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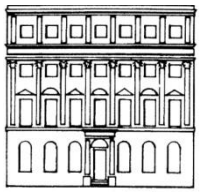

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ARTICLES

TOWARDS THE LIMITS TO GROWTH*?* *THE BOOK AND ITS RECEPTION IN WEST GERMANY AND BRITAIN 1972–73*

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In March 1972 a book was published in the United States and Europe. Its title became a key concept for the perception of crisis in the 1970s: *The Limits to Growth* (in German: *Die Grenzen des Wachstums*). The world model created by the Massachusetts Institute of Technology (MIT) for the Club of Rome suggested the following scenario: 'If the present growth in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years.'[1] Only a controlled end to the growth of both economy and population could prevent that catastrophe.

The international response was immense. *The Limits to Growth*, which belonged to the heterogeneous field of 'futures studies' (or futures research/futurology), became a bestseller and received significant attention. Writers on futures studies, scientists, and intellectuals commented on its arguments, which also entered the political arena. In the Western industrialized countries, 'The Limits to Growth' became a topos for the perception of crisis in the 1970s, linked with an anticipation of crisis. This was expressed in concern about environmental deterioration, depletion of resources, overpopulation, and in a critique of growth, especially when the oil price crisis of 1973 seemed to demonstrate the fragility of the foundations of affluence and the limits of resources. Currently, the 1970s is one of the main

[1] Donella H. Meadows, Dennis Meadows, Jørgen Randers, and William W. Behrens III, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (New York, 1972), 23; published in German as Dennis Meadows, Donella H. Meadows, Erich Zahn, and Peter Milling, *Die Grenzen des Wachstums: Bericht des Club of Rome zur Lage der Menschheit* (Stuttgart, 1972).

areas of research in contemporary history. A dynamic research landscape has developed in this field, focusing on a number of questions. How far was the decade a watershed in the post-war history of Western industrialized countries, comprising economic crises, structural transformations in the wake of the decline of Fordism, and profound social, political, and cultural changes? And how far were the 1970s tied up with a crisis of the ideas of 'modernization' and 'progress'?[2]

Against the background of the latter aspect in particular, this article will examine the history of *The Limits to Growth*.[3] This article is not

[2] See Summer Conference of the Centre for Contemporary British History at the Institute for Historical Research, University of London, 'Reassessing the Seventies', 2010 <http://www.h-net.org/announce/show.cgi?ID=173296>, accessed 16 Feb. 2010; Anselm Doering-Manteuffel and Lutz Raphael, *Nach dem Boom: Perspektiven auf die Zeitgeschichte seit 1970* (2nd edn. Göttingen, 2010); Andy Beckett, *When the Lights Went Out: Britain in the Seventies* (London, 2009); Thomas Raithel, Andreas Rödder, and Andreas Wirsching (eds.), *Auf dem Weg in eine neue Moderne? Die Bundesrepublik Deutschland in den siebziger und achtziger Jahren* (Munich, 2009); Konrad Jarausch (ed.), *Das Ende der Zuversicht? Die siebziger Jahre als Geschichte* (Göttingen, 2008); Hans Maier, 'Fortschrittsoptimismus oder Kulturpessimismus? Die Bundesrepublik Deutschland in den 70er und 80er Jahren', *Vierteljahrshefte für Zeitgeschichte*, 56 (2008), 1–17; Martin Geyer, 'Rahmenbedingungen: Unsicherheit als Normalität', in id. (ed.), *1974–1982 Bundesrepublik Deutschland. Neue Herausforderungen, wachsende Unsicherheiten: Geschichte der Sozialpolitik* (Baden-Baden, 2008), 1–109; and now Niall Ferguson et al. (eds.), *The Shock of the Global: The 1970s in Perspective* (Cambridge, Mass., 2010), and the excellent study by Silke Mende, *'Nicht rechts, nicht links, sondern vorn': Eine Geschichte der Gründungsgrünen* (Munich, 2011).

[3] See Patrick Kupper, ' "Weltuntergangs-Vision aus dem Computer": Zur Geschichte der Studie "Die Grenzen des Wachstums" von 1972', in Frank Uekötter and Jens Hohensee (eds.), *Wird Kassandra heiser? Die Geschichte falscher Ökoalarme* (Stuttgart, 2004), 98–111, who focuses on the reception of *The Limits to Growth* in Switzerland. For accounts of the Club of Rome and the book's reception in West German trade unions and the Protestant church see Friedemann Hahn, *Von Unsinn bis Untergang: Rezeption des Club of Rome und der Grenzen des Wachstums in der Bundesrepublik der frühen 1970er Jahre* (Freiburg, 2006) <http://www.freidok.uni-freiburg.de/volltexte/2722/pdf/hahn_friedemann_2006_von_unsinn_bis_untergang.pdf>, accessed 12 Dec. 2010; further Nils Freytag, '"Eine Bombe im Taschenbuchformat"? Die Grenzen des Wachstums und die öffentliche Resonanz', *Zeithistorische For-*

interested in asking how accurate the study's forecasts have turned out to be. This would be of limited epistemological value for two reasons. First, in all cases forecasts and projected scenarios also had a social and political impact, prompting individual, social, and political action and thus operating within a specific context.[4] After all, the authors' aim in writing their apocalyptic scenario was to stir up public opinion in order to prevent the disaster they were forecasting. Secondly, the dynamic development and expansion of scientific and technical knowledge meant that the future became less and less predictable. As productive forces, science and scientific expertise changed 'the future more quickly and comprehensively than science, as knowledge of the future, can itself grasp'.[5] Instead, discussion of the study will be historicized. This article reflects new approaches to the history of science, linking this discipline with the discourse of general history by arguing that the production and distribution of scientific knowledge are based on their contexts.[6] Thus the contextualizations of *The Limits to Growth* will be examined in what follows.

schungen/Studies in Contemporary History Online, 3 (2006), 3 <http://www.zeithistorische-forschungen.de/16126041-Freytag-3-2006>, accessed 12 Dec. 2010; Mauricio Schoijet, 'Limits to Growth and the Rise of Catastrophism', *Environmental History,* 4 (1999), 515–30.

[4] See also Kupper, 'Weltuntergangs-Vision aus dem Computer'.

[5] Helmut Schelsky, *Die Arbeit tun die anderen: Klassenkampf und Priesterherrschaft der Intellektuellen* (Opladen, 1975), 373; Alexander Schmidt-Gernig, 'Das Jahrzehnt der Zukunft: Leitbilder und Visionen der Zukunftsforschung in den 60er Jahren in Westeuropa und den USA', in Uta Gerhardt (ed.), *Zeitperspektiven: Studien zu Kultur und Gesellschaft* (Wiesbaden, 2003), 305–45, at 306; Hermann Lübbe, *Zeit-Erfahrungen: Sieben Begriffe zur Beschreibung moderner Zivilisationsdynamik (*Stuttgart, 1996), 15–16; Niklas Luhmann, *Beobachtungen der Moderne* (Wiesbaden, 1992), 129–47; for economic forecasting see Tim Schanetzky*, Die große Ernüchterung: Wirtschaftspolitik, Expertise und Gesellschaft in der Bundesrepublik 1966 bis 1982* (Berlin, 2007), esp. 270.

[6] See Helmut Trischler, 'Geschichtswissenschaft—Wissenschaftsgeschichte: Koexistenz oder Konvergenz?', *Berichte zur Wissenschaftsgeschichte,* 22 (1999), 239–56; Lorraine Daston, 'Die Kultur der wissenschaftlichen Objektivität', in Otto Gerhard Oexle (ed.), *Naturwissenschaft, Geisteswissenschaft, Kulturwissenschaft: Einheit – Gegensatz – Komplementarität?* (Göttingen, 1998), 9–39; Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (Cambridge, 1998).

Agreement and criticism will be discussed as well as, briefly within the framework of this article, the study's political impact.[7]

This article begins by analysing how futures studies changed around 1970 against the background of increasing criticism of growth (Part I). Part II outlines the scientific, cultural, and ideological context, and the main arguments of *The Limits to Growth*. Part III looks at scientific, intellectual, and political concurrence, and the reception of the book, while Part IV presents criticism of it. The final, concluding, section (Part V) examines to what extent this study strengthened the questioning of a linear paradigm of modernization and progress, and drew new attention to ecological and global categories. This article focuses on the debates in West Germany and Britain in the period 1972–3. Discussion of *The Limits to Growth* was particularly intense in these two countries, not least because some members of the Club of Rome (such as Alexander King and Eduard Pestel) were of British or German origin. A comparison highlights similarities in patterns of discussion as well as differences in the arguments used, reflected mainly in the intensity of reception and criticism of growth.

I

In the summer of 1972, the German weekly *Die Zeit* commented as follows on *The Limits to Growth*: 'In the past, futures researchers mainly occupied themselves by issuing optimistic forecasts about unimaginable prosperity, an excess of leisure, and victory over old age and

[7] Interactions between 'futures studies' and politics are the subject of a broader research project being conducted at the moment. The effects are, of course, difficult to measure, as scientific knowledge does not enter other contexts on a simple one to one basis; cf. Carol Weiss, 'The Many Meanings of Research Utilization', in Martin Bulmer (ed.), *Social Science and Social Policy* (London, 1986), 31–40; Ulrich Beck and Wolfgang Bonß (eds.), *Weder Sozialtechnologie noch Aufklärung? Analysen zur Verwendung sozialwissenschaftlichen Wissens* (Frankfurt am Main, 1989); Peter Weingart, *Die Stunde der Wahrheit? Zum Verhältnis von Wissenschaft zu Politik, Wirtschaft und Medien in der Wissensgesellschaft* (Weilerswist, 2001); Wilfried Rudloff, 'Einleitung', in Stefan Fisch and Wilfried Rudloff (eds.), *Experten und Politik: Wissenschaftliche Politikberatung in geschichtlicher Perspektive* (Berlin, 2004), 13–57.

disease. Today, their prognoses are mainly gloomy.'[8] It is true that around 1970 futures research in Western industrialized societies was combined with an ambivalent criticism of growth and progress, which also fed into *The Limits to Growth*.

