules) respond to basic needs (*needs-based demand* or *NbD*). A third element would be to identify *NbD* at local, regional, and global scales. Fourth, society would need to determine how to satisfy the *NbD* with already extracted minerals (extracted stocks, recovery, and recycling). Then, if there is a remaining *NbD*, the balance could be extracted only if the technology currently exists to later recover or recycle those minerals, and if the extraction and production processes meet ecological, human and community rights standards (under the *where* and *how to mine* rules). In the case of coal and bitumen *NbD* that cannot yet be met with renewable alternatives,[130] extraction would be limited by the "unburnable carbon" calculation[131] and decided based on considerations including energy return on energy invested.[132] Finally, demand that is not needs-based could be satisfied as follows: through recovery and recycling only; once *NbD* has been satisfied; and provided a stock from already extracted minerals is set aside for future generations if the minerals in question are already or nearly depleted.

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[127] See for example, Ivan Illich, 'Needs' in Wolfgang Sachs (ed), *The Development Dictionary: A Guide to Knowledge as Power* (2nd edn Zed Books, 2010) 95-110] (offering a critique and a brief history of the concept of 'needs' in the development discourse); also Amartya Sen, 'The Ends and Means of Sustainability' (2013) 14(1) Journal of Human Development and Capabilities 6.

[128] Jackson (n 13) 45-47; see also Breena Holland, 'Ecology and the Limits of Justice: Establishing Capability Ceilings in Nussbaum's Capability Approach' (2008) 9 Journal of Human Development 401.

[129] Jackson (n 13) 46.

[130] See text to n 110 regarding nuclear energy.

[131] "Unburnable Carbon refers to fossil fuel energy sources which cannot be burnt if the world is to adhere to a given carbon budget" set to avoid catastrophic climate change. Carbon Tracker, 'Unburnable Carbon' <www.carbontracker.org/resources/> accessed 12 December 2014. See also text to n 105.

[132] "Energy return on investment (EROI) is the ratio of the energy delivered by a process to the energy used directly and indirectly in that process."<www.eoearth.org/view/article/152557/> accessed 12 December 2014.

