

SUSTAINABLE DEVELOPMENT GOALS

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SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation

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Definitions

The headline title of 'Industry, Innovation and Infrastructure' for SDG 9 conveys a strong economic focus. Within the overall concept of sustainable development that encompasses the overlapping systems of social (people), ecological (planet) and economic (profit), SDG 9 is clearly the SDG that is most embedded within the economic system. As such, the specific goal, expressed in the title of this policy brief, has within it a set of terms that have particular economic meaning. Unpacking these terms in the context of sustainable development is critical in appreciating the role of this SDG within the total SDGs *Agenda* (UN 2015). This definitional explication exposes dilemmas and contradictions inherent in SDG 9.

Referring to building 'resilient' infrastructure, an economic system or economy needs to create physical infrastructure that is proactive in accepting the inevitability of shocks and challenges, while able to adapt and absorb to changing conditions (Dovers and Handmer 1992). Such changes need to operate in a way that there is no loss in the integrity of the functioning economic system (Walker et al. 2004). An example of lack of resilience when building infrastructure is a two-year project to widen a large big city ring road with more lanes, only to experience the same (or even worse) traffic gridlock as more vehicles enter the system post-expansion.

Referring to promoting 'inclusive' industrialisation means the need for industry development to ensure 'decent work for all' as per SDG 8 (As-Saber 2019). This means the process of the market developing into a strong industry with public funded support (e.g. through trade agreements) also needs to ensure all citizens in that economy have the opportunity to gain employment or set up their own business that is consistent with the dignity of human development (Sen 2004). Further to this, 'inclusive' implies the need for industrialisation to have support and commitment across all stakeholders affected by such development. Biekart and Fowler (2018) argue that multi-stakeholders' drive and support for the SDGs is critical to any development process. This involves national and sub-national governments, businesses, Non-Government Organisations (NGOs), and Civil Society Organisations (CSOs) forming partnerships that use the competitive advantage of each stakeholder partner for the best possible sustainability outcome (MacDonald et al. 2018).

SDG 9 also states that ‘sustainable’ activity underpins the industrialisation process. This directly leads to the essence of sustainable development across the three Ps (profit, people, planet) which provides ‘for the fundamental needs of humankind in an equitable way without doing violence to the natural systems of life on earth’ (Kemp and Martens 2007, p.5). This requires productive union of mind and nature when focusing on the industrialisation process going into the future.

The final objective in SDG 9 is to ‘foster innovation. This is the most problematic of terms in the goal statement. In common parlance the term innovation’ is associated with positive creative endeavours that add to progress and prosperity of the regional space within which the innovation successfully is adopted; therefore fostering it is indisputably apposite. The dissenting economist Boulding (1966), writing before the science of global warming emerged, shows that “progress” through innovation is accompanied by significant ecological destruction. Further, Hirsch (1977) identifies social limits of ‘progress’ that undermines the social fabric of society well before any physical limits occur, due to the competition for sought-after positional goods coming out of innovation (e.g. housing bubbles, gridlock traffic, social media influence). James Galbraith locates another negative side of innovation, calling it ‘predation’. Innovation in predatory behaviour since the early 1980s maximises returns for participants in financial manipulation, creating the new power of finance in a financially deregulated environment. This then ties innovation to ‘the ebb and flow and occasional speculative fevers of the financial sector’ (Galbraith 2008, p.15).

Economics and Development

Since the Industrial Revolution, when the United Kingdom developed a sophisticated manufacturing sector, the mainstream economics discipline views development as the outcome of economic growth. From a sustainability perspective, Courvisanos (2012) disentangles the bind between growth and development. Economic growth specifically accounts for increases in economic activity measured by the quantity of GDP (Gross Domestic Product). Development accounts for improvements in the quality of life, measured by various indicators (e.g. Gross Progress Index, Human Development Index).