Futures studies dates from the late 1950s, when it built on dynamic changes in science and technology and the increasing orientation of the Western industrialized states towards political planning.[9] It drew its arsenal of new methods largely from US think tanks such as the RAND Corporation and MIT, which had provided the science for the strategic planning of US Administrations in the emergent Cold War. In a process of transnational circulation of knowledge, futures studies institutions were set up in the 1960s. The field of futures research was fluid, but its practitioners shared a holistic view that looked at the future as a whole, a medium to long-term perspective, and an affinity with cybernetics, that is, the science concerned with control and communication processes in systems.[10] These three aspects were rooted in an acknowledgement that the pace of technological, scientific, and social change was accelerating, and that as a result, knowledge from different areas was now more strongly inter-

[8] Michael Jungblut, 'Zukunftsforschung: Ist Wachstum des Teufels?', *Die Zeit*, 18 Aug. 1972; similarly 'Was den Menschen vom Schwein unterscheidet', *Der Spiegel,* 8 Jan. 1973, 30–44.

[9] See Glen O'Hara, *From Dreams to Disillusionment: Economic and Social Planning in 1960s Britain* (Basingstoke, 2007); Gabriele Metzler, *Konzeptionen politischen Handelns von Adenauer bis Brandt: Politische Planung in der pluralistischen Gesellschaft* (Paderborn, 2005).

[10] The plural term 'futures studies' is commonly used to highlight the notion that there are many possible futures. See Schmidt-Gernig, 'Das Jahrzehnt der Zukunft'; id., 'Die gesellschaftliche Konstruktion der Zukunft: Westeuropäische Zukunftsforschung und Gesellschaftsplanung zwischen 1950 und 1980', *WeltTrends*, 18 (1998), 63–84; Karlheinz Steinmüller, 'Zukunftsforschung in Europa: Ein Abriß', in id., Rolf Kreibich, and Christoph Zöpel (eds.), *Zukunftsforschung in Europa: Ergebnisse und Perspektiven* (Baden-Baden, 2000), 37–54; Rolf Kreibich, Weert Canzler, and Klaus Burmeister (eds.), *Zukunftsforschung und Politik in Deutschland, Frankreich, Schweden und der Schweiz* (Weinheim, 1991); Wendell Bell, *Foundations of Futures Studies: History, Purposes, and Knowledge* (New Brunswick, NJ, 2003), 1–58; Alex Abella, *Soldiers of Reason: The RAND Corporation and the Rise of the American Empire* (Orlando, Fla., 2008).

connected.[11] Given the perception of acceleration, the knowledge of the past seemed to offer less and less that was useful for solving future problems. Thus the future was separated from any relation to the past; the horizon of expectation (*Erwartungshorizont*) was separated from the space of experience (*Erfahrungsraum*).[12] Here cybernetics offered new methodological approaches. This science held out the promise of unifying knowledge across the boundaries separating the natural sciences from the humanities, thus offering a way of researching the future in its entirety and controlling rapid change in the medium to long term.[13] On the basis of aspirations to exercise control, the majority of futures studies in the 1960s was shaped by a belief in feasibility and drew upon empirical approaches using trend extrapolations, systematic polls of experts, and computer simulations to forecast the consequences of technological and scientific innovations. In contrast, a smaller normative approach thought about how to secure peace and global food supply.

At the end of the 1960s, a polyvalent and ecologically tinged criticism of the growth and progress paradigm of Western industrialized societies crept into futures studies. During the boom years of the 1950s and 1960s, economic growth had become the main criterion of

[11] See e.g. Robert Jungk, 'Vorwort: Damit die Zukunft nicht aufhört', in id. (ed.), *Menschen im Jahr 2000: Eine Übersicht über mögliche Zukünfte* (Frankfurt am Main, 1969), 9–11; Institut für Zeitgeschichte Archives, ED 701/7, Grundsatzerklärung der Gesellschaft für Zukunftsfragen; Karl Steinbuch, *Falsch programmiert: Über das Versagen unserer Gesellschaft in der Gegenwart und vor der Zukunft und was eigentlich geschehen müsste* (Munich, 1968); 'Futures', *Futures,* 1/1 (1968), 2–3.

[12] See Schmidt-Gernig, 'Jahrzehnt der Zukunft', 306–7; Reinhart Koselleck, '"Erfahrungsraum" und "Erwartungshorizont": Zwei historische Kategorien' (1976), in id., *Vergangene Zukunft: Zur Semantik geschichtlicher Zeiten* (Frankfurt am Main, 1989), 349–75.

[13] See Michael Hagner, 'Vom Aufstieg und Fall der Kybernetik als Universalwissenschaft', in id. and Erich Hörl (eds.), *Transformation des Humanen: Beiträge zur Kulturgeschichte der Kybernetik* (Frankfurt am Main, 2008), 38–72; Philipp Aumann, *Mode und Methode: Die Kybernetik in der Bundesrepublik Deutschland* (Göttingen, 2009); Claus Pias (ed.), *Cybernetics: Die Macy-Konferenzen 1946–1953* (Zurich, 2004); Alexander Schmidt-Gernig, 'Das "kybernetische Zeitalter": Zur Bedeutung wissenschaftlicher Leitbilder für die Politikberatung am Beispiel der Zukunftsforschung der 60er und 70er Jahre', in Fisch and Rudloff (eds.), *Experten und Politik*, 349–68.

national economic success and prosperity in these states. This attitude began to crumble in the second half of the 1960s.[14] Criticism of progress was nothing new. Conservative criticism of culture and consumption which drew on older intellectual patterns of the first half of the century can be seen in the 1950s and early 1960s, as can fear of an apocalyptic nuclear war or anxiety about a population explosion.[15] Now, however, a criticism of the paradigm of economic growth emerged with social and, especially, ecological motives. The new interest in ecology, whose criticism of growth was to become important, began in the 1960s and combined with the politicization of conservation. Since the mid nineteenth century, traditional nature conservation organizations had tackled the issue of protecting nature, animals, and landscapes. They were mostly 'located in the conservative milieu of the educated middle classes' and, especially in Britain, administratively interconnected.[16] At the end of the 1960s, however, a complex modern environmentalism emerged, initially in the USA. It grew out of the perception of growing pollution and the threats posed by new technologies and, unlike the traditional movement, was shaped by counter-culturalism and the self-perceptions and

[14] See Reinhard Steurer, *Der Wachstumsdiskurs in Wissenschaft und Politik: Von der Wachstumseuphorie über 'Grenzen des Wachstums' zur Nachhaltigkeit* (Berlin, 2002).

[15] See Jens Ivo Engels, *Naturpolitik in der Bundesrepublik: Ideenwelt und politische Verhaltensstile in Naturschutz und Umweltbewegung 1950–1980* (Paderborn, 2006), 281–2; Axel Schildt, *Moderne Zeiten: Freizeit, Massenmedien und 'Zeitgeist' in der Bundesrepublik der 50er Jahre* (Hamburg, 1995), 352–63; Holger Nehring, 'Cold War, Apocalypse and Peaceful Atoms: Interpretations of Nuclear Energy in the British and West German Anti-Nuclear Weapons Movements, 1955–1964', *Historical Social Research*, 29 (2004), 150–70; Björn-Ola Linnér, *The Return of Malthus: Environmentalism and Post-War Population Resource Crises* (Isle of Harris, 2003).

[16] Jens Ivo Engels, 'Umweltschutz in der Bundesrepublik: Von der Unwahrscheinlichkeit einer Alternativbewegung', in Sven Reichardt and Detlef Siegfried (eds.), *Das Alternative Milieu: Antibürgerlicher Lebensstil und linke Politik in der Bundesrepublik Deutschland und Europa 1968–1983* (Göttingen, 2010), 405–22, at 409; cf. Engels, *Naturpolitik in der Bundesrepublik*; John McCormick, *Reclaiming Paradise: The Global Environmental Movement* (Bloomington, Ind., 1989), 1–17; James Sheail, *An Environmental History of Twentieth-Century Britain* (Basingstoke, 2002); Franz-Josef Brüggemeier, *Tschernobyl, 26. April 1986: Die ökologische Herausforderung* (Munich, 1998), 49–128.

practices of civil society.[17] Ecology, the science of the relationship between living organisms and their environment, provided a link with traditional conservation. By thinking in terms of the circulation of materials and energy (rather than linear processes), this approach located the strain which humans put on the basis of life within the framework of the global ecosystem. Ecology became the 'master discipline for the description of environmental problems worldwide'.[18]

The left liberal US economist John Kenneth Galbraith provided a first reference point for the criticism of growth in the 1960s.[19] In *The Affluent Society* (1958), he had already deplored the growth of private wealth in the face of public poverty,[20] and in the mid 1960s called for lower economic growth rates to be accepted instead of economic growth involving social inequality and environmental damage. Galbraith conceived Lyndon B. Johnson's 'Great Society' speech and shaped the concept of 'quality of life', which embraced not only the quantity of goods, but also social and environmental aspects in the pursuit of individual happiness. This term played a central part in the debate on *The Limits to Growth*,[21] and thus criticism of growth was

[17] See Patrick Kupper, 'Die "1970er Diagnose": Grundsätzliche Überlegungen zu einem Wendepunkt der Umweltgeschichte', *Archiv für Sozialgeschichte,* 43 (2003), 325–48; John R. McNeill, 'The Environment, Environmentalism, and International Society in the Long 1970s', in Ferguson et al. (eds.), *The Shock of the Global,* 262–78; John R. McNeill, *Blue Planet: Die Geschichte der Umwelt im 20. Jahrhundert* (Bonn, 2005), 356–60, first published as *Something New under the Sun: An Environmental History of the World in the Twentieth Century* (New York, 2000); Brian Doherty, *Ideas and Actions in the Green Movement* (London, 2002), 7–66; Engels, *Naturpolitik in der Bundesrepublik,* 322–99; Kai F. Hünemörder, *Die Frühgeschichte der globalen Umweltkrise und die Formierung der deutschen Umweltpolitik (1950–1973)* (Stuttgart, 2004), 114–26; for Britain see Stephen Cotgrove, *Catastrophe or Cornucopia: The Environment, Politics and the Future* (Chichester, 1982).

[18] Engels, *Naturpolitik in der Bundesrepublik*, at 296; cf. ibid. 294–9; *'Nicht rechts, nicht links, sondern vorn'*, 389–97.

[19] Galbraith saw himself as a radical liberal who, in Europe, would possibly be a socialist: 'Glauben Sie mehr an Galbraith als an Marx: US-Ökonom John Kenneth Galbraith über die Gefahren wirtschaftlichen Wachstums', *Der Spiegel*, 10 Jan. 1972, 84–9, at 88.

