

Book Review:

The Sixth Wave: How to Succeed in a Resource-limited World

Stephen McGrail
Independent futures researcher and
foresight practitioner
Australia

by James Bradfield Moody and Bianca Nogrady (Vintage Books: Sydney, 2010)

The Sixth Wave provides us with glimpses of a future in which the visions of "green-topia" and "digital-topia" (Inayatullah, 2007) are combined and realised by scientists and business. It is authored by an Executive Director of CSIRO (Moody), Australia's peak scientific body, and a science journalist (Nogrady). The book is written for "anyone who is interested in thinking about what a sustainable future holds for humankind". It promises to make "a very bold prediction" and take the reader "on a journey through the next thirty years of global development". The author's predict that due to a new wave of innovation there will "not be a tension between progress and saving the environment".¹

The book has two parts. The first, "the next wave of innovation", argues the emerging future will be centred on natural resource efficiency. That is, focussed on "minimising inputs, such as fuel or water, while maximising all the right outputs, such as energy and food, products or services, and minimising or eliminating all the wrong outputs, namely waste" (p.117). It also discusses "innovation waves" theory. The second part, "catching the wave", outlines ideas for creating this future – the emerging practices and opportunities suggested by today's innovators e.g. shifting from product-based to a services orientation. The second half interweaves reportage, related predictions, and a call to action.

The Sixth Wave explores the potential intersection of three main trends: "clean technology", pervasive computing, and natural resource and other environmental pressures. Clean technology (or "cleantech") is central, which aims to "address the roots of ecological problems with new science" and promotes solutions that promise both "greater financial upside and sustainability".² The following statement on the publisher's website provides a sense of the overall message:

Natural resources are dwindling and we are wasting the resources we do have at an unparalleled rate. Climate change threatens our way of life and digital technology is advancing at such a rate as to leave many of us baffled. But far from being all "doom and gloom", these signs

*point to the emergence of an exciting new wave of innovation.*³

The perspective taken is akin to *ecological modernisation*. This school of thought argues we can decouple economic growth from environmental harm through various technological and institutional transformations (see Howes, McKenzie, Gleeson, Gray, Byrne, & Daniels, 2009). The title comes from an innovation theory termed "Kondratiev waves" created by economist Joseph Schumpeter, which drew on Kondratiev's research on boom and bust cycles in capitalist economies and has since been further developed by Perez (2002) into a theory of "techno-economic paradigms". Five successive waves lasting 50 or 60 years were observed since the industrial revolution, with the current information and communication revolution (ICT) wave beginning in the 1980s. This theory contends that each wave ends with a significant economic recession.

The authors construct two significant arguments about why "we are in a period of transition" (p.25) from the fifth to the sixth innovation wave. First, they argue the global financial crisis is the significant recession marking the "downswing" of the fifth wave. Second, they contend that "things are now speeding up" (p.25) and, consequently, innovation waves will be shorter (for a new wave to begin the ICT wave must only last about 30 years). These arguments are commented on, following an outline of the forecast made, in different suggested ways of reading the book.

In the future:

Our homes will be populated with smart appliances that switch themselves on and off to ensure a minimum of waste and maximum of efficiency. Landfill will be obsolete, as every bit of waste we throw out will be carefully sorted and reclaimed. Water will be managed as carefully as electricity – every litre accounted for, tracked and treasured. The air in our cities will be a lot cleaner, with less particulate pollution but also with less noise pollution, as electric vehicles purr silently along our streets... growth will no longer be dependent on the consumption, and production, of natural resources (p.141-2).

Babies growing up in this decade and the next:

Will grow up in a world of limits – limits on energy, limits on resources and limits on waste. But this will also be one of extraordinary opportunity and innovation. It will be a world where everything has a value and nothing is discarded or wasted, where the air and water are cleaner, where the destruction of wilderness is slowly turned around and where the natural environment becomes a thing to be cherished and nurtured. It will be a world where the boundaries that might have restricted opportunities are dissolved, so that people are no longer constrained by geographic distance. Instead, they will have become one interconnected organism. And in this new world, the harder edges of civilisation will soften; people will become more organic, as they finally cease their fruitless battle against nature and start to embrace wisdom, guidance and inspiration (p.278)

The book is the latest example of the genre of futures books claiming to have identified an unfolding and transformative wave of change, such as Toffler's *The Third Wave*. It is worth noting that Toffler (1980, p.134) himself declared three decades ago

that "we have reached a turning point in the 'war against nature'" that "it is vital to understand that the industrial game is over, its energies spent, the force of the Second [industrial] Wave diminishing everywhere as the next wave of change begins".⁴ *The Sixth Wave* may also be too optimistic and is similarly not short on hyperbole.

Unlike most examples of this genre the authors do articulate a theory of change; however, this is a weak aspect of the analysis. It focusses on innovation which is said to occur due to new *technologies, markets, and societal institutions* "that link, enable and encourage the first two components to come together". Institutional changes include administrative systems, such as those needed for carbon trading. Further, "while technology and markets are sexier concepts, and easier to understand, most innovation actually happens in institutions." *The Sixth Wave* is expected to be driven by cleantech, markets for resource efficiency, and new institutions that better price waste and resources.

Catching the Wave or Surfing Tsunamis? Innovation for Sustainability in the Early 21st Century

A key question in the back of my mind when reading the book was: is the wave of innovation likely to be sufficient to meet emerging challenges or will "tsunamis of change", to use Jim Dator's term, overwhelm such utopian dreams. That is, is the emerging future about "catching the wave" or trying to "surf" the tsunamis? Dator is less optimistic that technology will come to the rescue. His optimism resides in the potential for these challenges to be a "positive enabling force" stimulating *social* responses that create "values-aligned futures" with more local, communal, self-reliant societies "good for us and for the Earth" (Dator, 2009). Similarly, many green thinkers (e.g. Trainer, 2007; McKibben, 2010) propose a retreat from modernity. The tension between these polar opposite views – techno-utopianism and a retreat from modernity – is central to the sustainability debate.

For futures scholars and practitioner two ways of reading the book can be highlighted: as *utopian image of the future* and *uncritical extrapolation of current trends*.

In the first reading, the scenario described is of a technologically-enabled sustainable society – powered, it seems, entirely by renewable energy – that adapts seamlessly to climate change and environmental limits. Many other capture the techno-utopianism. Statements like the "possibilities [are] limited only by the imagination of the scientists" (p.129) and we can "create more opportunity than we can possibly imagine" (p.2) appear throughout. It aims to mobilise support via promises of positive futures, as is often attempted in cleantech. In a recent example, such a future was termed "prosperous sustainability" (O'Brien, 2010). This view is also supported by considering how the "bold prediction" is sometimes softened, the conclusion, and their views on the root cause of the sustainability crisis. Towards the end of the book the authors' state that it has been about "the major changes that we might see in the future" (p.278) and it concludes with a call to action, quoting Peter Drucker who said "the best way to predict the future is to create it". This suggests the authors recognise the future is very uncertain. The "forecast" made is an expression of their preferred future as champions of science. The following grocery shopping scenario gives a sense of

what this future could be like:

Your intelligent fridge will interact with other intelligent devices. When you head to your local supermarket for your weekly grocery shop, your mobile phone will sense you are in the shop and be able to query the fridge at home about its grocery needs. The fridge will assess its contents, compare that with its usual stock and judge which of the usual essentials are missing and running low. Then it will send you that shopping list to your mobile phone... In a fully RFID-capable store, your mobile might even order those items for you automatically; you will simply collect them at the checkout (p.204).

Finally, the techno-utopianism is further captured by the discussion of the famous "I=PAT" equation; that is, humans' impact on the environment [I] is a product of population [P], the level affluence [A], and the state of technology [T]). The authors ask us to consider the possibility that "technology will win out without compromising either population or affluence" (p.280). The sustainability problem is that technology to-date "hasn't kept pace with increases in population and affluence". This is a stark contrast to most sustainability problematic literature which points to socio-political roots.

On a second reading, a lot of *The Sixth Wave* amounts to an interesting environmental scan. Emerging trends are then uncritically extrapolated. Predictions include: consumers seeing the "true cost" of what they buy via information systems providing data on emissions emitted etc (e.g. on smart phones); new networks of appliances will self-manage to use energy more smartly and efficiently, connected to a new "smart" renewable energy powered grids; and, the blurring of boundaries between digital and natural worlds caused by the monitoring and measuring of our interactions with nature and the condition of natural systems. Myriad predictions are made regarding new business models, green consumption (e.g. trending towards fully recyclable items in closed-loop systems), and everyday life.

To enjoy this reading you need to be willing to go with the authors as they lightly touch-on a vast array of emerging innovations and scientific developments and then extrapolate from them. Personally, I was looking for a more critical perspective.

The authors note but don't adequately consider explanations given for why past waves *consistently* lasted 50-60 years: the institutional inertia caused by vested interests and the long-life of infrastructure and investments. I am not convinced this inertia has lessened to "speed things up". We only need to consider the legislative stand-still on climate change in most advanced economies. But, perhaps I am too pessimistic. Halal (2009), reporting on a recent technology forecast, asserted that:

One of the most striking conclusions of this work is that a green revolution is imminent that promises to pull the global economy out of today's deepening recession at about 2015, leading to a new wave of sustainable economic growth. Our forecasts suggest that today's surging interest in green business practices should reach mainstream use about that time, and governments are likely to take serious steps to curb global warming and climate change.

Perez's own analysis of the fifth wave (ICT) contends that we are at the "turning point" towards much greater deployment (see Figure 1 below), which could be shaped in an attempt to realise a "sustainable global knowledge society" over coming decades.

In her view the sixth wave is 20-30 years away and will likely be focussed on emerging areas such as biotechnology, "bioelectronics", nanotechnology and new materials sciences (Perez, 2008). These technologies are not mentioned in *The Sixth Wave*.

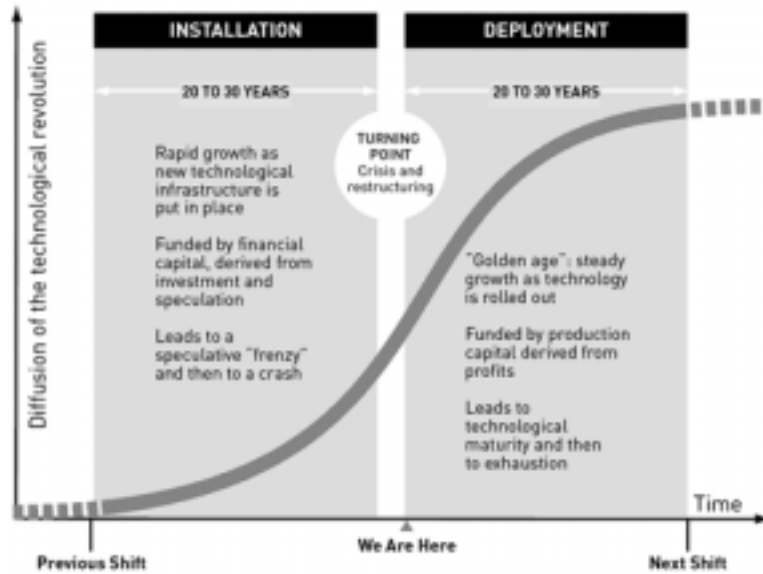


Figure 1. Perez's 60 Year Cycles of Technological Change (as presented in Stahlman, 2010; see also Perez, 2008)

Further, Science and Technology Studies scholars have long noted tensions between technological determinism and social choice and the potential for "lock-in" to occur. Further, social factors such as cultural impediments can prevent technological change (Sovacool, 2010). During lock-in "current socio-technical network relations [prove] to be too rigid for the proposed set of changes" (Selin, 2008). Time will tell if we are experiencing this. In this regard, I agree with Jones (2007) who contends that assessment of the potential of new technologies requires "consideration of both technical possibilities and socio-economic realities". Only the former is seriously considered in *The Sixth Wave*. The GFC also appears to be contributing to lock-in, despite green stimulus packages in many countries, not weakening "institutions and structures that have stymied innovation" (p.25). Overall, there are significant grounds for questioning whether the GFC marks the downswing of the fifth wave.

Additional issues and gaps can be highlighted. Important questions about how global this predicted "global development" will be over the next three decades are not addressed. The apparent focus on advanced industrial economies is a problematic aspect of broader ecological modernisation discourse, which has "little application to non-industrial societies or global analysis" (Dryzek, 2005, p.232). A wave of innovation is clearly building but I am less optimistic about its scope and medium-term influence over the next few decades. Similarly, a more balanced assessment of the potential consequences of new technologies would also have been beneficial. Only cursory

glances at potential "dark sides" are provided, e.g. noting that people are "starting to get a creepy feeling about the amount of [personal] information being collected" and that "there is the potential for it to be stolen and abused" (p.222-3). Finally, the lack of engagement with socio-economic realities often makes the analysis appear technologically-deterministic; an uneasy juxtaposition with the calls to action.