Empirical studies from Abramovitz (1956) onwards identify the major source of economic growth not as capital or labour, but as the ‘residual’ factor, referring to technical progress (or broadly innovation). This growth, viewed conventionally as all positive, enables underdeveloped countries to emerge and “take-off” into industrialisation (Rostow, 1960). From the early 1970s, the limits to growth have been the focus of much scientific and social literature: physical (Meadows et al. 1972); social (Hirsch 1977); technological (Schumacher 1974); consumerist (Packard 1978); and entropic (Georgescu-Roegen 1971).

Then, in 1985 the first scientific statement reviewing the latest evidence on the Greenhouse Effect emerged (WMO 1985). This made the front pages of newspapers around the world for one day, then disappeared until the Bruntland Report *On Our Common Future* (WCED 1987) made it a *cause célèbre*. From all this emerged the concept ‘sustainable development’ which came into popular usage with the contemporaneous publication of the Bruntland Report and the environment pamphlet from the World Bank (1987). This changed the accepted notion of development away from quantity-based growth, to limits-based sustainable development.

Courvisanos (2012) shows how two strands of economics have attempted to address the limits to growth, but in only very limited terms. Mainstream environmental economics uses market failure and cost-benefit analysis to derive sustainable development policies that only apply at the margins of the economic system. Ecological economics adopts a systems-based approach to the environment based on an optimal zero-growth ‘biophysical equilibrium’ (Daly 1997). This ignores crucially the cumulative process of learning-by-doing and acquiring knowledge

through implementing acceptable adaptive (non-optimal) conventions and rules (e.g. precautionary principle).

Targets and Indicators

The tensions between economic growth (EG) and sustainable development (SD) that emerge from the discussion above lead to the ‘fundamental flaw’ identified in the SDG 3 Policy Brief by Long (2019). This flaw comes to the fore when examining each of the SDG 9 targets and indicators in relation to EG and SD that appear in the United Nations (UN) *SDGs Agenda*. Table 1 identifies the growth/sustainability dilemma by setting out each target (with words that convey SD placed in bold by the author) and its linked indicators.