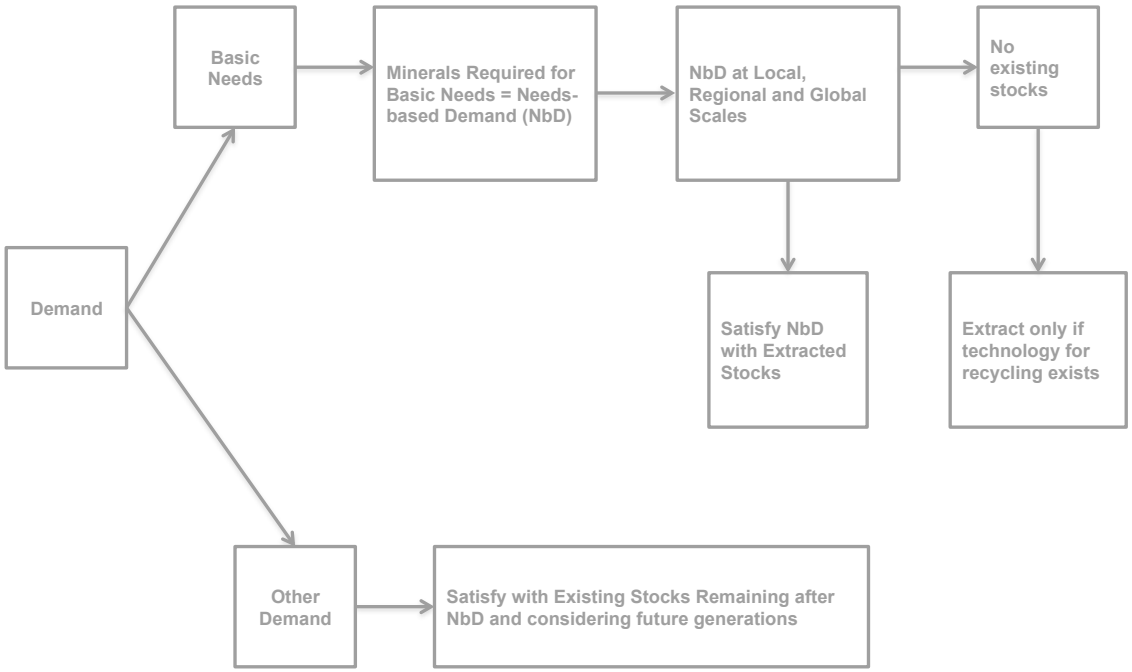

Figure 1 - A hypothetical path to minimizing depletion

Goodland and Daly offer a complementary model for minimizing depletion in the input-output rule they propose as the fundamental definition of environmental sustainability.[133] The input portion of the rule that refers to non-renewable resources states that "depletion rates of non-renewable-resource inputs should be equal to the rate at which renewable substitutes are developed by human invention and investment" and that part "of the proceeds from liquidating non-renewables should be allocated to research in pursuit of sustainable substitutes".[134]

How would a path to minimizing depletion along the lines suggested above be implemented in the mining sector? The *Earth Charter* states that "[w]e have the knowledge and technology to provide for all and to reduce our impacts on the environment".[135] Some "argue that enough minerals and metals have been mined already" and that global basic needs can

[133] Robert Goodland and Herman Daly, 'Environmental Sustainability: Universal and Non-Negotiable' (1996) 6(4) Ecological Applications 1002.

[134] Ibid 1008.

[135] *Earth Charter* (n 6) Preamble.

be met by "changing the way we design, make and sell products, closing the loop to ensure zero waste, [and] investing in a circular economy".[136] In their call for a "whole earth economy in right relationship with life's commonwealth", Brown and Garver propose a "Global Reserve" focused on "the analysis of the earth's life support budgets and their uses in accordance with right relationship with the commonwealth of life".[137]

The needed recovery and recycling capacity is not in place yet,[138] and much research and development will be required for a deep transformation of the mining industry along the lines sketched above. However, there are encouraging breakthroughs in technology and design, as well as consumer and retailer awareness. For example, increased demand for copper is driving its recovery-recycling and life cycle management;[139] design-for-disassembly and design-for-recycling have been available for at least two decades;[140] and consumers are beginning to demand products made with recycled gold and other metals.[141]

At the same time, major governance reforms would be required to implement a path to minimizing depletion. Left to the market forces and economic growth policies that dominate macro-decision-making about mining, the shift is unlikely to happen quickly or comprehensively enough to avoid resource depletion and further environmental damage. Yet society has the option to set different priorities and directions. Governments can refocus their education, research, and infrastructure investments on the development and deployment of mineral recovery and recycling technologies,[142] and away from discovery of

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[136] The Gaia Foundation (n 21) 7.

[137] Brown and Garver (n 15) 113.

[138] Markus Reuter, Outotec Oyj, Christian Hudson, Antoinette van Schaik, Kari Heiskanen, Christina Meskers and Christian Hagelüken, 'Metal Recycling: Opportunities, Limits, Infrastructure (A Report of the Working Group on the Global Metal Flows to the International Resource Panel)' (UNEP 2013) <www.unep.org/resourcepanel/Portals/24102/PDFs/Metal_Recycling_Full_Report.pdf> accessed 23 February 2015.

[139] Five Winds International, 'Sustainable Development and the Global Copper Supply Chain: International Research Team Report' (IISD 2011).

[140] Paul Dvorak, 'Putting the Brakes on Throwaway Designs' (1993) Machine Design 46.

[141] Earthworks, 'The Gold Star List' <http://nodirtygold.earthworksaction.org/retailers/the_gold_star_list#.Uv6b-f2jRg1> accessed 15 February 2014; Responsible Jewellery Council, (2014) <www.responsiblejewellery.com/> accessed 11 February 2015.

[142] While aimed at ensuring the stable supply of minerals for Europe, rather than at minimizing depletion and equitable access, the European Union Raw Materials Initiative exemplifies this type of

new mineral deposits.[143] Brown and Garver also propose that a "Global Federation could wield its taxing authority to work toward eliminating or finding substitutes for metal compounds that are persistent and harmful in the biosphere".[144]