[20] John Kenneth Galbraith, *The Affluent Society* (Cambridge, Mass., 1958), published in German as *Gesellschaft im Überfluß* (Munich, 1958).

[21] The term 'quality of life' was used by Arthur Pigou in the 1920s and then

also combined with the 'post-materialist' aspects of the political.[22] Herbert Marcuse picked up this topic from the context of neo-Marxism and Critical Theory, and suggested that organized capitalism creates controlled needs in an affluent society. A peaceful, humane society, in his view, would reject unrestrained growth.[23] The link between criticism of growth and ecological thinking was essentially forged by the left liberal economist Kenneth Boulding, who coined the richly symbolic metaphor of 'spaceship earth', encapsulating the earth's fragility, its systemic nature dictated by the constant reproduction of resources, and its capacity to be steered. According to Boulding, the economic system of the future spaceship earth should be oriented not towards production and therefore growth, but towards quality.[24] This was picked up by the US eco-socialist

by Lyndon B. Johnson in his 'Great Society' speech of 1964 which was conceived by Galbraith; see Heinz-Herbert Noll, *Konzepte der Wohlfahrtsentwicklung: Lebensqualität und 'neue' Wohlfahrtskonzepte* (Berlin, 2000), 3–4; John Kenneth Galbraith, *The New Industrial State* (Boston, 1967), 408; 'Glauben Sie mehr an Galbraith als an Marx'; Hünemörder, *Die Frühgeschichte der globalen Umweltkrise*, 228–32; Dieter Masberg, 'Zur Entwicklung der Diskussion um "Lebensqualität" und "qualitatives Wachstum" in der Bundesrepublik', in Helge Majer (ed.), *Qualitatives Wachstum: Einführung in Konzeptionen der Lebensqualität* (Frankfurt am Main, 1984), 11–31.

[22] For the 'post-materialist' redefinition of politics see now Lawrence Black, *Redefining British Politics: Culture, Consumerism and Participation, 1954–70* (Basingstoke, 2010); see also Samuel P. Hays, 'The Limits to Growth Issue', in id., *Explorations in Environmental History: Essays* (Pittsburgh, 1998), 3–23, at 9; for the theory of 'post-materialist' value change, which is doubtful because materialistic differences between haves and have-nots persisted, see Ronald Inglehart, *The Silent Revolution: Changing Values and Political Styles among Western Publics* (Princeton, 1977); for a critique see also Holger Nehring, 'The Growth of Social Movements', in Paul Addison and Harriet Jones (eds.), *A Companion to Contemporary Britain 1939–2000* (Malden, 2007), 389–406.

[23] Herbert Marcuse, 'Das Individuum in der "Great Society" '(1966), in id., *Ideen zu einer kritischen Theorie der Gesellschaft* (3rd edn. Frankfurt, 1969), 157–190; 'Was den Menschen vom Schwein unterscheidet'.

[24] Kenneth Boulding, 'The Economics of the Coming Spaceship Earth' (1966), in Herman Daly and Kenneth Townsend (eds.), *Valuing the Earth: Economics, Ecology, Ethics* (Cambridge, Mass., 1994), 297–310, at 304; see Sabine Höhler, ' "Spaceship Earth": Envisioning Human Habitats in the Environmental Age', *GHI Washington Bulletin*, 42 (Spring 2008), 65–85. For British economist

Barry Commoner, who saw the environmental crisis as an outcome of capitalist economic growth structures.[25] At the other end of the political spectrum, a conservative cultural criticism of growth took shape in the late 1960s. By analogy with older trends in the conservative criticism of civilization (*Kulturkritik*), it stigmatized what it saw as dangerous tendencies towards a loss of individuality (*Vermassung*) and the devaluation of traditional values in modern industrial society, now linking them with the theme of environmentalism.[26] Thus the British economist Edward J. Mishan argued that the modern fixation on economic progress and growth had triggered a decline in values, the destruction of organic social ties, and environmental pollution, a line also taken by the conservative journal *Scheidewege* in the Federal Republic of Germany.[27]

The polyvalent, ecologically fed criticism of the paradigm of growth and progress in Western industrialized societies permeated futures studies and its public face around 1970. The image of spaceship earth, which was turned into the 'mythical figure of the environmental age' by the moon landing of 1969, whose pictures of the Blue Planet were transmitted around the world, facilitated the ecologization of futures research.[28] This discipline had a special affinity

Barbara Ward, who possibly coined the phase 'spaceship earth', see McCormick, *Reclaiming Paradise*, 67; Barbara Ward, *Spaceship Earth* (New York, 1966).

[25] Barry Commoner, *The Closing Circle: Nature, Man, and Technology* (New York, 1971), published in German as *Wachstumswahn und Umweltkrise* (Munich, 1973).

[26] See Mende, *'Nicht rechts, nicht links, sondern vorn'*, 310–15.

[27] See E. J. Mishan, *The Costs of Economic Growth* (London, 1967); id. 'Growth and Antigrowth: What are the Issues', in Andrew Weintraub, Eli Schwartz, and J. Richard Aronson (eds.), *The Economic Growth Controversy* (New York, 1973), 3–38; Gerhard Helmut Schwabe , 'Naturschutz', *Scheidewege: Jahresschrift für skeptisches Denken*, 1 (1971), 78–96; for *Scheidewege* see Rüdiger Graf, 'Die Grenzen des Wachstums und die Grenzen des Staates: Konservative und die ökologischen Bedrohungsszenarien der frühen 1970er Jahre', in Dominik Geppert and Jens Hacke (eds.), *Streit um den Staat: Intellektuelle Debatten in der Bundesrepublik 1960–1980* (Göttingen, 2008), 207–28, at 215–17.

[28] Sabine Höhler, '"Raumschiff Erde", eine mythische Figur des Umweltzeitalters', in ead. and Fred Luks (eds.), *Beam us up, Boulding! 40 Jahre 'Raumschiff Erde'* (Hamburg, 2006), 43–52.

with the futuristic topic of space travel.[29] Moreover, the image of the spaceship as a system was highly susceptible of cybernetic interpretation, and could thus be linked with many areas of futures research.[30] The fact that around 1970 scenarios and prognoses often acquired such a pessimistic, even apocalyptic tone and that so-called 'prophecies of doom' proliferated was the result of a particular conjunction, namely, of a lasting belief in cybernetic and predictive models with (ecologically inspired) criticism of growth.[31] Alvin Toffler described the coming 'future shock' as a result of technological and social innovations that were too dynamic,[32] while the biologist Paul Ehrlich, who saw population development as part of the global ecological system, forecast a 'population bomb'.[33] Jay Forrester writing in his *World Dynamics,*[34] and *The Limits to Growth* combined methods of systems analysis with a critique of growth. These books arose in the context of the Club of Rome.

[29] See e.g. Herman Kahn and Anthony Wiener, *The Year 2000* (New York, 1968).

[30] See also Engels, *Naturpolitik in der Bundesrepublik*, 281; for futures studies and cybernetics see also Schmidt-Gernig, 'Das "kybernetische Zeitalter" '.

[31] McCormick, *Reclaiming Paradise*, 69; cf. ibid. 69–87; Kai F. Hünemörder, 'Kassandra im modernen Gewand: Die umweltapokalyptischen Mahnrufe der frühen 1970er Jahre', in Frank Uekötter and Jens Hohensee (eds.), *Wird Kassandra heiser? Die Geschichte falscher Ökoalarme (*Stuttgart, 2004), 78–97; Hünemörder, *Die Frühgeschichte der globalen Umweltkrise*, 209–21; Matthew Connelly, 'Future Shock: The End of the World as they Knew it', in Ferguson et al. (eds.), *Shock of the Global*, 337–50.

[32] Alvin Toffler, *Future Shock* (New York, 1970).

[33] Paul R. Ehrlich, *The Population Bomb* (New York, 1968), published in German as *Die Bevölkerungsbombe* (Stuttgart, 1971); see Sabine Höhler, 'Die Wissenschaft von der "Überbevölkerung": Paul Ehrlichs "Bevölkerungsbombe" als Fanal für die 1970er-Jahre', *Zeithistorische Forschungen/Studies in Contemporary History Online,* 3 (2006), 3 <http://www.zeithistorische-forschungen.de/16126041-Hoehler-3-2006>, accessed 16 Feb. 2011.

[34] Jay W. Forrester, *World Dynamics* (Cambridge, 1971), published in German as *Der teuflische Regelkreis: Das Globalmodell der Menschheitskrise* (Stuttgart, 1971).

II

The Club of Rome, a transnational circle of scientists, intellectuals, and industrialists, was founded in 1968 during a conference held at the Accademia dei Lincei. Its founders were the Italian industrial manager Aurelio Peccei, who became interested in aspects of global development when heading Fiat's Latin American operations, and the Scot Alexander King, a chemist who was, at the time, head of the OECD's Scientific Affairs Directorate in Paris. Dennis Gabor, a British physicist, was another one of the main characters. The Club of Rome described itself as an 'informal, multinational, non-political group of scientists, economists, planners, educators, and business leaders'. In its elitist view of itself, membership was limited to 100 people who had to be co-opted by the Executive Committee. The group was united by its members' conviction that mankind was in a 'predicament', the 'World Problématique'. Technical and economic progress had increased prosperity, the Club argued, but had also confronted 'mankind' with major problems which were 'of such complexity and are so interrelated that traditional institutions and policies are no longer able to cope with them, nor even to come to grips with their full account'.[35] In 1968 Peccei identified as major global problems the 'technological gap' between Western Europe and the USA, global overpopulation, food supply difficulties, and 'the degradation of our ecosystem'.[36] The aim was to conduct studies 'on systematic, long-term planning of world scope', and to inform politics and the public on the creation of a 'humane world society'. But the precise meaning of 'humane' remained unclear, as Peccei also spoke in a utopian sense of the need to produce 'a new set of values'. He had a technocratic, Western-led, elite-centred, and perhaps authoritarian solution in