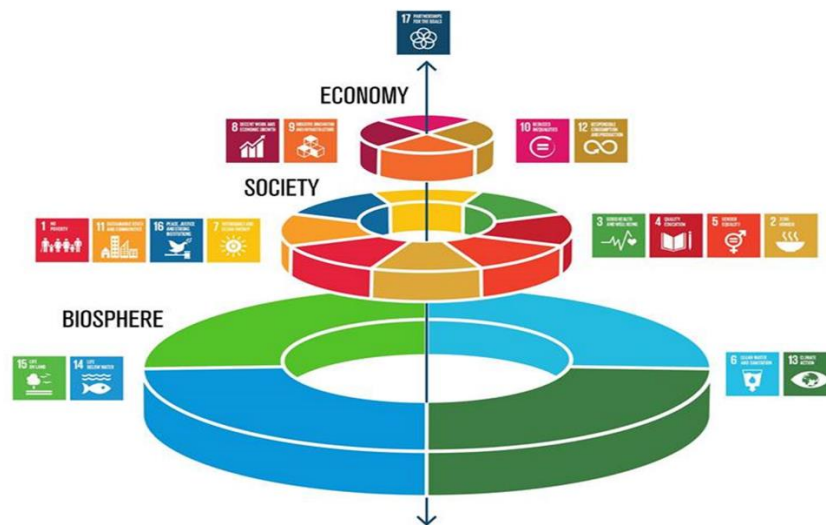
Table 1: SDG 9 Targets and Indicators

| Target No. and its description | | Indicator No. and its specification | | Growth vs Sustainability |
|--------------------------------|--|-------------------------------------|--|--|
| 9.1 | Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all | 9.1.1 | Proportion of the rural population who live within 2 km of an all-season road | EG target with traffic volumes and access criteria; bolded words not linked to SD and planet |
| | | 9.1.2 | Passenger and freight volumes, by mode of transport | |
| 9.2 | Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry’s share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries | 9.2.1 | Manufacturing value added as a proportion of GDP and per capita | EG target with valued added in GDP terms; bolded words not linked to SD and planet |
| | | 9.2.2 | Manufacturing value added as a proportion of GDP and per capita | |
| 9.3 | Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit , and their integration into value chains and markets | 9.3.1 | Proportion of small-scale industries in total industry value added | EG target with access value indicators limited to small industries, but not all small firms; no link to planet |
| | | 9.3.2 | Proportion of small-scale industries with a loan or line of credit | |
| 9.4 | By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities | 9.4.1 | CO ₂ emission per unit of value added | SD indicator limited to only global warming, despite much broader ecology target as per bolded words |
| 9.5 | Enhance scientific research , upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending | 9.5.1 | Research and development expenditure as a proportion of GDP | EG target with indicators matching; all related to R&D based on science and technology. No assurance of SD |
| | | 9.5.2 | Researchers (in full-time equivalent) per million inhabitants | |
| 9.A | Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States | 9.A.1 | Total official international support (official development assistance plus other official flows) to infrastructure | Target for vulnerable poor countries; but indicator only reflects EG-focus despite SD bold words |
| 9.B | Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to | 9.B.1 | Proportion of medium and high-tech industry value added in total value added | Strong EG focus in both target and indicator, but no SD direction for diversify industry |

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|-----|--|-------|---|--|
| | commodities | | | |
| 9.C | Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020 | 9.C.1 | Proportion of population covered by a mobile network, by technology | EG focus with social access; but no indication of its ecology implications |

Viewing the last column in Table 1 shows the emphasis in SDG 9 on mainstream economic growth (EG) targets with 11 quantitative indicators based on GDP and proportions of given populations. Even the only one sustainable development (SD) indicator is a quantitative indicator of carbon emissions per unit of value added. This undercuts the inclusive and limits-based nature of sustainable development as a concept, while underscoring Long’s ‘fundamental flaw’ in the way that the SDGs have been conceived. There is, however, a way to rescue this dilemma so manifestly apparent in SDG 9. Paragraph 54 of the *SDG Agenda* (United Nations 2015) opens by noting that the SDGs and their accompanying targets ‘are integrated and indivisible’. This clearly means humankind lives in one ecosystem called Earth, and it is unviable to separate each goal or target as one individual item merely to tick off with a quantitative indicator. SDG 9 targets, with all the words in bold attended to, need to be interrelated with the other 16 SDGs in one world that connects all three economic, social and biosphere systems in the way identified by the Stockholm Resilience Centre (see Figure 1). In this conceptualisation of the SDGs, SDG 9 fits – as one of four economic SDGs – inside the social and biospheres that are more foundational to the ecosystem, but with the economic system closer to the centre of the driving mechanism of the ecosystem.

Figure 1: SDGs within the Context of Economic-Social-Ecological Systems



Source: Rockström and Sukhdev (2015)

Global Advancement on SDG 9

‘Despite considerable efforts these past four years, we are not on track to achieve the Sustainable Development Goals by 2030’. This is the opening remark by Secretary-General of the UN, António Guterres, in the report by the Independent Group of Scientists appointed by the Secretary-General (2019). The UN Economic and Social Council more specifically, in mainstream economic terms, stated in May 2019 that: ‘Aspects of the prevailing global economic environment have not been conducive to rapid progress on Sustainable Development Goal 9’ (United Nations 2019). Many of the specific indicators of weak progress can all be questioned from a SD perspective:

- (i) Only 3.7 per cent increase in maritime freight, thus testing capacity (Do we need increased capacity?)
- (ii) Manufacturing slowed globally, making doubling manufacturing by 2030 difficult (Is it sustainable to double manufacturing? Or should it be redistributed better globally?)
- (iii) Manufacturing employment falling since 2000 (Is not services more eco-sustainable?)

More pertinent is the serious lack of economic development in less developing countries especially in terms of Research & Development (R&D), medium-to-high tech sectors, transport and finance infrastructure.

The United Nations (2019) identifies two indicators as showing success. One is the 90 per cent population coverage by 3G-quality Internet networks; yet networks are rising more rapidly than percentage of population using the Internet. The other is 20 per cent decrease globally by manufacturing of CO₂ emissions (2000-16) to 0.3kg CO₂ per US\$. However, overall since 2000, CO₂ per capita is rising again faster than GDP per capita, after levelling off prior to the start of the millennium. Thus, decoupling these two critical measures seems a chimera as ‘incentives are not being aligned’ with sustainable development (Independent Group of Scientists appointed by the Secretary-General 2019, p.51-52).