At the core of the issue of depletion is the treatment of minerals as commodities. While this requires more detailed analysis than is possible here, one could argue that in order to minimize depletion there should be a shift of focus in the management of these non-renewable resources – a shift from exchange value for wealth creation to use value for the satisfaction of needs. Scarce minerals should be managed so that they can be privately used, but not privately owned, and not treated as commodities. It is hard to imagine minerals, and metals like gold, not being treated as commodities – particularly given the current trend towards greater "commoditization" [145] and the "financialisation" of commodities.[146] Yet, some level of de-commodification may result from a practical or strategic response to scarcity. Already, frameworks for managing "mineral services" are emerging in anticipation of "peak metal" [147] – the point at which minable deposits become scarce.[148] It is also possible for de-commodification to result from a normative choice to treat

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government intervention. Commission Communication to the European Parliament and the Council, 'The Raw Materials Initiative-Meeting Our Critical Needs for Growth and Jobs in Europe' (COM 2008 699); Johanna Sydow, Lili Fuhr and Ute Straub, 'Analysis of the EU Raw Materials Initiative' (Heinrich Böll Foundation 3 February 2011) <www.boell.de/en/ecology/resource-governance-analysis-of-the-eu-raw-materials-initiative-11124.html> accessed 11 February 2015, 7.

[143] In Canada for example, '[e]xploration and deposit appraisal expenditures increased from $912 million in 1998 to $3.9 billion in 2012'. Government of Canada, 'Mining Sector Performance Report:1998-2012' (Energy and Mines Minister's Conference, August 2013) <http://publications.gc.ca/site/eng/450082/publication.html> accessed 10 February 2014, 10.

[144] Brown and Garver (n 15) 13.

[145] JP Manno, 'Commoditization: Consumption Efficiency and an Economy of Care and Connection' in T Princen, M Maniates and K Conca (eds), *Confronting Consumption* (MIT Press 2002).

[146] Sibaud (n 22) 42-43.

[147] Leah Mason, Timothy Prior, Gavin Mudd and Damien Giurco, 'Availability, Addiction and Alternatives: Three Criteria for Assessing the Impact of Peak Minerals on Society' (2011) 19 Journal of Cleaner Production 958.

[148] 'Beyond Mining' (2011) 4 Nature Geoscience 653 <doi: 10.1038/ngeo1291>; see also Mikhail Butusov and Arne Jernelöv, *Phosphorus: An Element That Could Have Been Called Lucifer* (Springer 2013) ch 9, 10.

minerals as commons [149] or manage them through public trusts in the interest of current and future generations.[150] Admittedly, this would be fraught with difficulties, starting with the challenge of gaining state support for commons or public trust regimes and ensuring such regimes are structured to avoid treating resources as commodities.[151] For example, the regime for mining the seabed area designated as "the common heritage of humankind" (CHM) remains controversial and treats the minerals found there as commodities.[152]

Other major difficulties derive from the role of resource extraction in economic growth strategies, especially given growing demand from both developed and developing countries. Countries with mineral reserves currently have no incentive to place even those most at risk of depletion under any form of global commons regime.[153] Given historical inequities in the distribution of benefits from resource extraction,[154] developing countries where most of these reserves are located have even less reason to share their scarce mineral reserves. However, the development benefits of resource extraction have long been questioned, especially in developing countries,[155] and mineral extraction is increasingly being criticized for failing to benefit the poor.[156] Moreover, the growth-centered economic model in which it is embedded is, as noted earlier, increasingly being challenged, especially in developed countries.[157] If, as some argue, a steady state or degrowth model would be more favourable

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[149] See Burns H Weston and David Bollier, *Green Governance: Ecological Survival, Human Rights, and the Law of the Commons* (Cambridge University Press 2013) 203 (arguing commons governance enhances the role of nonmonetized value).

[150] Mary Christina Wood, *Nature's Trust: Environmental Law for a New Ecological Age* (Cambridge University Press 2013) 73-75; Prue Taylor, 'The Future of The Common Heritage of Mankind: Intersections with the Public Trust Doctrine' in Westra and Michelot (n 85) 43.

[151] Taylor (n 150) 43.

[152] *UNCLOS* (n 29) *Agreement Relating to the Implementation of Part XI*; Taylor (n 150) 42 (arguing the CHM "was intended as a non-property concept").

[153] In fact, the opposite appears to be the case, as governments rush to secure future access to scarce resources. See for example, Sydow, Fuhr and Straub (n 142).

[154] Sibaud (n 22) 39-42; Graham A Davis, 'Extractive Economies, Growth, and the Poor' in Richards (n 73) 94.

