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The limits to growth and development? Computer modeling, planetary limits, and the question of industrial development in the Global South, 1960s–1970s

List of abbreviations

ADELA Atlantic Community Development Group for Latin America
CoR Club of Rome
DRC Development and Resources Corporation
IDRC International Development Research Centre
LAAD Latin American Agribusiness Development Corporation
LAWM Latin American World Model or *Modelo Mundial Latinoamericano*
MIT Massachusetts Institute of Technology
OECD Organization for Economic Cooperation and Development
OECEI *Oficina de Estudio para la Colaboración Económica International* or Bureau for Research on International Economic Collaboration
PICA Private Investment Company for Asia
SIFIDA *Société Internationale Financière pour les Investissements et le Développement en Afrique* or International Financial Group for Investment and Development in Africa
STS Science and Technology Studies
TVA Tennessee Valley Authority
US(A) United States (of America)
USSR Union of Soviet Socialist Republics

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Introduction

In 1972, the MIT computer modeling study, *The Limits to Growth*, commissioned by the Club of Rome (CoR), projected humanity heading for collapse if the growth in

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population, resource consumption and environmental pollution continued to push planetary boundaries.[1] In the ensuing debate, actors in the Global South fiercely criticized the CoR and *Limits* for linking the notion of ecological limits to limitations on population and economic growth in the developing world. As Argentinian researcher Gilberto Gallopin put it in retrospect, while such models were "concerned with a crisis looming in the future, already the majority of humankind was living in a state of poverty and misery." For this reason, the "policies oriented towards getting a state of global equilibrium as recognized in Limits to Growth would tend to ensure that the present injustices in the global systems are maintained."[2]

Yet the ideas behind the CoR's project on the predicament of mankind grew out of the often-overlooked roots of the Club in Latin American industrial development. Starting in the 1950s, the CoR's founder and leader, Aurelio Peccei, promoted industrial development in the region, particularly through the multinational investment corporation Atlantic Community Development Group for Latin America (ADELA), which aided the transfer of technologies, skills and capital to counter the growing imbalance between North and South. This development model was challenged by concerns about population growth, environmental problems, and resource scarcity that were reflected in the *Limits* debate. Perhaps because of Peccei's deep involvement in Latin America, he and the CoR engaged with critiques of *Limits* originating in the Global South. In Argentina, the CoR sponsored the Fundación Bariloche in developing an alternative computer modeling study of 1976, the *Modelo Mundial Latinoamericano* or Latin American World Model (LAWM), which envisioned a future where the developing world could progress within limits that were sociopolitical, rather than physical. In Africa, the Club de Dakar – taking its cue from the CoR – was created in 1974 to promote industrial development with private capital and rejected the notion of physical limits to development.

Our chapter ties together several strands of history that have largely – if at all – been studied separately. While there is a substantial literature on the CoR and *Limits*, the main focus has been on the influence on societal debates about resources and the environment, on the disciplines of systems analysis and future

1 Donella H. Meadows, Dennis L. 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: Potomac, 1972).

2 Gilberto C. Gallopin, "The Latin American World Model (a.k.a. the Bariloche Model): Three Decades Ago," *Futures* 33, no.1 (2001): 77–88, here 81.

studies, and on the MIT group's use of computer modeling.[3] Matthias Schmelzer has argued that the CoR built primarily on personnel and studies of the Organization for Economic Cooperation and Development (OECD) in the 1960s.[4] While the link to OECD is evident, it should not overshadow the equally important influence of Peccei's efforts in Latin America with ADELA.[5] The critique of *Limits* from the Global South, above all the 1976 LAWM, has likewise often only been mentioned in passing in studies of the *Limits* debate.[6] In contrast to the CoR, the history of the Club de Dakar has largely been forgotten after the organization's sudden end following the downfall and imprisonment of its founder, Mohamed Tiékoura Diawara, and has only recently been rediscovered.[7] To the rich literature on the history of development, we contribute a view on the business-led development model promoted by Peccei, ADELA, and the Club de Dakar, which was considered a private sector alternative to international agencies.