[35] 'Foreword', in Meadows et al., *The Limits to Growth*, 9–10; cf. Kupper, 'Weltuntergangs-Vision aus dem Computer', 98–9; Peter Moll, *From Scarcity to Sustainability. Futures Studies and the Environment: The Role of the Club of Rome* (Frankfurt am Main, 1991), 49–70; Hahn, *Von Unsinn bis Untergang*, 23–45; Fernando Elichirigoity, *Planet Management: Limits to Growth, Computer Simulation, and the Emergence of Global Spaces* (Evanston, Ill., 1999), 60–74.
[36] Aurelio Peccei, *The Chasm Ahead* (London, 1969), 242, 1, p. viii.

mind as he focused on 'world planning' conducted in the main by the USA, Europe, the Soviet Union, and Japan.[37]

The Club of Rome's first project, 'The Predicament of Mankind', was to examine global problems and developments and how they were interrelated. Eduard Pestel, Professor of Mechanics at the Technical University of Hanover, a systems scientist and member of the Club of Rome, organized funding by the Volkswagen Foundation. A first concept written by the systems scientist Hasan Ozbekhan did not persuade the Club's Executive Committee, who found it too complex and time-consuming. The Club then commissioned the electronics engineer and systems scientist Jay Forrester of MIT to recast his cybernetically inspired model of Systems Dynamics, which had been designed for urban and industrial subjects. This was a far-reaching decision, as the project was more or less restricted to mathematical and quantitative modelling. Forrester constructed the background model and some reflections on it, published in 1971 as *World Dynamics*. This book first put forward the thesis of imminent 'limits to growth'. MIT's interdisciplinary, international research group working on the World Model was led by Forrester's student Dennis Meadows. After eighteen months the MIT team and the Club of Rome published *The Limits to Growth* as a Report for the Club of Rome in a generally comprehensible form made visually appealing by the inclusion of many figures.[38]

The World Model was based on Jay Forrester's reflections on Systems Dynamics, according to which 'the structure of any sys-

[37] Ibid. 219, 281, 243; see id. and Manfred Siebker, *'Die Grenzen des Wachstums': Fazit und Folgestudien* (Reinbek, 1974), 19–21.

[38] Meadows et al., *The Limits to Growth*; see Moll, *From Scarcity to Sustainability*, 70–81; Hahn, *Von Unsinn bis Untergang*, 44–9; Eduard Pestel, 'Einführung', in Forrester, *Der teuflische Regelkreis*, 9–13, at 12; Jay W. Forrester, *Industrial Dynamics* (Cambridge, Mass., 1961); id., *Urban Dynamics* (Cambridge, Mass., 1969); id., *World Dynamics*; on the Volkswagen Foundation see Helga Nowotny, 'Vergangene Zukunft: Ein Blick zurück auf die "Grenzen des Wachstums" ', in *Impulse geben – Wissen stiften: 40 Jahre Volkswagen-Stiftung* (Göttingen, 2002), 655–94. The compactness and visual aspects of the report are also noted by Kupper, 'Weltuntergangs-Vision aus dem Computer'. The technical report was published in 1973: Dennis and Donella Meadows, *Toward Global Equilibrium: Collected Papers* (Cambridge, Mass., 1973); published in German as *Das globale Gleichgewicht* (Stuttgart, 1974).

tem—the many circular, interlocking, sometimes time-delayed relationships among its components—is often just as important in determining its behavior as the individual components themselves'.[39] The MIT team examined five basic, interrelated parameters: population, agricultural production, natural resources, industrial production, and pollution. The most important phase was to identify the interrelations between the factors in a feedback loop structure that represented the dynamic behaviour of the factors. The World Model drew on growth figures in the five parameters from 1900 to 1970, and the computerized model extrapolated data from the five sectors. The MIT team stated that the model's central elements were 'the scientific method, systems analysis, and the modern computer'.[40] The 'standard run', which was based on the assumption that nothing in social, political, technical, or economic development would change, stated that exponential population and economic growth would lead to a world collapse within the next 100 years. The most probable result would be a sudden and uncontrollable decline in both population and industrial capacity. 'The behavior mode of the system . . . is clearly that of overshoot and collapse.' And that also seemed true for alternative 'runs' which introduced technological progress by way of recycling, substitution of resources, and so on into the model.[41] The MIT team therefore called for a 'state of global equilibrium', a 'deliberate, controlled end to growth' of both population and capital. This equilibrium state 'would not be free of pressures', they suggested, as freedoms such as that of having unlimited numbers of children or consuming uncontrolled quantities of resources would be limited. They recommended that people should concentrate on activities that do not require a large flow of resources or produce environmental degradation, such as education, art, music, or social interaction. The book referred to John Stuart Mill in order to legitimize 'a stationary condition of capital and population', which does not imply a stationary state of human improvement. 'Without such a goal and a commitment to it, short-term concerns will generate the exponential growth that drives the world system toward the limits of the earth and ultimate collapse.'[42]

[39] Meadows et al., *The Limits to Growth*, 31.
[40] Ibid. 21.
[41] Ibid. 125.
[42] Ibid. 170, 179, 175, 184.

III

The arguments put forward in *The Limits to Growth* obviously hit a nerve. The book became an international bestseller. It sold around 12 million copies, was translated into more than thirty languages, and, by the autumn of 1973, that is, within eighteen months of publication, had provided the topic for at least twenty television programmes and fifty conferences.[43] Apart from the readable text and visual nature of the book, 'mass marketing'[44] and 'clever use of the media'[45] were sometimes cited as factors in its success. Media reinforcement undoubtedly played an important part in the resonance achieved by *The Limits to Growth*, which picked up on two concepts that were topical beyond the academic discourse, namely, planning and growth (criticism).

Agreement with *The Limits to Growth* was based on the same two factors. First, computer simulations conferred a quasi mathematical validity on the scenario posited, which met with agreement among enthusiasts for planning and control. While the MIT team pointed out that the 'graphs are not exact predictions', but 'indications of the system's behavioral tendencies only',[46] it was also stated that the implications of the assumptions 'for the future behavior of the world system can be traced without error by a computer'. Even in the absence of improved data, they suggested, the information 'is sufficient to generate valid basic behavior modes'.[47] The MIT team thus emphasized its belief in the study's validity.[48] Beyond this, the study recommended a global programme of control in order to create glob-

[43] See <http://www.clubofrome.org/eng/about/4/>, accessed 18 Dec. 2010; Brüggemeier, *Tschernobyl, 26. April 1986*, 271, mentions a figure of 10 million books sold. Dennis Meadows, 'Kurskorrektur oder bis zur Kollision', in Horst E. Richter (ed.), *Wachstum bis zur Katastrophe? Pro und Contra zum Weltmodell* (Stuttgart, 1974), 98–107, states on p. 98 that two and a half million copies had been sold by autumn 1973.

[44] Robert Gillette, 'The Limits to Growth: Hard Sell for a Computer View of Doomsday', *Science*, 10 Mar. 1972, 1088–92.

[45] Steurer, *Der Wachstumsdiskurs in Wissenschaft und Politik*, 430.

[46] Meadows et al., *The Limits to Growth*, 93.

[47] Ibid. 22, 121.

[48] See also Kupper, 'Weltuntergangs-Vision aus dem Computer'.

al equilibrium. Although the interpretative pattern on which it was based contained no traces of an optimistic belief in technological progress, the book itself, paradoxically, conveyed a belief in control and a trust in computer simulations. These and the book's inherent faith in global planning did, in fact, evoke a response among those who continued to believe that the future could be calculated and changes implemented.[49] Initially this was the Club of Rome, which assessed the study as 'a reasoned and systematic explanation of trends [of] which people are but dimly aware'. The Executive Committee, along with Peccei and King, mentioned critically that models could accommodate only a limited number of variables. Further, they went on, the report gave insufficient weight to the possibilities of scientific and technological advances in solving problems, and it did not consider social factors and specific regions. But it did show that 'the need will quickly become evident for social innovation to match technical change, for radical reform of institutions and political processes at all levels, including the highest, that of world polity'. A first step, they suggested, would be 'the creation of a world forum where statesmen, policy-makers, and scientists can discuss the dangers and hopes for the future global system' and coordinate 'joint long-term planning'.[50] The persistence of a technocratic belief in a global planning strategy and its implementation is obvious. Other futures researchers were also impressed by the combination of global planning strategies and cybernetic computer modelling, as illustrated by Karl Steinbuch, Professor of Communications Technology and previously an exponent of an empirical and technologically optimistic line of futures research. In contrast to his earlier views, he concluded: 'Human nature is at a tipping point in its development. The growth that has so far been possible has hit an insuperable limit.'[51] But the cybernetic model was also positively received by a more strongly normative

[49] See Kai F. Hünemörder, '1972—Epochenschwelle der Umweltgeschichte?', in Franz-Josef Brüggemeier and Jens Ivo Engels (eds.), *Natur- und Umweltschutz nach 1945* (Frankfurt, 2005), 124–44, at 133, 142; Kupper, 'Weltuntergangs-Vision aus dem Computer'.

[50] Alexander King et al., 'Commentary by the Club of Rome Executive Committee', in Meadows et al., *The Limits to Growth*, 185–97, at 189, 193–4, 196–7; see also Peccei and Siebker, *'Die Grenzen des Wachstums'*, 29–37.

[51] 'Dem Konsum abschwören: Fragen an Karl Steinbuch zum wirtschaftlichen Wachstum', *Die Zeit*, 2 June 1972.

branch of futures research represented by the philosopher Robert Jungk. He regarded cybernetic simulations of various different 'futures' as a 'breakthrough' in the areas of forecasting and planning.[52] Finally, administrative planning elites appreciated the book. On publication of *World Dynamics*, Alan Cottrell, Chief Scientific Adviser to Edward Heath's government, said: 'I believe that the Forrester approach is the most important development of its kind since Keynes' General Theory.'[53] Cottrell invited Dennis Meadows to take part in a discussion in London.[54]

Steinbuch leads us to the second factor on which agreement with *The Limits to Growth* was based. The study encountered the beginnings of a criticism of growth which, as we have seen, emerged from various intellectual backgrounds in the 1960s, and now drew scientific legitimization and encouragement from the book. This trend accelerated during the oil crisis, which seemed to confirm that resources and economic growth were fast approaching their limits. This criticism asked not only whether (economic) growth was possible, but whether it was even desirable; that is, its value was questioned.