[155] See for example, Vandana Shiva, *Earth Democracy: Justice, Sustainability, and Peace* (South End Press c2005); Gustavo Esteva, 'Development' in Sachs (n 127).

[156] See for example, Davis (n 154) 37.

[157] See text to n 9-17 above, "Beyond a Growth-Insistent Economy".

for the development of commons regimes,[158] it is worth exploring the possibilities of minerals commons within these alternative economic models.

Rule 3: Protect the Rights of People

The core *Earth Charter* principle of "Respect and Care for the Community of Life" provides that society must "[a]ccept that with the right to own, manage, and use natural resources comes the duty to prevent environmental harm and to protect the rights of people".[159] Because mining can have gravely detrimental impacts on human well-being, *protecting the rights of people* requires protecting rights that range from safe labour conditions to free prior informed consent of indigenous peoples (FPIC); from the rights of individuals, to those of communities; and the rights of women, men, seniors, and children.

The *Earth Charter* principle speaks of a "duty to protect", demanding more vigilance and proactive engagement than the (often-unrealized)[160] current commitment of "respecting" people's rights. At a minimum, it requires ensuring meaningful participation of affected communities and indigenous peoples in decision making on what, where, and how to mine, and on minimizing depletion, as well as full access to effective redress mechanisms for those affected by mining activities.[161] The *Aarhus Convention*[162] sets a good example of participatory rights, although it fails to recognize the right of affected communities and indigenous people to withhold their consent, an element further discussed below.

Principle 12, under the theme of "Social and Economic Justice", provides that society should "[a]ffirm the right of indigenous peoples to their spirituality, knowledge, lands and resources

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[158] See for example, Silke Helfrich and David Bollier, 'Commons' ch 14 in D'Alisa, Demaria and Kallis (n 14) 75-78.

[159] *Earth Charter* (n 6) Principle 2(a).

[160] See for example, Human Rights Watch, 'Gold's Costly Dividend: Human Rights Impacts of Papua New Guinea's Porgera Gold Mine' (Human Rights Watch 2011) <www.hrw.org/sites/default/files/reports/png0211webwcover.pdf> accessed 23 February 2014.

[161] Canadian Network on Corporate Accountability, 'Open for Justice' (2013) <http://cnca-rcrce.ca/wp-content/uploads/CNCA-Backgrounder-Open-for-justice-ENG.-FINAL1.pdf> accessed 23 February 2014, 3.

[162] Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (concluded 25 June 1998, entered into force 30 October 2001) 37770 UNTS 2161.

and to their related practice of sustainable livelihoods".[163] Historically, indigenous peoples have been substantially impacted by mineral extraction, and it is estimated that almost half of new extraction will occur in their territories.[164]

Mining companies are beginning to recognize their role with respect to human rights.[165] However, the right of communities to bar mining is rarely recognized.[166] This is at the heart of many conflicts and much violence associated with mining across the world.[167] Despite this, and the growing international legal recognition of FPIC as a right of indigenous peoples,[168] governments and companies often interpret FPIC as a right not to prevent but only to have a say in the development of a mining project, and to be compensated or benefit from it.[169]

Moreover, in some countries mining operates under a "free entry" system whereby anyone can stake a claim in available land.[170] This system assumes that mining is the preferred use of land and resources, preempting other uses,[171] and seems incompatible with a needs-based approach to mining.

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[163] *Earth Charter* (n 6) Principle 12(b).

[164] C Doyle and A Whitmore, 'Indigenous Peoples and the Extractive Sector: Towards a Rights-Respecting Engagement' (Tebtebba, PIPLinks and Middlesex University 2014) at 5.

[165] ICMM, 'Sustainable Development Framework' <www.icmm.com/our-work/sustainable-development-framework/10-principles> accessed 19 February 2014.

[166] Other legal means may be used to that effect. For example, the Traditional Healers' Association of South Africa has stopped a mining project at a site protected under heritage laws. Katharine Child, 'Ancestors Thwart Mine Bosses' (timeslive.co.za 15 January, 2015) <www.timeslive.co.za/thetimes/2015/01/15/ancestors-thwart-mine-bosses> accessed 11 February 2015.

[167] See for example, Alexandra Pedersen, 'Power, Violence and Mining in Guatemala: Non-Violent Resistance to Canada's Northern Shadow' (30 January 2014) <http://upsidedownworld.org/main/news-briefs-archives-68/4672-power-violence-and-mining-in-guatemala-non-violent-resistance-to-canadas-northern-shadow-> accessed 20 February 2014.