The Sixth Wave will be an interesting read for those unfamiliar with works like *Natural Capitalism* (Hawken, Lovins, & Lovins, 1999) or concepts like clean technology, biomimicry, industrial ecology, green chemistry, and so forth. It challenges and informs our consideration of what responses to sustainability issues could emerge. In this regard the authors' enthusiasm is quite infectious. For most futures scholars, however, it will disappoint but it does point to areas for further analysis. One is the potential and consequences of rapidly emerging technologies. As Rejeski (2002) notes, "as various people explore these intersections [of emerging, converging technologies] they will come away with different perceptions, ranging from a coming sustainable nirvana to an approaching world of perilous technological advance". It also suggests a need to identify and evaluate different, evolving preferred images of sustainable futures.

Correspondence

Stephen McGrail
Independent futures researcher and foresight practitioner
57 Arden St, North Melbourne, VIC, Australia 3051
E-mail: stephen.mcgrail@gmail.com

Notes

1. Note: this quote is from an interview conducted with one of the authors (Moody) on ABC radio Perth on 10th July, 2010, not from the book itself
2. This definition is from <http://cleantech.com/about/cleantechdefinition.cfm>. "Cleantech" includes both technical advances and associated *new business models* for commercialising these advances in a range of areas such as energy (generation, storage, management, and efficiency), transport, water and environmental management, recycling and waste treatment.
3. <http://www.randomhouse.com.au/Books/Default.aspx?Page=Book&ID=9781741668896>
4. Indeed, Toffler's consultancy similarly current claims that the three major driving forces shaping change today are sustainability, innovation and adaptability (see <http://www.toffler.com/our-thinking.html>)

References

- Dator, Jim. (2009). The unholy trinity, plus one. *Journal of Futures Studies*, 13(3), 33-48.
- Dryzek, John S. (2005). *The politics of the earth: Environmental discourse (2nd Edition)*. New York: Oxford University Press Inc.
- Hawken, Paul, Amory Lovins, & Hunter Lovins. (1999). *Natural capitalism: The next industrial revolution*. London: Earthscan Books.

- Halal, William (2009). The future has arrived: Forecasts of the 2015 economic boom. *Journal of Futures Studies*, 14(1), 103-108.
- Howes, Michael, Marteena McKenzie, Brendan Gleeson, Rowan Gray, Jason Byrne, & Peter Daniels. (2009). A preliminary assessment of the potential to adapt ecological modernisation to the Australian context. Griffith University Urban Research Program: Research Paper 23, March 2009. Retrieved from http://www.griffith.edu.au/___data/assets/pdf_file/0013/127201/urp-rp23-howes-et-al-2009.pdf
- Inayatullah, Sohail. (2007). Futures studies in Asia: Players and institutions. Retrieved July 8, 2010, from <http://www.metafuture.org/Articles/futures-studies-asia.htm>
- Jones, Richard. (2007). Nanotechnology and visions of the future. Retrieved June 6, 2010, from <http://www.softmachines.org/wordpress/?p=326>
- McKibben, Bill. (2010). *Eaarth: Making a life on a tough new planet*. Melbourne, Australia: Black Inc.
- O'Brien, John. (2010). *Prosperous sustainability – Clean technology forecasts to 2050: Picking winners or securing options?* Australian CleanTech. Retrieved February 21, 2011, from <http://www.auscleantech.com.au/>
- Perez, Carlota. (2002). *Technological revolutions and financial capital: The dynamics of Bubbles and golden ages*. Cheltenham, UK: Elgar.
- Perez, Carlota. (2008). Towards a sustainable global golden age: Reshaping globalization and redesigning well being. Paper presented at the Connected Urban Development Global Conference 2008: 'Connecting Cities: Innovation for Sustainability'.
- Rejeski, David (2002), Anticipations. *Sustainability at the speed of light*. WWF Sweden. Retrieved July 6, 2010, from http://wwf.panda.org/about_our_earth/all_publications/ict/
- Selin, Cynthia. (2008). The sociology of the future: Tracing stories of technology and time. *Sociology Compass*, 2(6), 1878-1895.
- Slaughter, Richard. (2004). *Futures beyond dystopia: Creating social foresight*. London: Routledge Falmer.
- Sovacool, Benjamin K. (2010). The cultural barriers to renewable energy and energy efficiency in the United States. *Technology in Society*, 31, 365-373.
- Stahlman, Mark. (2010). The new golden age. *Strategy+Business*, 58 (Spring), February 23, 1-4. Retrieved February 21, 2011, from http://www.strategy-business.com/media/file/sb58_LeadingIdeas-1.GoldenAge.pdf
- Toffler, Alvin. (1980). *The third wave*. London: Pan Books Ltd.
- Trainer, Ted. (2007). *Renewable energy cannot sustain consumer society*. Dordrecht, The Netherlands: Springer.