In this chapter, we examine the relationships between computer modeling, industrial development, and the debates about environmental pollution and planetary limits. In doing so, we point out two ways in which technologies and environmentalism interacted with ideas about development. On the one hand, technology transfers were an essential part of the business-led industrial development model promoted by Peccei and his allies, but were also challenged by the environmental

3 Kevin T. Baker, "World Processors: Computer Simulation, The Limits to Growth, and The Birth of Sustainable Development" (PhD diss., Northwestern University, 2019); Peter Moll, *From Scarcity to Sustainability: Futures Studies and the Environment: The Role of the Club of Rome* (Bern: Peter Lang, 1991); Fernando Elichirigoity, *Planet Management: Limits to Growth, Computer Simulation, and the Emergence of Global Spaces* (Evanston, IL: Northwestern University Press, 1999); Patrick Kupper and Elke Seefried, "A Computer's Vision of Doomsday: On the History of the 1972 Study The Limits of Growth," in *Exploring Apocalyptica: Coming to Terms with Environmental Alarmism*, ed. Frank Uekötter (Pittsburgh: Pittsburgh University Press, 2019), 49–74; Elke Seefried, *Zukünfte. Aufstieg und Krise der Zukunftsforschung, 1945–1980* (Berlin: De Gruyter, 2015); Thomas Turnbull, "Simulating the Global Environment: The British Government's Response to *Limits to Growth*," in *Histories of Technology, the Environment, and Modern Britain*, ed. Jon Agar and Jacob Ward (London: UCL Press, 2018), 271–299.

4 Matthias Schmelzer, "'Born in the Corridors of the OECD': The Forgotten Origins of the Club of Rome, Transnational Networks, and the 1970s in Global History," *Journal of Global History* 12, no.1 (2017): 26–48.

5 As has been proposed by Piccioni and Sánchez Burmester: Luigi Piccioni, *Forty Years Later: The Reception of the Limits to Growth in Italy, 1971–1974* (Brescia: Fondazione Luigi Micheletti, 2012); Candida F. Sánchez Burmester, "From Development to Sustainable Development: Latin America and the Limits to Growth Debate, 1961–1987" (MA Thesis, Maastricht University, 2021).

6 Though see Ana Grondona, "Latin American World Model: A Third-World Voice to Face Limits to Growth," *Journal of Imperial and Commonwealth History* 52, no.6 (2024): 1003–1031.

7 See George Roberts' forthcoming work on the Club de Dakar.

and scarcity debates of the 1970s. On the other hand, the technology of computer modeling decisively shaped the era's imaginaries of development and specifically the question of whether planetary limits would ultimately constrain development. Technology therefore played many roles: it was a *problem* that had created an imbalance between humans and the natural environment as well as between the developed and developing world; it was a research *instrument* that allowed the simulation of the future through computer models; and it was seen as a *solution* to bridge imbalances in development through technology transfers from North to South, redress environmental problems, and overcome resource constraints. To that end, we build on concepts and studies from history of technology and Science and Technology Studies (STS), particularly studies of computer modeling, the concept of technology transfers, and Eden Medina and colleagues' problematization of the widespread notion of North-South technology transfers as simply being "imported magic." That view, we agree, ignores the local shaping of those technologies as well as local knowledge and innovation, as was the case with Fundación Bariloche's computer modeling study.[8]

Based on publications and archival materials of actors involved with the organizations under examination, our chapter explores this history in three, largely chronological sections. It first looks at the roots of the Club of Rome in Aurelio Peccei's Latin American initiatives in the 1950s and 1960s and how Peccei and the CoR instead ended up promoting *Limits* by 1972. The second part focuses on the development implications of *Limits*, how the CoR dealt with criticisms from the Global South, and how it supported the alternative Latin American World Model. The final section zooms in on the case of the Club de Dakar and relates its fate to the overall demise of all three organizations – ADELA, the Club of Rome and the Club de Dakar – and with them their development plans and imaginaries during the 1980s.