[168] Tara Ward, 'The Right to Free, Prior, and Informed Consent: Indigenous Peoples' Participation Rights within International Law' (2011) 10 Nw J Int'l Hum Rts 54 <http://scholarlycommons.law.northwestern.edu/njihr/vol10/iss2/2> accessed 8 December 2014.

[169] ICMM, 'Indigenous Peoples and Mining' (2013) <www.icmm.com/our-work/sustainable-development-framework/position-statements> accessed 19 February 2014.

[170] Barry Barton, *Canadian Law of Mining* (Canadian Institute of Resources Law 1993) 165.

[171] Maureen Carter-Whitney and Justin Duncan, *Balancing Needs, Minimizing Conflict: A Proposal for a Mining Modernization Act, 2008* (Canadian Institute for Environmental Law and Policy 2008) 2.

Under the *Earth Charter*, mining activities would require the FPIC of indigenous peoples, and communities would have the right to prevent mining activities that negatively affect them. A recent amendment to Quebec's *Mining Act* which allows municipalities to identify areas considered incompatible with mining activities exemplifies that this is feasible.[172]

Many poor and marginalized people, however, depend on mining,[173] so the rule to *protect the rights of people* may require implementation of the other two rules in developed countries first and other transitional trade-offs. For example, it may involve supporting initiatives like the Alliance for Responsible Mining, which seeks to "transform artisanal small-scale mining into a socially and environmentally responsible activity that improves the quality of life of marginalized artisanal communities".[174] An illustration of the challenges is "new progressive extractivism", whereby left-leaning governments are looking to their mineral resources for poverty eradication and social programs, at the expense of other priorities like the rights of nature and alternatives to development, such as "buen vivir".[175] However, in the long term the incentive to mine for profit would arguably be superseded as mining transitions globally from a focus on the exchange value of minerals to their use value.

Tools, Actors, and Institutions

New mining governance under the *Earth Charter* principles implies profound change, but it could be achieved by building on many existing tools. Protected areas, land use and sustainable development planning at all levels,[176] best practices,[177] trusteeship institutions, and commons governance could be adapted and expanded to support the implementation of these *Earth Charter*-derived rules. Approaches to production and manufacturing processes

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[172] Bill 70, *An Act to amend the Mining Act*, 1st Sess, 40th Leg, Quebec, 2013, cl 1 (assented to 10 December 2013), SQ 2013, c 32, cl 108 (inserting new section 304.1.1).

[173] Davis (n 154) 37.

[174] Alliance for Responsible Mining, <www.communitymining.org/en> accessed 11 February 2015.

[175] Eduardo Gudynas, 'Diez tesis urgentes sobre el nuevo extractivismo. Contextos y demandas bajo el progresismo sudamericano actual' in *Extractivismo, Política y Sociedad* (CAAP and CLAES 2009) 187; Eduardo Gudynas, 'Development Alternatives in Bolivia: The Impulse, the Resistance, and the Restoration' (2013) 46(1) NACLA Report on the Americas 22.

[176] *Earth Charter* (n 6) Principles 5-a and 5-b.

[177] John P Williams, '"International Best Practice" in Mining: Who Decides and How-And How Does It Impact Law Development?' (2007-2008) 39 Geo J Int'l L 693.

like industrial ecology,[178] design-for-reuse/recycling, and mineral "servicizing",[179] as well as the concept of a circular economy,[180] will be critical for transitioning to a sustainable way of mining.

As the *Earth Charter* underscores, "[t]he partnership of government, civil society, and business is essential for effective governance".[181] The current roles each of these plays in mining must change fundamentally. There may be little room for governments as revenue-seeking promoters of mining, for civil society as unquestioning consumers of goods and services supported by mining, and for mining companies as largely unaccountable profit seekers.