In this context, *The Limits to Growth* was first applauded by conservative cultural critics who rejected growth as such. By analogy with the conservative cultural criticism of the first half of the century, which had expanded into an ecological criticism of growth, political and social changes were demanded. In the Federal Republic of Germany the conservative journal *Scheidewege* mentioned above, which was edited by, among others, Friedrich Georg Jünger, published a number of articles agreeing with *The Limits to Growth*, culminating in the Bussauer Manifesto, published in 1975. Given the problems of modern mass, industrial society, this manifesto called for a return to nature and advocated living in small units in order to overcome the alienation between humans and nature. References to 'self-help workshops' showed that it was also drawing upon the vocabu-

[52] Robert Jungk, 'Zukunftsforschung. Dennis Meadows: Die Grenzen des Wachstums', *Universitas,* 27 (1972), 1113–14.
[53] The National Archives, Kew (hereafter TNA), CAB 168/291, Alan Cottrell to Burke Trend and Lord Rothschild, 23 July 1971.
[54] TNA, CAB 164/1083, Alan Cottrell to Dennis Meadows, 23 Sept. 1971.

lary of the alternative milieu.[55] Herbert Gruhl, a parliamentary deputy from the Christian Democratic Union (CDU) who had dealt with environmental topics and was deeply impressed with *The Limits to Growth*, aimed even more strongly for a conservative Protestant ethic of austerity.[56] Faced with exponential population growth and growing environmental pollution, he rejected modern industrial society which, he claimed, concentrated purely on materialism, consumption, and linear growth. A strong state, if necessary, a dictatorship, was to ensure survival by enforcing population controls and a restriction on consumption. Given his views of order, Gruhl left the CDU and became a leader of the conservative group which co-founded the new political party, Die Grünen (the Greens).[57]

A similarly conservative criticism of growth can be seen in the reception of the MIT proposals in Britain, voiced in particular in the journal *The Ecologist*. Founded in 1970 by the philosopher and economist Edward Goldsmith, *The Ecologist* addressed Forrester's arguments and those put in *The Limits to Growth*, of which, it seems, it had received advance copies, in its issue *Blueprint for Survival* of January 1972.[58] In doing so, the journal regarded itself as the 'national movement' of the Club of Rome, 'complementing the invaluable work being done by the Club of Rome'. It used the book's arguments to develop its own future scenario, but its conclusions went far beyond those of *The Limits to Growth*. The MIT team's computer simulations had shown that the ideology of growth and the consumer mentality

[55] 'Bussauer Manifest zur umweltpolitischen Situation', *Scheidewege*, 5 (1975), 469–86; Gerhard Helmut Schwabe, 'Menschheit am Wendepunkt', ibid. 61–92; see Mende, *'Nicht rechts, nicht links, sondern vorn'*, 298–304, 310–15; Graf, 'Die Grenzen des Wachstums'.

[56] See Hermann Schreiber, ' "Ja, die Welt ist eben komisch": Hermann Schreiber über den Parteigründer Herbert Gruhl', *Der Spiegel,* 24 July 1978, 29–30; Mende, *'Nicht rechts, nicht links, sondern vorn'*, 73–5.

[57] Herbert Gruhl, *Ein Planet wird geplündert: Die Schreckensbilanz unserer Politik* (Frankfurt, 1975). See also Mende, *'Nicht rechts, nicht links, sondern vorn'*, 76–7, 302.

[58] 'Blueprint for Survival', *The Ecologist,* 2/1 (1972), quotations at 1, 2, 8; published as a book by Edward Goldsmith at al., *Blueprint for Survival* (Harmondsworth, 1972); published in German as *Planspiel zum Überleben: Ein Aktionsprogramm* (Stuttgart, 1972); see Beckett, *When the Lights Went Out*, 235–44.

had led to environmental pollution and shortages of raw materials, with the result that the breakdown of society was inevitable. The only hope, it claimed, lay in a stable or sustainable society where people looked after themselves in small communes and recycled materials, with an authoritarian state imposing population controls.[59] The parallels with Gruhl are obvious. Distributed with the *Blueprint for Survival* was an appeal for a Movement for Survival signed by well-known British scientists and conservationists such as Julian Huxley. This was the starting point for the founding of the People Party, predecessor of the later Green Party.[60] Initially, the Movement for Survival was supported by the environmental groups Conservation Society and Friends of the Earth. Both had been created as part of the modern environmental movement in the late 1960s. Unlike the established nature conservation organizations (such as the Royal Society for Nature Conservation and others), they used direct action to pursue their interests and were inspired by the practices of civil society. But they also worked within the system.[61] To this extent, their aims did not go as far as those of *The Ecologist*. The Conservation Society referred to *The Limits to Growth* when proposing a limit on consumption. It voted in favour of a 'sharing and rationing of the scarcer non-renewable resources' and supported a governmental campaign to influence consumer appetites and a shift in the emphasis of employment from manufacturing to services.[62] Like the majority of British environmental organizations, which were pragmatic by comparison with their international counterparts, the Conservation Society did not advocate opting out of industrial society altogether. Thus it is

[59] See Edward Goldsmith, writing in Willem L. Oltmans, '*Die Grenzen des Wachstums': Pro und Contra* (Reinbek, 1974), 131–7.

[60] See Christopher Rootes, 'Britain: Greens in a Cold Climate', in Dick Richardson and Christopher Rootes (eds.), *The Green Challenge: The Development of Green Parties in Europe* (London, 1995), 66–90; Wolfgang Rüdig and Philip D. Lowe, 'The Withered "Greening" of British Politics: A Study of the Ecology Party', *Political Studies*, 34 (1986), 262–84.

[61] John Davoll, 'The Conservation Society', *The Ecologist,* 2/4 (1972), 28–9; 'Many show interest in Doomwatch', *The Guardian*, 15 Jan. 1972; for Friends of the Earth see Philip Lowe and Jane Goyder, *Environmental Groups in Politics* (London, 1983), 124–37.

[62] The Conservation Society, *The Economics of Conservation: An Outline Plan for the United Kingdom* (Walton-on-Thames, 1973), at 23.

hardly surprising that the People Party with its far-reaching aims inspired by the *Blueprint for Survival* could not marshal the support of the British environmental movement.[63]

Secondly, the arguments of *The Limits to Growth* were in essence supported by those who did not reject growth outright, but attempted to distinguish between quantitative growth with negative connotations, and qualitative or organic growth seen in a more positive light. The notion of qualitative growth can be seen as a post-materialist interpretation which took ecological problems and quality of life into account but did not vote for 'back to nature' or an ethic of austerity.[64] This was true of the German and British members of the Club of Rome who initially defended the basic argument of *The Limits to Growth* against criticism (to be outlined below) and regarded it as vindicated by the oil crisis, but then differentiated between various criticisms of growth.[65] Alexander King explained that a total renunciation of growth was not feasible because jobs depended on industrial activity. Thus 'the immediate problem is not to stop growth as such, but to change its nature . . . it is our present economy of waste and of artificially stimulated consumption which is on trial.' The aim was to improve the quality of growth in terms of anti-pollution technologies, for example, but also with respect to the quality of life.[66] A similar argument was put forward by Eduard Pestel, who was work-

[63] See Christopher A. Rootes, 'The New Politics and the New Social Movements: Accounting for British Exceptionalism', *European Journal of Political Research,* 22 (1992), 171–91; Brian Doherty and Peter Rawcliffe, 'British Exceptionalism? Comparing the Environmental Movement in Britain and Germany', in Ingolfur Blühdorn, Frank Krause, and Thomas Scharf (eds.), *The Green Agenda: Environmental Politics and Policy in Germany* (Keele, 1995), 235–50; Wolfgang Rüdig, 'Between Moderation and Marginalization: Environmental Radicalism in Britain', in Bron R. Taylor (ed.), *Ecological Resistance Movements* (New York, 1995), 219–40; Nehring, 'The Growth of Social Movements'.

[64] See also Mende, *'Nicht rechts, nicht links, sondern vorn'*, 447–52; Steurer, *Der Wachstumsdiskurs in Wissenschaft und Politik*, 332, 334.

[65] ' "Wir können nur froh sein, daß es jetzt passiert ist": Interview mit Eduard Pestel', *Bild der Wissenschaft,* 11 (1974), 73–4; see also Dennis Gabor, 'The New Responsibilities of Science', *Science Policy,* 1/2 (1972), 1–8.

[66] Alexander King, *Another Kind of Growth: Industrial Society and the Quality of Life* (London, 1972), 18–20.

ing on an improved World Model with the US economist Mihajlo Mesarovic. This recognized seven world regions and further structures and, to this extent, was methodologically more complex than Meadows's study. However, it arrived at the same apocalyptic conclusions. The aim was not to renounce growth, as Meadows had suggested, but to promote 'organic growth'. In contrast to exponential, undifferentiated growth, organic growth gradually flattens out and becomes more structured, they argued. According to Pestel, who continued to believe in global planning, this controlled growth had to be implemented via a master plan. But he argued, as did Dennis Gabor, that it was equally necessary to develop a 'new ethic in the use of material resources' which would accept the coming shortages and foreground harmony between humankind and nature.[67] In a further development of *The Limits to Growth*, qualitative criticism of growth was linked with a technocratic spirit of planning.

The CDU accepted, at least in part, the formula of qualitative growth and so it is not surprising that Pestel joined this party in the late 1970s. Like the Conservative Party in Britain, the CDU in West Germany had adopted the concepts of environmental protection and quality of life in 1970–1. The preservation of creation could be seen as a classic field of Christian and conservative policy in the guise of environmental protection.[68] Unlike the Conservative Party, the CDU questioned its view of growth. With reference to the current scientific controversies (and to *The Limits to Growth*), Richard von Weizsäcker of the *Grundsatzkommission* declared in 1972 that in a social

[67] Mihajlo Mesarovic and Eduard Pestel, *Mankind at the Turning Point* (New York, 1974), at 1, 7, 9, 147, published in German as *Menschheit am Wendepunkt: 2. Bericht an den Club of Rome zur Weltlage* (Stuttgart, 1974); Imperial College Archives, Gabor Papers, MC/1/2,3: Dennis Gabor, Thoughts on the Future, 20 Oct. 1973.