1 Development by investment: Peccei in Latin America, 1950 – 1968

With the publication of *The Limits to Growth* in March 1972, the Club of Rome was catapulted onto the world's front pages and acclaimed as a leading exponent of neo-Malthusianism – and of computer modeling – in the ensuing debate about

8 Eden Medina, Ivan de Costa Marques, and Christina Holmes, introduction to *Beyond Imported Magic: Essays on Science, Technology, and Society in Latin America*, ed. Eden Medina, Ivan de Costa Marques, and Christina Holmes (Cambridge, MA: The MIT Press, 2014), 1 – 23.

population, pollution, and resource scarcity. Histories in which the CoR figures therefore start from the foreknowledge that *Limits* would be its best-known achievement.[9] Yet the CoR wandered into commissioning *Limits* somewhat accidentally, and many of its members were taken aback both by its findings and its acclaim.[10] Certainly, no one in the CoR saw it as the final say. Many of the CoR's activities for the rest of the 1970s – such as commissioning the Latin American World Model – were intended to critically reassess *Limits*.

When the Club was founded in 1968, its early membership regarded it as a nexus where elites from government, industry, and academia could forge solutions to *all* of the world's problems, not just problems relating to population growth, pollution, or resource scarcity.[11] That's apparent, for instance, in Club member Arne Tiselius' invitation to the Club's founders (Aurelio Peccei and Alexander King) to use the Nobel Symposia in the early 1970s as a platform for addressing issues such as "global inequality, the dangers of new technology, the alienation of youth," and rapprochement between East and West.[12] Moreover, contrary to Matthias Schmelzer's claim that the Club was "born in the corridors of the OECD," the Club's various preoccupations mainly reflected Aurelio Peccei's experience with industry-led development in the decade prior to its founding and his visions and concerns for the world's future.[13]

Those visions began to coalesce in the 1950s, when Peccei, originally from Italy, was Fiat's (very successful) man in Latin America. On that basis, in 1956–1957, he convinced the leadership of Fiat to back two new ventures. The first was the *Oficina de Estudio para la Colaboración Económica International* (OECEI, or Bureau for Research on International Economic Collaboration) at Fiat in Buenos Aires. Unusual for an automobile manufacturer at the time, Fiat's research center mainly produced Latin American economic and development reports

9 E.g., Jenny Andersson, *The Future of the World: Futurology, Futurists, and the Struggle for the Post-Cold War Imagination* (Oxford: Oxford University Press, 2018); Elke Seefried, "Rethinking Progress: On the Origin of the Modern Sustainability Discourse, 1970–2000," *Journal of Modern European History* 13, no.3 (2015): 377–400. Elodie Vielle Blanchard, "Modelling the Future: An Overview of the 'Limits to Growth' Debate," *Centaurus* 52, no.2 (2010): 91–116. Bretton Fosbrook, "How Scenarios became Corporate Strategies: Alternative Futures and Uncertainty in Strategic Management" (PhD diss., York University, 2017).

10 On the somewhat accidental commissioning, see Baker, "World Processors," 18–19.

11 On the Club's founding ideals, see, Aurelio Peccei, "The Club of Rome: Ten Years On," *Futures* 10, no.2 (1978): 171–174.

12 The quote, and background on Tiselius' invitation to Peccei and King, is from Sven Widmalm, "'Super Bowl of the World Conference Circuit'? A Network Approach to High-Level Science and Policy Conferencing," *British Journal for the History of Science* 56, no.4 (2023): 535–551, here 540.

13 Schmelzer, "'Born in the Corridors,'" 26–48.

and built up a permanent staff of over fifty researchers.[14] Second, in 1957, