

NOTES

- 1 Details were provided in the revised programme budget endorsed by the General Assembly at the end of 2012.
- 2 Rio+20 United Nations Conference on Sustainable Development, Executive Committee on Economic and Social Affairs (EC-ESA) Plus Members (New York, United Nations, 2011). Available from <http://www.uncsd2012.org/ecesaplus.html>
- 3 United Nations, *Prototype Global Sustainable Development Report*, online unedited edition (New York, United Nations Department of Economic and Social Affairs, Division for Sustainable Development, 2014). Available from <http://sustainabledevelopment.un.org/index.php?menu=1621>
- 4 K. Riahi et al., "Chapter 17: Energy pathways for sustainable development", in *Global Energy Assessment – Toward a Sustainable Future*, GEA writing team (Cambridge, United Kingdom and New York, New York, Cambridge University Press; Laxenburg, Austria, the International Institute for Applied Systems Analysis, 2012). & McCollum, D., and Riahi, K., (2012). *To Rio and Beyond: Sustainable Energy Scenarios for the 21st Century*. IIASA, April 2012. (based on GEA scenario chapter)
- 5 D. Van Vuuren, M. Kok, eds., *Roads from Rio+20: Pathways to Achieve Global Sustainability Goals by 2050* (Den Haag/Bilthoven, the Netherlands, PBL Environmental Assessment Agency, 2012).
- 6 M. Nilsson et al., *Energy for All in the Anthropocene: Towards a Shared Development Agenda* (Stockholm Environment Institute, 2012), and M. Nilsson et al., *Energy for a Shared Development Agenda: Global Scenarios and Governance Implications* (Stockholm Environment Institute, 2012).
- 7 Organisation for Economic Co-operation and Development (OECD), *Environment Outlook for 2050: The Consequences of Inaction* (OECD, 2012), and J. Chateau, C. Rebolledo, R. Dellink, *An Economic Projection to 2050: The OECD 'ENV-LINKAGES' Model Baseline*, *OECD Environment Working Papers, No. 41* (OECD Publishing, 2011).
- 8 K. Akimoto et al., *Consistent Assessments of Pathways Toward Sustainable Development and Climate Stabilization* (City, Japan, RITE, 2012).
- 9 C. Carraro, E. De Cian, M. Tavoni, *Human Capital, Innovation, and Climate Policy: An Integrated Assessment, Working Papers 2012.18, Fondazione Eni Enrico Mattei*, 2012, and E. De Cian, V. Bosetti, A. Sgobbi, M. Tavoni, *The 2008 WITCH Model: New Model Features and Baseline, Working Papers 2009.85, Fondazione Eni Enrico Mattei*, 2009.
- 10 P. Raskin et al., "The century ahead: searching for sustainability", *Sustainability*, vol. 2 (2010), pp. 2626–2651. Note: This is an update of Global Scenario Group's work.
- 11 United Nations Department of Economic and Social Affairs (UN DESA), *Financial Needs for Sustainable Development*, Division for Sustainable Development's inputs to the United Nations Task Team on post-2015 agenda (2013).
- 12 This section draws on the presentation "Science and Sustainable Development" by Bob Kates at the United Nations Expert Group Meeting on the Science-Policy Interface, New York, 5 September 2013.
- 13 U. Grober, *Deep Roots: A Conceptual History of 'Sustainable Development' (Nachhaltigkeit)*, (Berlin, Wissenschaftszentrum Berlin für Sozialforschung, 2007). Available from <http://skylla.wzb.eu/pdf/2007/p07-002.pdf>
- 14 United Nations, *Report of the World Commission on Environment and Development: Our Common Future*, World Commission on Environment and Development, transmitted to the United Nations General Assembly as an Annex to United Nations document A/42/427 ("Development and International Co-operation: Environment") (New York, 1987). Available from <http://www.un-documents.net/wced-ocf.htm>
- 15 <http://www.un.org/documents/ga/conf151/annex1.htm>
- 16 <http://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>
- 17 It should be noted, however, that the concept was "pushed by scientific notions" and environmental research.
- 18 Most members of the WCED were politicians, but two of them were scientists: Paulo Nogueira-Neto (ecologist, professor) and Istvan Lang (biochemist, academician, Secretary General of the Hungarian Academy of Sciences).
- 19 Some scientific input was coordinated by the Secretariat for the for the 1992 World Conference on Environment and Development. For example, an international scientific meeting was held at IIASA and *Population, Environment and Development, a case study about Mauritius, was published*.
- 20 United States National Research Council, Policy Division, Board on Sustainable Development, *Our Common Journey: A Transition Toward Sustainability* (Washington, D.C., National Academy Press, 1999). Available from http://www.nap.edu/openbook.php?record_id=9690
- 21 It should be noted that the United Nations Division for Sustainable Development also served as the Secretariat

for Rio+20. The SD21 study was the only project report under the official budget for Rio+20.

22 SD21 study, <http://sustainabledevelopment.un.org/sd21.html> 36

23 High-level Panel on Global Sustainability, *Resilient People, Resilient Planet: A Future Worth Choosing* (2012). Available from <http://www.un.org/gsp/> 37

24 <http://sustainabledevelopment.un.org/rio20.html>

25 United Nations document A/66/288 and <http://sustainabledevelopment.un.org/futurewewant.html> 38

26 United Nations document A/67/591. 39

27 <http://sustainabledevelopment.un.org/content/documents/975GSDR%20Executive%20Summary.pdf>

28 M.J. Salganik and K.E.C. Levy, *Wiki Surveys: Open and Quantifiable Social Data Collection* (2012). Available from <http://arxiv.org/pdf/1202.0500v1.pdf> 40

29 Inputs can be made in English at <http://sustainabledevelopment.un.org/globalsdreport#ideas>, and also in Spanish and Chinese. 41

30 UNGA A/C.2/68/8, 18 November 2013. Available from http://www.un.org/ga/search/view_doc.asp?symbol=A/C.2/68/8

31 This is a clear difference to the *Assessment of Assessments on Oceans*. 42

32 For example, aspects of the climate–land–energy–water nexus are also discussed at the national and local levels. 43

33 R.W. Kates, T.M. Parris and A.A. Leiserowitz, "What is sustainable development? Goals, indicators, values, and practice", *Environment*, vol. 47, No. 3 (2005), pp. 9–21. Available from <http://www.environmentmagazine.org/Editorials/Kates-apr05-full.html>

34 This provides a general, illustrative picture only. The smaller circles are not necessarily fully included in the next larger circles. For example, there may well be communities that are totally unrelated to the economy. Ultimately all economic and social activities are related to life-supporting functions and nature, but this relation may be very remote in a large part of modern economies. However, this does not change anything about the overall message that these areas are to a large extent embedded in each other and thus strongly interconnected. 44

35 The idea of three pillars – social, economic, and environmental – was promoted by scientist and economist Mohan Munasinghe in the 1990s and adopted by United Nations Member States in Paragraph 5 of the Johannesburg Declaration on Sustainable Development (September 2002). A/CONF.199/20. Available from <http://www.un-documents.net/jburgdec.htm>. 45

http://portal.unesco.org/en/ev.php-URL_ID=13179&URL_DO=DO_TOPIC&URL_SECTION=201.html

R. Stavins, A. Wagner, G. Wagner, "Interpreting sustainability in economic terms: dynamic efficiency plus intergenerational equity", *Economic Letters*, vol. 79, No. 3 (2003), pp. 339–343.

R. Costanza et al., "Changes in the global value of ecosystem services", *Global Environmental Change*, vol. 26 (2014), pp. 152–158.

The chapter draws on the inputs and perspectives of scientists contributing to the United Nations Expert Group Meeting on Sustainable Development Assessments, held in New York from 3 to 4 September 2013.

The table present one prominent suggestion to delineate assessments from reviews. It should be noted, however, that there is no general consensus on this delineation.

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D.W. Cash et al., "Knowledge systems for sustainable development", *Proceedings of the National Academy of Sciences of the United States of America*, vol. 100, No. 14, (2003), pp. 8,086–8,091. Available from <http://www.pnas.org/content/100/14/8086.full.pdf>

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Cases in point are D. H. Meadows, D. L. Meadows, J. Randers and W. W. Behrens III. Limits to Growth. A report for the club of Rome's project on the predicament of mankind, (1972). Available from <http://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth-digital-scan-version.pdf> and Energy in a Finite World. Paths to a Sustainable Future. Report by the Energy Systems Program Group of the International Institute for Applied Systems Analysis, (1981). Available from <http://webarchive.iiasa.ac.at/Admin/PUB/Documents/XB-81-202.pdf>.

W. C. Clark, Sustainability Science: A room of its own. PNAS, vol. 104, no. 6, (2007), pp. 1,737–1,738. Available from <http://www.pnas.org/content/104/6/1737.full.pdf+html>

- 46 L.M.A. Bettencourt and J. Kaur, "Evolution and structure of sustainability science", *Proceedings of the National Academy of Sciences of the United States of America*, vol. 108, No. 49 (December 2011), pp. 19,540–19,545. Available from <http://www.pnas.org/content/108/49/19540.full.pdf+html?with-ds=yes>. See also <http://tuvalu.santafe.edu/~bettencourt/sustainability/>
- 47 As of 13 September 2013. Available from <http://www.unep-wcmc-apps.org/GRAMED/DataResults.cfm>
- 48 <http://catalog.ipbes.net/>
- 49 There are, of course, various views on which areas are of "importance" to sustainable development. The present statement is based on a consideration of the 17 areas currently being considered by the OWG on SDGs.
- 50 <http://sustainabledevelopment.un.org/globalreport>
- 51 This assumes a conservative estimate of US\$10,000 per scientist per year for their in-kind contributions and travel costs to the meetings.
- 52 <http://www.iiasa.ac.at/web/home/research/Flagship-Projects/Global-Energy-Assessment/Home-GEA.en.html>
- 53 Written submission to the Expert Group Meeting on the Sustainable Development Assessments (New York, 3–4 September 2013)
- 54 For example, the UNEP GEO series has traditionally had a strong focus on the description of trends and natural systems and associated problems. GEO-3 and GEO-4 extended that tradition with future scenarios. The GEO-5 increased its solutions focus by monitoring progress towards policy goals contained in intergovernmental environmental agreements. Future GEO reports might focus on recommending specific policy options.
- 55 Anecdotes of "negotiations" of scientists in the IPCC of primary energy shares are a case in point.
- 56 For example, G20 is used in an IPCC report, apparently to use as proxy for the largest emitters. Yet, G20 is not country grouping with the 20 largest emitters.
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- 58 J. Handmer and S. Dovers, "A Typology of Resilience: Rethinking Institutions for Sustainable Development", in *The Earthscan Reader on Adaptation to Climate Change*, L.F. Schipper and I. Burton, eds. (London, Earthscan, 2008), pp. 187–210
- 59 T. O'Riordan and A. Jordan, "Institutions, climate change and cultural theory: towards a common analytical framework", *Global Environmental Change*, vol. 9 (1999), pp. 81–93.. Available from <http://www.science-direct.com/science/article/pii/S0959378098000302#>.
- 60 See: Biological and cultural diversity in costal communities: exploring the potential of Satoumi for implementing the Ecosystem Approach in the Japanese Archipelago. Available from <http://www.cbd.int/doc/publications/cbd-ts-61-en.pdf>
- 61 See: Recognising and Supporting Territories and Areas Conserved by Indigenous Peoples and Local Communities. Available from <http://www.cbd.int/doc/publications/cbd-ts-64-en.pdf>
- 62 The United Nations System Chief Executives Board (CEB), the United Nations Development Group (UNDG), the Environmental Management Group (EMG) continue to coordinate system-wide follow-up activities in their respective areas.
- 63 <http://www.unep.org/geo/>
- 64 Full report at http://www.unep.org/geo/pdfs/geo5/GE05_report_full_en.pdf and the Summary for Policymakers at http://www.unep.org/geo/GE05_SPM.asp
- 65 <http://www.cbd.int/gbo3/>