Australia and SDG 9

In the 2018 DFAT (2018) review of all SDGs in Australia since 2015, under SDG 9 the opening statement notes: ‘The Australian Government’s vision is for an agile economy, capitalising on our commercial and scientific strengths’ (p.64) This reflects the Coalition Government’s inability to embrace sustainable development as a concept and strategy in its vision of the economy going forward. As Malekpour (2018) recognises in her Monash Sustainable Development Institute assessment of the DFAT review overall: ‘[it] emphasises what we have already been doing – not new initiatives explicitly related to the goals’.

Looking at examples of failure to address SDG 9 specifically is instructive.

- Target 9.1 fails on economic development that is affordable and equitable for human well-being because the Australian economy exhibits huge divisions. OECD (2018) ranks this country 21st out of 39 in the “Better Life Index”, yet Melbourne is 2nd and Sydney 3rd in a “Liveability Index” of all major cities in the world (The Economist Intelligence Unit 2019);
- Target 9.2 fails on inclusive and sustainable industrialisation with the ‘Closing the Gap’ report showing Indigenous Australians are not participating in economic development (Department of the Prime Minister and Cabinet 2020);
- Target 9.3 fails on small business prosperity as the FADT Committee (2019, p.152) noted that ‘small and medium enterprises may face barriers in engaging with the business opportunities presented by the SDGs’ because of inadequate cash flow, low capital, and lack of growth focus in regions. Given the remarkably high monopoly strength of large business in Australia, small businesses ‘are vulnerable when demand softens and financing conditions tighten’ (Nicholls and Orsmond 2015, p.16);
- Target 9.4 is on track to be met by using the Kyoto carry over credits’ (rejected by most other nations), and with no long-term CO₂ emission target or strategic plan. More broadly Australia ranks 55th in the Climate Change Performance Index with the highest exporter of CO₂ emission, no national climate policy and a major recycling crisis (Burk et al. 2018);
- Target 9.5 fails to develop diversified industrial sectors due to lack of both diversity in industrial structure (Courvisanos et al. 2016) and indigenous local innovation (Cutler, 2008) while depending on industries with low value-added commodity exports;

- Target 9.A suffers from a lack of an effective aid program to support SDGs in developing countries (DFAT Committee 2019), with further reduction as percentage of Gross National Income from 0.32 per cent (2014-15) to 0.21 per cent (2019-20) – well below the UN target by 2030 of 0.7 per cent by all developed countries (Clare 2019);
- Target 9.B ‘industrialisation diversification and value addition’ is limited. See Labor MP and economist Dr Andrew Leigh’s statement to House of Representatives Economics Committee: ‘declines in labour productivity for the first time on record, the slowest wage growth on record, declining household spending per capita, record household debt, record government debt, below average consumer confidence, retail suffering its worst downturn since 1990, and construction shrinking at its fastest rate since 1999’ (Gittins, 2020);
- Target 9.C is lauded through the National Broadcasting Network (NBN) program in the SDG review (DFAT 2018, p. 65), yet suffers from ‘unwarranted claims over the purported benefits of the programs and excessive optimism over both the speed of its projected delivery and its aggregate costs’ (Valle de Souza et al. 2016, p. 6).

What is to be Done?

As is evident from its inability to move effectively towards the seven out of eight targets that are purely economic, the mainstream economic growth approach fails on its own terms. Any attempts to continue on the same development path with fine-tuning of the standard neoclassical economics tools (interest rates, tax cuts, infrastructure spending, and microeconomic reform) cannot deliver SDG 9 as the Australian economy remains – along with the rest of the developed world – in muted growth or worse, stagnation (Gittins 2019).