[68] Minutes of the 1971 CDU party conference held in Düsseldorf, at 197 and 572 <http://www.kas.de/upload/ACDP/CDU/Protokolle_Bundesparteitage/1971-01-25-27_Protokoll_18.Bundesparteitag_Duesseldorf. pdf>, accessed 18 Dec. 2010; see 'For a Better Tomorrow: Conservative Party Manifesto 1970', in Fred W. S. Craig (ed.), *British General Election Manifestos 1900–1974* (London, 1975), 341; Bodleian Library, Conservative Party Archives, ACP 2/3, Minutes of the meeting of the Advisory Committee on Policy on 17 July 1968; see also Martina Steber, 'Konservatismus—Conservatism', Paper presented at the German Historikertag, Berlin, 1 Oct. 2010; Hünemörder, *Die Frühgeschichte der globalen Umweltkrise*, 234–5.

market economy, economic growth was 'not an absolute value, but a dependent variable'. And, he went on, it had to consider the conservation of the natural conditions of life and how the social costs which were incurred thereby were to be distributed. The rather nebulous aim was to pursue the 'qualitative control of growth' with the assistance of science and technology. The formula of qualitative growth made it possible to absorb ecological and social criticism of growth without abandoning the social market economy and a positive attitude to technology or giving environmentalism more space. The model of the social market economy was highly important to the CDU, not least because it allowed the party to claim credit for the dynamic economic growth created by the 'economic miracle' of the 1950s and early 1960s.[69]

A further interpretation can be found among Christian intellectuals who came to *The Limits to Growth* via a qualitative criticism of growth which, in essence, they welcomed. Their views grew out of an ambivalent combination of reflection about the consequences of the increased thinking about rationality and planning of the 1960s, the will to preserve creation, and an affinity with the ethics of renunciation greater than that of the CDU. The philosopher and theologian Georg Picht, who in the 1960s had defended the idea of planning,[70] conceded that the MIT study was correct in that the 'one-sided promotion of industrial growth' and 'technical-industrial production' had created a profound crisis. This was expressed in the 'growth of congestion, traffic, and environmental pollution and contamination' and even in 'crises of youth'. It was not consumption that increased the quality of life, he argued, but a 'revaluation of values' in the direction of 'sublimating desires'. Only a 'transition from extensive to

[69] Minutes of the Christian Democratic Party Conference in Wiesbaden 1972, contribution by Richard von Weizsäcker, 66 <http://www.kas.de/upload/ACDP/CDU/Protokolle_Bundesparteitage/1972-10-09-11_Protokoll_20.Bundesparteitag_Wiesbaden.pdf>, accessed 18 Dec. 2010; see Mende, *'Nicht rechts, nicht links, sondern vorn'*, 451–2; Frank Bösch, 'Die Krise als Chance: Die Neuformierung der Christdemokraten in den siebziger Jahren', in Jarausch (ed.), *Das Ende der Zuversicht?,* 296–309.

[70] See Wilfried Rudloff, 'Georg Picht: Die Verantwortung der Wissenschaften und die "aufgeklärte Utopie" ', in Theresia Bauer et al. (eds.), *Gesichter der Zeitgeschichte* (Munich, 2009), 279–96; Georg Picht, *Prognose. Utopie. Planung: Die Situation des Menschen in der Zukunft der technischen Welt* (Stuttgart, 1967).

intensive growth', he went on, could avert the crisis.[71] The British economist and Christian social reformer Ernst Friedrich Schumacher, who had German roots, took a similar line in his bestseller *Small is Beautiful*. In it, he drew on Catholic social doctrine, Buddhist economics, Galbraith's socially and ecologically inspired criticism of growth, and *The Limits to Growth* to argue that a materialistic mentality of ever more growth now had to be replaced by qualitatively ordered growth orientated by the quality of life and decentralized and ecologically aware intermediate technology. *The Limits to Growth* helped to prop up his argument but, given his call for intermediate technology, Schumacher was highly critical of its fixation on computers.[72]

This qualitative understanding of growth linked these views with support for the MIT study from the left. It is of central importance that this opened the debate on environmentalism to sections of the left,[73] including representatives of normative left-wing futures research around Robert Jungk, to sections of the West German Social Democratic Party (SPD), and the British left. As mentioned above, Jungk praised *The Limits to Growth* because of its approach to cybernetics, but also because of its ecological criticism of growth. Like Picht and Schumacher, he called for a different, qualitative growth oriented by ecology, quality rather than quantity, and small units (such as village structures). And, like Schumacher, Jungk expressed doubts about the fact that *The Limits to Growth* depended entirely on the computer as 'a well-nigh infallible oracle' while neglecting the imagination as a factor.[74] Ossip Flechtheim, connected with Jungk by

[71] Georg Picht, 'Wir brauchen neue Überzeugungen: Von der Wechselwirkung zwischen Wachstum und Werten', *Evangelische Kommentare,* 6 (1973), 329–33; similarly Friedhelm Solms, 'Die bedrohte Menschheit: Streit um die Unheilsprognosen der Meadows-Studie', *Lutherische Monatshefte,* 13 (1974), 506–8.

[72] E. F. Schumacher, *Small is Beautiful: Economics As If People Mattered* (London, 1973); see Barbara Wood, *Alias Papa: A Life of Fritz Schumacher* (London, 1984); Mende, *'Nicht rechts, nicht links, sondern vorn'*, 268.

[73] See ibid. 304–10, 396–7, emphasizing that many left-wing protagonists of what was to become the Grünen took some time to come to terms with the environment, ecology, and *The Limits to Growth*.

[74] Robert Jungk, 'Zukunftsforschung. Dennis Meadows: Die Grenzen des Wachstums', *Universitas,* 27/10 (1972), 1113–14; id., 'Anfänge eines anderen Wachstums', in Christopher Horn (ed.), *Umweltpolitik in Europa* (Frauenfeld, 1973), 34–44.

normative futures research, read *The Limits to Growth* more in terms of a neo-Marxist interpretation, which picked up on Marcuse's criticism of growth. Flechtheim criticized the book for neglecting social and political factors,[75] but, he argued, it made uncomfortably clear that, given the limits to growth (war, starvation in the Third World, overpopulation, exploitation of nature), human needs now had to be given greater consideration. These had been 'manipulated' in East and West, he claimed. For him, the utopian goal was a 'liberal socialist world democracy'.[76] As Flechtheim had close contacts with the alternative milieu in Berlin and Jungk was to play a central part in the anti-nuclear and peace movement, their views fed into the New Social Movements.[77]

Within the SPD *The Limits to Growth* evoked a fruitful response in the work of Erhard Eppler in particular and, again, a qualitative understanding of growth was the point of contact. Eppler, who was also a leading exponent of intellectual Protestantism, enthusiastically absorbed *The Limits to Growth*. The 'historical turning point' of the early 1970s, he argued, brought 'the insights of modern science within the boundaries of economic and demographic growth'.[78] Eppler focused on the global perspective: an 'undirected market mechanism' and the preoccupation with economic growth in the industrialized nations, he suggested, would have devastating consequences for the developing countries.[79] 'Quality of life' was of central significance for

[75] Ossip K. Flechtheim, 'Beunruhigend und unbequem', *Umwelt,* 4 (1972), 34–6.

[76] Id., 'Futurologie in der zweiten Phase?', in Dietger Pforte and Olaf Schwencke (eds.), *Ansichten einer künftigen Futurologie: Zukunftsforschung in der zweiten Phase* (Munich, 1973), 17–25.

[77] For Flechtheim see Mario Keßler, *Ossip K. Flechtheim: Politischer Wissenschaftler und Zukunftsdenker (1909–1998)* (Cologne, 2007), 199–200.

[78] Erhard Eppler, 'Die Qualität des Lebens', in Günter Friedrichs (ed.), *Aufgabe Zukunft: Qualität des Lebens. Beiträge zur vierten internationalen Arbeitstagung der Industriegewerkschaft Metall für die Bundesrepublik Deutschland. 11. bis 14. April 1972 in Oberhausen,* 10 vols. (Frankfurt, 1973), i. 86–101, at 87.

[79] Erhard Eppler, 'Alternative für eine humane Gesellschaft', in Heinrich von Nußbaum (ed.), *Die Zukunft des Wachstums: Kritische Antworten zum 'Bericht des Club of Rome'* (Düsseldorf, 1973), 231–46, at 244; see also Erhard Eppler, 'Lebensqualität als politisches Programm: Alternativen für eine humane Gesellschaft', *Evangelische Kommentare,* 6 (1973), 457–61, at 457.

Eppler. Although he refused to define it, he spoke of freedom, solidarity, self-determination, participation in nature and culture, and a notion of general welfare that built on Galbraith's demand for publicly owned property to be given priority. As an amalgam of social and ecological categories, 'quality of life' was, in his view, intended to point the way towards qualitative growth and 'free democratic socialism'.[80] This meant that Eppler played an important part in the formation of the emergent left-leaning ecological wing of the SPD. *The Limits to Growth* also influenced Willy Brandt, Chancellor and SPD party chairman. Although he saw the slogan of zero growth as mocking all those who lived in poverty, 'insight into the damaging impact of growth oriented by quantitative factors alone . . . has spread rapidly beyond the circle of theoreticians'. It remained to be seen, he said, whether the social 'value system would prove equal to the demand for an adequate quality of life'.[81] And the phrase 'quality of life' formed part of the title of the SPD's election manifesto in 1972.[82] Against the background of a certain crisis in the euphoric ideas of planning which had circulated widely in the SPD,[83] 'quality of life' now offered Brandt and the SPD a new paradigm which, in relation to ecology and securing resources, incorporated planning, but freed it from its technocratic, 'cold' shell. At the same time, it revived and ecologized the model of participation.

[80] Eppler, 'Die Qualität des Lebens', 99. In the mid 1970s Eppler saw himself as a *Wertkonservativer*; id., *Ende oder Wende* (Stuttgart, 1975), 29.

[81] Willy Brandt, 'Umwelt als internationale Aufgabe', speech delivered to the conference of Nobel Laureates held in Lindau, 26 June 1972, *Bulletin des Presse- und Informationsamtes der Bundesregierung*, 28 June 1972, 1285–9; more doubtful about the Club of Rome, Minutes of the negotations of the SPD's Extraordinary Party Conference held in Dortmund, 12–13 Oct. 1972, p. 62.

[82] *Wahlprogramm der SPD 1972: Mit Willy Brandt für Frieden, Sicherheit und eine bessere Qualität des Lebens* (Bonn, 1972); Willy Brandt, 'Die Qualität des Lebens', *Die neue Gesellschaft,* 19 (1972), 739–42.