- 66 <http://sustainabledevelopment.un.org/rio20nationalreports.html>
- 67 <http://sustainabledevelopment.un.org/index.php?menu=1621>
- 68 <http://sustainabledevelopment.un.org/memberstates.html>
- 69 <http://www.sidsnet.org/resources>
- 70 Previously available at: http://www.johannesburgsummit.org/html/prep_process/natlassessmentrep.html
- 71 <http://www.undp.org/content/undp/en/home/librarypage/mdg/mdg-reports/>
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- 73 R. Brinkmann, S. Garren and W. Liu, "A review of national sustainable development assessments", Background paper for the *Global Sustainable Development Report* (United Nations Department of Economic and Social Affairs, 2013).
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- 77 Organisation for Economic Co-operation and Development (OECD), *Development Assistance Committee Guidelines and Reference Series: Applying Strategic Environmental Assessment: Good Practice Guidance for Development Co-operation* (Paris, OECD, 2006). Available from <http://www.oecd.org/dac/environment-development/37353858.pdf>
- 78 B. Dalal-Clayton and B. Sadler, *Strategic Environmental Assessment: A Sourcebook and Reference Guide to International Experience* (London, Earthscan, 2005). Available from <http://pubs.iied.org/pdfs/G02193.pdf>.
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- 80 http://www.unece.org/env/eia/sea_protocol.html
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- 82 Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee SEA Task Team, Minutes of the 15th meeting of the OECD DAC Environet Task Team on SEA, held on 17–18 November 2010 at the Inter-American Development Bank, Washington, D.C.
- 83 L. Ghanimé et al., "Using SEA to enhance poverty reduction strategies", in *Handbook of Strategic Environmental Assessment*, R. Aschemann et al., eds. (London, Earthscan, 2010), and L. Ghanimé and N. Risse, "Environmental sustainability, strategic environmental assessment and poverty reduction strategies", in *International Experience on Strategic Environmental Assessment*, E.W.K. Au et al., eds. China's International Conference on Strategic Environmental Assessment (SEA), Center of Strategic Environmental Assessment for China (Chinese University of Hong Kong), Hong Kong Institute of Environmental Impact Assessment and Research Centre for Strategic Environmental Assessment (Nankai University, 2007).
- 84 Costs related to the preparation of an SEA vary depend-
- ing on the type, scope and complexity of the assessment. In the United Kingdom for example, SEA costs were reported by COWI (2009) to be typically in the range €35,000 (approximately US\$49,000) to €80,000 (approximately US\$111,000).
- 85 Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Romania, Yugoslavia, Slovenia, Tajikistan, the former Yugoslav Republic of Macedonia, Turkmenistan, Ukraine and Uzbekistan
- 86 For example, at the request of Morocco, UNECE has launched in 2012 the EPR of the country in cooperation with the United Nations Economic Commission for Africa. More recently, Tunisia expressed the hope to be reviewed under the third cycle of UNECE EPR programme with the support of UN ESCWA, the latter being particularly interested to strengthen accountability for sustainable development and to initiate an EPR programme for member countries committed to renew their environmental policies with the perspectives of green economy transition.
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- 92 Informal report prepared by students of Wageningen University, Netherlands, and the State University of New York – College of Environmental Science and Forestry (December 2013).
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	and emerging issues is available here: https://www.cbd.int/emerging/		https://www.cbd.int/emerging/
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95	CBD Technical Series 67 - https://www.cbd.int/doc/publications/cbd-ts-67-en.pdf	113	A.R. Hosseinpoor et al., "International shortfall inequality in life expectancy in women and in men, 1950–2010", <i>Bulletin of the World Health Organization</i> , vol. 90 (2012), pp. 588–594. doi:10.2471/BLT.11.097378. Available from http://www.who.int/bulletin/volumes/90/8/11-097378/en/index.html