There needs to be a cultural shift in recognising that the viability of economic system – however defined – is not the end in itself. Economics needs to serve the wider ecosystem with social and ecological objectives at the core. Economics can then develop a circular economic model that is the material driving mechanism of the ecosystem as per Figure 1. Three basic sustainable development economic models within an ecosystem exist: (i) technological adaptation (Garnaut 2019), Green New Deal (Pollin 2015), and de-growth towards Steady-State (Victor 2008). Much debate occurs on the strengths and limitations of each model, but all three require immediate action to harmonise an SD alternative that challenges the mainstream economic model. With such an alternative approach in place, eco-sustainable innovation underpinned by SDG 9 can transform the economy, enabling all the other SDGs to move more effectively and efficiently to their own targets. Economics for all SDGs, and not just for SDG 9.

References and Further Reading

- Abramovitz, M. (1956), “Resource and output trends in the United States since 1870”, *American Economic Review*, 46(2), p.5-23.
- As-Saber, S. (2019), *SDG 8: Promote sustained, inclusive and sustainable economic growth, and full and productive employment and decent work for all*, Jean Monnet Sustainable Development Goals Network Policy Brief Series, RMIT Melbourne. Accessed from: <https://www.rmit.edu.au/about/our-education/global-outlook/european-union-eu-centre/projects/eu-role-implementation-of-sdg-ap> (accessed 2 March 2020).
- Biekart, K. and Fowler, A., (2018), “Ownership dynamics in local multi-stakeholder initiatives”, *Third World Quarterly*, 39(9), p.1692-710.
- Boulding, K. (1966), “The economics of the coming Spaceship Earth”, in H. Jarrett (ed.), *Environmental Quality in a Growing Economy*, Baltimore: Resources for the Future/John Hopkins University Press, p.3-14.
- Burck, J., Hagen, U., Marten, F., Höhne, N., Bals, C. (2018), *The Climate Change*

- Performance Index: Results 2019*. Germanwatch, Bonn. Accessed from <https://www.climate-change-performance-index.org/> (accessed 2 March 2020).
- Clare, A. (2019), *Official Development Assistance (ODA): A Quick Guide*, Research Paper Series 2018-19, Canberra: Department of Parliamentary Services, 30 April.
- Courvisanos, J. (2012), *Cycles, Crises and Innovation: Path to Sustainable Development – A Kaleckian-Schumpeterian Synthesis*. Cheltenham, UK and Northampton, MA: Edward Elgar.
- Courvisanos, J., Jain, A, and Mardaneh, K. (2016), “Economic resilience of regions under crises: A study of the Australian economy”, *Regional Studies*, 50(4), p.629–643.
- Cutler, T. (Chair) (2008), *Venturous Australia: Building Strength in Innovation*, Report on the Review of the Australian National Innovation System, Melbourne: Cutler & Company Pty. Ltd.
- Daly, H. (1977), *Steady-State Economics*, San Francisco: W.H. Freeman [Second edition, 1991, Island Press, Washington].
- Department of the Prime Minister and Cabinet (2020), *Closing the Gap Report 2020*, Canberra: Commonwealth of Australia.
- DFAT [Department of Foreign Affairs and Trade] (2018), *Report on the Implementation of the Sustainable Development Goals*, for presentation to the United Nations High-Level Political Forum on Sustainable Development 2018, Canberra: Australian Government.
- Dovers, S.R., and Handmer, J.W. (1992), “Uncertainty, sustainability and change”, *Global Environmental Change*, 2(4), p.262-276.
- FADT [Foreign Affairs, Defence and Trade] Committee of The Senate (2019), *United Nations Sustainable Development Goals (SDG)*, Canberra: Commonwealth of Australia, February.
- Galbraith, J. (2008), “Innovation and predation”, in B. Laperche and D. Uzunidis (eds), *Powerful Finance and Innovation Trends in a High-Risk Economy*, Basingstoke: Palgrave Macmillan, p.13-8.
- Garnaut, R. (2019), *Superpower: Australia's Low-Carbon Opportunity*, Carlton: La Trobe University Press.
- Georgescu-Roegen, N. (1971), *The Entropy Law and the Economic Process*, Cambridge, MA: Harvard University Press.
- Gittins, R. (2019), “Our leaders slowly come to grips with a different economy”, *The Age*, 31 August, p.19.
- Gittins, R. (2020), “Is the Lucky Country struggling? Well it depends who you ask”, *The Age Business*, 15 February, p.6.
- Hirsch, F. (1977), *Social Limits to Growth*, London: Routledge & Kegan Paul.
- Independent Group of Scientists appointed by the Secretary-General (2019), *Global Sustainable Development Report 2019: The Future is Now –Science for Achieving Sustainable Development*, New York: United Nations.
- Kemp, R. and Martens, P. (2007), “Sustainable development”, *Sustainability*, 3(2), p.5-14.
- Nicholls, S. and Orsmond, D. (2015), “The economic trends, challenges and behaviour of small businesses in Australia”, in *Proceedings of the Reserve Bank Annual Conference*, Sydney: Reserve Bank of Australia, p.5-31.
- MacDonald, A., Clarke, A. and Huang, L. (2018), “Multi-stakeholder partnerships for sustainability: Designing decision-making processes for partnership capacity”, *Journal of Business Ethics*, 160(2), p.409-426.
- Malekpour, S. (2018), “Australia must embrace transformation for a sustainable future”, *The Conversation*, 19 June.
- Meadows, D.H., D. L. Meadows, J. Randers and W. Behrens III (1972), *The Limits to Growth*, New York: Universe Books.
- OECD (2018), *OECD Better Life Index*, 1 November 2017.