[83] For the crisis of euphoric planning ideas, not least as a result of financial problems, see Metzler, *Konzeptionen politischen Handelns*, 404–18; Winfried Süß, ' "Wer aber denkt für das Ganze?" Aufstieg und Fall der ressortübergreifenden Planung im Bundeskanzleramt', in Matthias Frese, Julia Paulus, and Karl Teppe (eds.), *Demokratisierung und gesellschaftlicher Aufbruch: Die sechziger Jahre als Wendezeit der Bundesrepublik* (Paderborn, 2003), 349–77; Elke Seefried, 'Experten für die Planung? "Zukunftsforscher" als Berater der Bundesregierung 1966–1972/73', *Archiv für Sozialgeschichte,* 50 (2010), 109–52.

In Britain, it is less easy to demonstrate an acceptance of *The Limits to Growth* on the part of the left. The small Liberal Party was impressed by the arguments put by the MIT study. While it was not left wing, it clearly oriented itself by Galbraith's socially and ecologically inspired criticism of growth. Limited resources on this planet and increasing social disintegration seemed to demand 'a policy of controlled economic growth, by which we mean the careful husbandry of resources and the limitation of private consumption by the few in favour of better public services for the majority of our citizens'. The aim was an 'age of stability', in which 'quality of life' could achieve a new significance in place of the 'pursuit of unlimited growth'.[84] The British Labour Party had begun to address environmental issues by the end of the 1960s, not least because of the *Torrey Canyon* oil spill of 1967. But in the early 1970s, the Labour Party's policy, and that of the unions closely affiliated with it, was more dominated by traditional industrial conflicts. The debate on *The Limits to Growth* coincided with violent industrial disputes around the Industrial Relations Act and the National Union of Miners' strike, which focused attention on the material aspects of industrial modernity. Beyond this, avoiding unemployment had been the Labour Party's main concern since 1945.[85] Only a small section of the Labour movement therefore questioned the notion of growth on the basis of ecological concerns, namely, the Socialist Environment and Resources Association, whose membership partly overlapped with that of the Labour Party, and a group around the journal *The Spokesman*, published by the Bertrand Russell Peace Foundation. Those on the left who criticized growth also criticized the exponential growth of consumption. Socialist alternatives to growth were to emerge from a combination of decentralization and allocation planning. Yet the Club of Rome was rejected as

[84] 'Liberal Party Manifesto February 1974', in Craig (ed.), *British General Election Manifestos*, 411.

[85] See *Report of the Seventy-Second Annual Conference of the Labour Party 1973* (London, 1973), 314–21; Anthony Wedgewood Benn, 'Die Qualität des Lebens', in Friedrichs (ed.), *Aufgabe Zukunft*, i. 27–52; Jon Tinker, 'The Environment: No Parsnips from Labour', *New Scientist*, 20 Sept. 1973, 667; Hugh Stretton, *Capitalism, Socialism and the Environment* (Cambridge, 1976); Sheail, *An Environmental History*, 273; Rüdig, 'Between Moderation and Marginalization'; id. and Lowe, 'The Withered "Greening" of British Politics', 271–2.

a 'technocratic elite',[86] and this follows the patterns of left-wing criticism of *The Limits to Growth*, which are discussed in the following section.

IV

In Britain, criticism of *The Limits to Growth* was stronger than in the Federal Republic of Germany, and focused primarily on the study's view of growth. To start with, scientists of various disciplines found fault with its epistemological and methodological determinism. The technocratic computer model, it was argued, underestimated individuals, their human potential, and technical progress. Forecasting should pay more attention to people and their values and needs, argued the interdisciplinary research group on Social and Technological Forecasting for the Future in the Science Policy Research Unit at the University of Sussex.[87] The group put forward a sophisticated and widely acknowledged critique of *The Limits to Growth*. They criticized 'computer fetishism' which endowed 'the computer model with a validity and independent power which altogether transcends the mental models which are its essential basis'. Every model, they pointed out, depended on assumptions which had been fed into it.[88]

[86] Colin Stoneman, 'Growth in a Socialist Society', in Michael Barratt Brown, Tony Emerson, and Colin Stoneman (eds.), *Resources and the Environment: A Socialist Perspective* (Nottingham, 1976), 137–50, at 141; Dave Elliott and Tony Emerson, 'The Democratisation of Decision-Making', ibid. 113–29, at 117; see Malcolm Caldwell (ed.), *Socialism and the Environment: Essays* (Nottingham, 1972).

[87] TNA, EY 216: Science Policy Research Unit, Christopher Freeman, Application to SSRC for Support for a Programme of Forecasting Research. The Research Group for Social and Technological Forecasting was also named STAFF (Social and Technological Alternatives for the Future).

[88] Christopher Freeman, 'Malthus with a Computer', *Futures,* 6 (1973), 5–13. This article is also published in Hugh S. Cole, Christopher Freeman, Marie Jahoda, et al. (eds.), *Thinking About the Future: A Critique of the Limits to Growth* (London, 1973), 5–13, published in German as *Die Zukunft aus dem Computer? Eine Antwort auf die 'Grenzen des Wachstums'* (Neuwied, 1973); see Marie Jahoda, 'Postscript on Social Change', in Cole, Freeman, Jahoda, et al. (eds.), *Thinking About the Future*, 209–15.

For the Sussex group, the future was still open: 'Forecasting . . . cannot predict history to come, it is limited to the identification of possible futures and of problems that might have to be faced on the way to such futures.'[89] It is striking how strongly British scientists picked up on the accusation of technocratism. One reason for this was the spectacular failure of a British forecast, 'Essay on the Principle of Population', by Thomas Robert Malthus. He, too, had ignored the potential of technological progress and the human capacity for development.[90] *The Limits to Growth* was 'Malthus with a Computer',[91] argued Christopher Freeman of the Sussex group. Another reason was that British scientists and futures writers displayed a more pragmatic attitude towards method and content than either the MIT group or West German researchers, in respect of both cybernetic approaches and ecology. While systems analyses could be useful, Freeman said, *The Limits to Growth* documented 'a strong, almost Messianic faith in the more modern system dynamics', which overshadowed everything else and was as 'characteristic of contemporary American thought' as the overestimation of ecology as a factor.[92]

Beyond this, criticism came from two sources, both of which defended economic growth but for different reasons. First, economists in particular insisted that a renunciation of economic growth was neither sensible nor practical, and they defended a market economy. The British economist Wilfred Beckerman's assessment of *The Limits to Growth* was damning. He called it 'a brazen, impudent piece of nonsense' which displayed an ignorance of economics. It neglected the price mechanism, he said, which, in a market economy, came into play where there were bottlenecks and led to technological innovation.[93] The German protagonist of a post-Keynesian theory of

[89] Marie Jahoda, 'Introduction', in Christopher Freeman and Marie Jahoda (eds.), *World Futures: The Great Debate* (London, 1978), 1–6, at 2.

[90] See 'Another Whiff of Doomsday', *Nature*, 10 Mar. 1972, 47–9; the chief editor of *Nature*, John Maddox, published his critique in the same year. John Maddox, *The Doomsday Syndrome* (London, 1972); Gillette, 'The Limits to Growth'.

[91] Freeman, 'Malthus with a Computer'.

[92] Ibid. 9.

[93] Wilfred Beckerman, 'Economists, Scientists, and Environmental Catastrophe', *Oxford Economic Papers*, NS 24 (1972), 327–44, at 327; published in German as *Naturwissenschaftler, Wirtschaftswissenschaftler und Umweltkata-*

growth, Gottfried Bombach, too, saw no alternative to a market economy and promoting new technologies which could solve problems such as environmental pollution and scarcity of raw materials. Moreover, he pointed out, it was only the rapid growth of the market economy in the post-war years that had created the foundation for widespread prosperity, and thus political stability.[94]

Secondly, critics of the MIT study defended the principle of economic growth with reference to social redistributive justice. They criticized the study on the grounds that it had not considered social factors which, they claimed, were of central importance not only to the present situation, but also for the future of growth. Without growth, the Sussex group pointed out, redistributive justice would never be achieved.[95] The German left, including such figures as Hans Magnus Enzensberger, editor of *Kursbuch* and Gerhard Kade, a neo-Marxist economist, pointed out that the technocrats of the Club of Rome, a group of entrepreneurs, could afford to question the whole notion of growth.[96] According to Kade, this was in order to preserve the capital accumulation of the wealthier classes. Growth, he argued, should be distributed justly on an international basis.[97] Representatives of developing countries, in particular, called for global distributive justice worldwide. They demanded that a distinction be drawn between industrialized countries and developing ones, something that had been mentioned in *The Limits to Growth* but not integrated into the computer modelling. Argentinian scientists in the Bariloche Group, for example, argued that by calling for zero growth the MIT study wanted to secure long-term Western domination and

strophe (Tübingen, 1972); cf. id., *In Defence of Economic Growth* (London, 1974); Kupper, 'Weltuntergangs-Vision aus dem Computer'.

[94] Gottfried Bombach, 'Planspiele zum Überleben: Prophezeiungen des Club of Rome', *Mitteilungen der List-Gesellschaft,* 8/1 (1973), 3–16; for Bombach's 'qualitative growth' approach see id., 'Konsum oder Investitionen in die Zukunft?', in Friedrichs (ed.), *Aufgabe Zukunft*, vii. *Qualitatives Wachstum*, 38–73.

[95] See Freeman, 'Malthus with a Computer', 10.

[96] Hans Magnus Enzensberger, 'Zur Kritik der politischen Ökologie', *Kursbuch*, 9/33 (1973), 1–52, at 6; see Mende, *'Nicht rechts, nicht links, sondern vorn'*, 306–7.

[97] Gerhard Kade, 'Vorwort zur deutschen Ausgabe', in Cole, Freeman, Jahoda, et al. (eds.), *Die Zukunft aus dem Computer*, pp. vii–xxvii.

deny the developing countries their chance. This group put up its own world model,[98] earning the approval of West German protagonists of futures research such as Peter Menke-Glückert, President of the West German Gesellschaft für Zukunftsfragen (Society for Questions of the Future),[99] and the Sussex group.[100] This discussion, especially in relation to the developing world, meant that futures research as well as politics and public opinion focused more on the global dimensions of growth and ecology. One outcome of this aspect of the discussion was undoubtedly a greater perception of the conflict between North and South.