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97	CBD Technical Series 46 - https://www.cbd.int/doc/publications/cbd-ts-46-en.pdf	114	World Health Organization (WHO), <i>Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks</i> (Geneva, 2009), pp. 1–31. Available from http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf
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99	document UNEP/CBD/SBSTTA/16/INF/12 - http://www.cbd.int/doc/meetings/sbstta/sbstta-16/information/sbstta-16-inf-12-en.doc	115	Global Burden of Disease Study 2010, <i>Lancet</i> (December 2012). Available from http://www.thelancet.com/themed/global-burden-of-disease
100	21 Issues for the 21 st Century: Results of the UNEP Foresight Process on Emerging Environmental Issues.	116	No reliable numbers are available for the time period before 1980.
101	http://www.unep.org/publications/ebooks/foresightreport/Portals/24175/pdfs/Foresight_Report-21_Issues_for_the_21st_Century.pdf	117	The relative poverty line is defined as the minimum cost of inclusion and a better measure of poverty with rising income than an absolute poverty line.
102	Please refer to the United Nations crowdsourcing platform results as of 2 September 2013.	118	United Nations, <i>Millennium Development Goals, Targets and Indicators, 2013: Statistical Tables</i> (New York, 2013).
103	United Nations, <i>Millennium Development Goals, targets and indicators, 2013: Statistical Tables</i> (New York, 2013). Available from http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Products/ProgressReports.htm .	119	It should be noted, however, that the prevalence of underweight children under 5 years of age increased in developed countries from 1 to 2 per cent between 1990 and 2011!
104	http://data.un.org/	120	S. KC, B. Barakat, A. Goujon, V. Skirbekk and W. Lutz, <i>Projection of Populations by Level of Educational Attainment, Age and Sex for 120 Countries for 2005–2050</i> , Interim Report IR-08-038 (Laxenburg, Austria, International Institute for Applied Systems Analysis, 2008). Available from http://datatopics.worldbank.org/education/files/Learning/ProjectionsIR-08-038.pdf
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106	R.W. Kates, and T.M. Parris, "Long-term trends and a sustainability transition", <i>Proceedings of the National Academy of Sciences</i> , vol. 100, No. 14 (2003).	122	Organisation for Economic Co-operation and Development (OECD), "Chapter 5: A family affair: intergenerational social mobility across OECD countries", in <i>Economic Policy Reforms 2010: Going for Growth</i> (Paris, OECD Publishing, 2010). Available from http://www.oecd.org/tax/public-finance/chapter%205%20gfg%202010.pdf .
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- 427 Transparency: As in any "good practice" scientific endeavour, the model structure, main assumptions and data used as input ought to be open for review and criticism, thus enhancing the credibility of the model.
- 428 Accessibility: In connection to the previous feature, the developed model should be accessible to all interested members from the scientific, policy-framing or public community. As such, the model and its produced results should not be exceedingly difficult to comprehend, which leads to the necessity for simplicity.
- 429 Modularity: The model should consist of an ensemble of modules that can function both as isolated and interconnected parts of the entire model. These modules can be thought of as pieces of a puzzle and assess different sectors of the economy. In this way, the model can easily be disassembled and modified to alter the focus given to a particular set of technologies or sector of the economy.
- 430 Scalability: A generic model structure should be established to allow the use of the model in varying degrees of aggregation (i.e. global, regional, national). In the primary stage of GLUCOSE model development, a high aggregation has been employed, as the globe is represented in a single region.
- 431 Crowdsourcing: The interdisciplinary nature of any integrated assessment effort entails a great deal of input from a number of fields of expertise. The four aforementioned criteria serve as the means to promote and encourage this final feature. Consequently, the proposed model can be seen as a constantly evolving tool, where stakeholders can populate the model with their own data and test their own assumptions.
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