The *Earth Charter's* call for acting in the public good and for recognizing the duties derived from power and rights sets a high bar for all of society. In particular, the *Earth Charter* sets a transformational vision for corporations by "[requiring] multinational corporations and international financial organizations to act transparently in the public good, and [be held] accountable for the consequences of their activities".[182] Mining corporations acting in the public good would approach the questions about what is extracted, where, how, and how much, not in terms of profits and growth, but of sustainability and equity. Planned obsolescence and marketing to promote rapid replacement of products would have no place in determining demand for minerals.[183] A fundamental change in corporate law would be needed to require mining corporations to act in the public good. Some change is already happening with the emergence of benefit corporations – profit corporations with a public good mandate – notably in the United States.[184] The transformation of mining could also be advanced through changes in property laws to define minerals as commons, or as "public

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[178] See for example, John Ehrenfeld and Nicholas Gertler, **'**Industrial Ecology in Practice: The Evolution of Interdependence at Kalundborg' (1997) 1(1) Journal of Industrial Ecology 67.

[179] Timothy Prior, Patrick A Wäger, Anna Stamp, Rolf Widmer and Damien Giurco, 'Sustainable Governance of Scarce Metals: The Case of Lithium' (2013) 461–462 Science of the Total Environment 785–791.

[180] See for example, Damien Giurco, 'Circular Economy: Questions for Responsible Minerals, Additive Manufacturing and Recycling of Metals' (2014) 3 Resources 432 doi:10.3390/resources3020432.

[181] *Earth Charter* (n 6) The Way Forward.

[182] Ibid Principle 10(d).

[183] Ponting (n 24) 334.

[184] J William Callison, 'Benefit Corporations, Innovation, and Statutory Design' (2013-2014) 26 Regent U L Rev 143. See also James Gustave Speth, *The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability* (Yale University Press c2008) 165-182.

natural resources", as proposed in the United Kingdom through a "*Legacy Act*" that "would define public natural resources that must be preserved for future generations, and would prohibit all actions that would degrade or deplete them".[185] Clearly, parallel reform of the international system of trade and finance would also be required – no small task but an essential one.

Some may object that this sketch of new mining governance implies potentially inefficient and dangerously authoritarian central planning. It need not. The *Earth Charter* is deeply rooted in the pursuit of democracy and civil society engagement.[186] Under the *Earth Charter*, planning and decision-making regarding mining would likely involve community-based processes and reframed enterprises embedded in a global trusteeship framework. The local processes may be akin to cooperatives governance or to the community watershed committees envisaged by Hughes.[187] The global framework may involve a renewed system of international agencies with global trusteeship functions.[188] Humanity has ample expertise for assessing needs and prioritizing production of certain goods. In democratic countries this expertise has been highly developed to support the military sector and global business. The challenge is to refocus it to support the transition to a sustainable, equitable and peaceful society.

Conclusion

With its far-reaching effects on society and the environment, mining has a crucial role to play in building a sustainable world, and must be profoundly transformed. The *Earth Charter* offers an ethical grounding for the transition to a world of sustainability, equity, and peace. This transition becomes ever more urgent as the global ecological, economic, and social crises deepen.

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[185] Peter Roderick, 'Feasibility of Environmental Limits Legislation: A Discussion Paper for WWF-UK' (WWF-UK 2011) <www.wwf.org.uk/wwf_articles.cfm?unewsid=5098> accessed 20 February 2014, 12.

[186] *Earth Charter* (n 6) Principle 13.

[187] Elaine L Hughes, 'Fishwives and Other Tails: Ecofeminism and Environmental Law' (1995) 8 Can J Women & L 502, 526.

[188] Klaus Bosselmann, Peter Brown and Brendan Mackey, 'Enabling a Flourishing Earth: Challenges for the Green Economy, Opportunities for Global Governance' (The Earth Charter Initiative 2011) <www.ieg.earthsystemgovernance.org/publications/enabling-flourishing-earth-challenges-green-economy-opportunities-global-governance> accessed 20 February 2014, 8; Brown and Garver (n 15) 111-137.

This paper argues that the *Earth Charter* provides guidance for ecological mining reform, and draws from it three overarching rules: *cause no serious environmental harm, minimize depletion*, and *protect the rights of people*. To mine in a way that is consistent with these principles of ecological justice and ecological integrity would entail a profound transformation of mining. It would eliminate the use of certain minerals, set a broader range of places off limits to extractive activities, and tighten the operational rules to prioritize ecological integrity. Determining the details would demand close collaboration among all sectors of society. Changing what, from where, and how to mine would involve abandoning certain entitlements, grappling with the question of needs, and transforming resource governance. While very challenging, this surely would be easier than experiencing collapse, and the reward might be nothing less than an ecologically just society.