V

During the 1960s, studies in the field of futures research had been permeated by a belief in feasibility. Most were empirical and optimistic about technology. Around 1970, however, the main parts of this field became ecologized and underwent a pessimistic, even dystopian, turn. *The Limits to Growth* was the best known of these studies, first because it was short, readable, visually attractive, and appealed to a wide public. Secondly, its computer-based simulations and far-reaching planning model were able to build on the intense planning debates of the 1960s. And finally, the argument of *The Limits to Growth* hit the nerve of rising criticism of the paradigm of economic growth, which was fed by a growing uneasiness about the linear view of progress and material growth common in Western industrialized societies. The study criticized the optimistic view of technology and progress that had provided the instruments of its own

[98] Amīlcar O. Herrera, Hugo D. Scolnik, et al., *Catastrophe or New Society? A Latin American World Model* (Ottawa, 1976); Moll, *From Scarcity to Sustainability*, 118.

[99] Peter Menke-Glückert, 'Vorwort. Das BARILOCHE-Modell: Eine Chance zum Überleben', in Amīlcar O. Herrera, Hugo D. Scolnik, et al., *Grenzen des Elends. Das BARILOCHE-Modell: So kann die Menschheit überleben* (Frankfurt, 1977), 9–14.

[100] See Freeman, 'Malthus with a Computer', 10; Jahoda, 'Postscript on Social Change'.

analysis. Thus *The Limits to Growth* was located at a 'historical juncture' between planning euphoria and criticism of growth.[101]

If we examine the reception and impact of *The Limits to Growth*, we can say that a questioning not only of the feasibility but also of the desirability or value of (economic) growth, a questioning which drew on many sources, gained momentum, scientific credibility, and popularity as a result of this book. In essence, this ecological criticism of growth, which coincided with the reception of *The Limits to Growth*, aimed to question the linear paradigm of progress and modernization. The notion of progress in history was partly reconceptualized and bound up with ecological and qualitative aspects. It was thus open to support by some Conservatives (via criticism of industrial modernity), Christian intellectuals (via criticism of excess, materialism, and the destruction of creation), and even parts of the left-wing spectrum (via criticism of capitalism). First, this debate gave rise to the idea of qualitative growth which, in contrast to quantitative growth, was ecologically and socially balanced. The discussion culminated in the notion of 'quality of life' which expanded the category of 'living standard' by post-materialist aspects and comprised ecological, social, individual, and participatory criteria in addition to material ones. Secondly, the environment as a topic was examined in a more global dimension, for example, in the UN environmental conference held in Stockholm in the summer of 1972.[102] Thirdly, *The Limits to Growth* cast light on aspects of securing global resources and economic relations between North and South. As Peccei saw it, *The Limits to Growth* arose out of a Western-based and Western-led perspective. Yet against the background of détente during the Cold War, the crisis of the monetary system at Bretton Woods, and the oil crisis, the issues of international economic relations between North and South, between industrialized, threshold, and developing nations, and calls for a new economic world order became more attractive and were discussed at the UN General Assembly of 1974.[103] The debate

[101] Kupper, 'Weltuntergangs-Vision aus dem Computer', 110.

[102] See Kai F. Hünemörder, 'Vom Expertennetzwerk zur Umweltpolitik: Frühe Umweltkonferenzen und die Ausweitung der öffentlichen Aufmerksamkeit für Umweltfragen in Europa (1959–1972)', *Archiv für Sozialgeschichte,* 43 (2003), 275–96; McCormick, *Reclaiming Paradise,* 88–105.

[103] See Glenda Sluga, 'The Transformation of International Institutions:

around *The Limits to Growth* supported the change in perspective because it provided a platform for scientists from threshold and developing countries.

As we have seen, the reception of *The Limits to Growth* and the debate around growth were temporarily stimulated by the oil crisis, but this changed when the implications of the economic crisis became clear. Zero growth could mean rising unemployment. This was now evident in Western industrialized societies. But 'quality of life' became a polyvalent leading concept, while the notion of 'qualitative growth' entered the vocabulary of environmental and development policy, later to be replaced by the term 'sustainability', which had already been used in Britain during the debate on *The Limits to Growth*.[104]

In essence, this applied to both Britain and West Germany. If we are looking for differences, then, first, the scientific, intellectual, and political reception of *The Limits to Growth* was more excited, ideologized, and marked by fears about survival in the Federal Republic of Germany than in Britain. In Britain there was more pragmatic criticism of the epistemological and methodological determinism of *The Limits to Growth*, and of the value of cybernetic models. And in terms of social and political perceptions, the broad spectrum of interconnected environmental organizations prevented a more apocalyptic pigeon-holing of environmentalism. Secondly, in Britain the notions of qualitative growth and quality of life were less important than in West Germany. In the early 1970s British politics were dominated by industrial conflict, which was a formative experience for the left. Until the consensus dissolved in the late 1970s, to avoid unemployment was the major concern, which meant that criticism of growth was not as widespread as it was in West Germany. Instead, thirdly, in Britain the focus was more on global population developments

Global Shock as Cultural Shock', in Ferguson et al. (eds.), *The Shock of the Global*, 223–36.

[104] 'Sustainable development' was defined by the Brundtland Report in 1987 as development that meets the needs of the present without compromising the ability of future generations to meet their own needs; see World Commission on Environment and Development, *Our Common Future* (Oxford, 1987); Moll, *From Scarcity to Sustainability*; Steurer, *Der Wachstumsdiskurs in Wissenschaft und Politik*, esp. 382–400.

and securing resources. This was certainly true of Edward Heath's government, as I will show in greater detail elsewhere. In 1971–2 it established an interministerial Committee on World Future Trends in reaction to Forrester's *World Dynamics* and *Blueprint for Survival*. As future problems, the committee identified population growth in the developing countries and Britain's dependence on imported supplies of food and raw materials, while criticism of growth played no part at all.[105] Thus British attention was focused on securing its own resources,[106] in part dictated by its position as a global trading nation. In the West German discussion, by contrast, environmentalism and ecological criticism of growth, added to the residues of a euphoric notion of planning, played a much more important part. Criticism of growth—or criticism of quantitative growth—flowed into the discipline of futures studies and various intellectual contexts, breaking through the classical continuum of left and right. This was one of the factors leading to the foundation of the political party known as Die Grünen in the late 1970s.[107] The notion of qualitative growth also entered the vocabulary of parts of the SPD and the CDU and, as we will see, West Germany's federal government. In 1969–70 Willy Brandt's government had set up a department for environmental protection within the Interior Ministry. Initially, it understood its environmental brief as a technical problem in the context of planning. Yet in 1972, during the debate around *The Limits to Growth*, the West German government diagnosed a basic tension between environmental protection and economic growth.[108] Not least for this reason,

[105] See Her Majesty's Stationery Office, Cabinet Office, *Future World Trends: A Discussion Paper on World Trends in Population, Resources, Pollution etc., and their Implications* (London, 1976).

[106] TNA, CAB 178/20, esp. Robert Press to John Hunt, 12 June 1975.

[107] See also Mende, *'Nicht rechts, nicht links, sondern vorn'*; Engels, 'Umweltschutz in der Bundesrepublik'.

[108] Hans Dietrich Genscher, 'Umweltschutz und Umweltpolitik als weltweite Aufgabe: Rede vor dem Plenum der UNO-Umweltschutzkonferenz', 9 June 1972, printed in *Bulletin des Presse- und Informationsamtes der Bundesregierung*, 13 June 1972, 1185–7, at 1186; for West German environmental policy see Engels, *Naturpolitik in der Bundesrepublik*, 275–94; Hünemörder, *Die Frühgeschichte der globalen Umweltkrise*; id., '1972', 126–30; Holger Nehring, 'Genealogies of the Ecological Moment: Planning, Complexity and the Emergence of "the Environment" as Politics in West Germany, 1949–1982', in Sverker Sör-

when the economic crisis hit in 1974–5, environmental policy was sometimes seen as putting a brake on growth.[109]

In principle, the debate around *The Limits to Growth* showed how difficult it was to separate scientific knowledge from social and political knowledge. Produced by a think tank using scientific methods, *The Limits to Growth* was so widely read largely because it was seen as a scientific study. The history of its reception shows, however, that scientific knowledge provided topics of argument for the public and politicians, and that the boundaries between science, politics, and public were blurred. Ultimately, the debate around *The Limits to Growth* showed that scientific knowledge was based on individual interpretations of the world, on inherent norms and ideas of order.[110]

Everyone was talking about *The Limits to Growth*, and yet the debate hastened a questioning of futures studies. As we have seen, criticism of growth combined with criticism of linear thinking about progress. From the 1970s, more and more doubt was cast upon modernization theories, large-scale concepts of planning and control, and promises of rationalization, while increasing attention was paid to global structures and theories of entangled, post-colonial modernities. This process, which is also spoken of as the beginning of a 'second' modernity,[111] was visibly reinforced by the debate around *The Limits to Growth*. Yet futures research and world modelling had lived from the belief that society could be controlled. In the throes of a new uncertainty, futures research was itself plunged into crisis.

ling and Paul Warde (eds.), *Nature's End: History and the Environment* (Basingstoke, 2009), 115–38.

[109] See Edda Müller, *Innenwelt der Umweltpolitik. Sozial-liberale Umweltpolitik: (Ohn)macht durch Organisation* (Opladen, 1986).

[110] Sam Cole, 'The Global Futures Debate 1965–1976', in Freeman and Jahoda (eds.), *World Futures*, 9–49, at 49; Sam Cole and Ian Miles, 'Assumptions and Methods: Population, Economic Development, Modelling and Technical Change', ibid. 51–75; further Weingart, *Die Stunde der Wahrheit?*; Kupper, '1970er Diagnose', 339.

[111] See Ulrich Beck and Wolfgang Bonß (eds.), *Die Modernisierung der Moderne* (Frankfurt am Main, 2001); Raithel, Rödder, and Wirsching (eds.), *Auf dem Weg in eine neue Moderne?*; Doering-Manteuffel and Raphael, *Nach dem Boom*, 72–6, 116–19; Martin H. Geyer, 'Die Gegenwart der Vergangenheit: Die Sozialstaatsdebatten der 1970er Jahre und die umstrittenen Entwürfe der Moderne', *Archiv für Sozialgeschichte*, 47 (2007), 47–93; Schanetzky, *Die große Ernüchterung*.

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