- <http://www.oecdbetterlifeindex.org/countries/Australia> (accessed 2 March 2020).
- Packard, V. (1978), *The Waste Makers*, New York: Simon & Schuster.
- Pollin, R. (2015), *Greening the Global Economy*, Cambridge, MA: MIT Press.
- Rockström, J. and Sukhdev, P. (2015), “How food connects all the SDGs”, Stockholm Resilience Center. <http://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html> (accessed 2 March 2020).
- Rostow, W.W. (1960), *The Stages of Economic Growth*, Cambridge: Cambridge University Press.
- Sen, A. (2004), *Development as Freedom*, London: Oxford University Press.
- Schumacher, E.F. (1974), *Small is Beautiful: A Study of Economics as if People Mattered*, London: Abacus/Sphere Books [original published 1973 by Blond & Briggs].
- The Economist Intelligence Unit (2019), *2019 Global Liveability Report*, London: The Economist. <https://www.eiu.com/topic/liveability> (accessed 2 March 2020).
- United Nations (2015), *Transforming Our World: The 2030 Agenda for Sustainable Development, Resolution A/RES/70/1*, Washington D.C.: United Nations. <https://sustainabledevelopment.un.org/post2015/transformingourworld> (accessed 2 March 2020).
- United Nations (2019), *Report of the Secretary-General, Special edition: Progress towards the Sustainable Development Goals*, UN Economic and Social Council, 8 May. <https://undocs.org/E/2019/68> (accessed 2 March 2020).
- Valle de Souza, S., Dollery, B.E., and Kortt, M.A. (2016), “Counting the cost: A critical evaluation of the Australian National Broadband Network roll-out under the Rudd/Gillard Governments”, *International Journal of Public Administration*, 41(2), p.129-136.
- Victor, P.A. (2008), *Managing without Growth: Slower by Design, Not Disaster*, Cheltenham UK and Northampton, MA: Edward Elgar.
- Walker, B., Holling, C.S., Carpenter, S.R. and Kinzig, A. (2004), “Resilience, adaptability and transformability in social-ecological systems”, *Ecology and Society*, 9(2), p.5.
- WCED [World Commission on Environment and Development] (1987), *Our Common Future*, Oxford: Oxford University Press.
- WMO [World Meteorological Organisation] (1985), *Report of the International Conference on the assessment of the role of carbon dioxide and of other greenhouse gases in climate variations and associated impacts*, 9-15 October 1985, No. 661, Villach, Austria. https://library.wmo.int/doc_num.php?explnum_id=8512 (accessed 2 March 2020).
- World Bank (1987), *Environment, Growth and Development*, Development Committee Pamphlet 14, Washington, D.C.: World Bank.



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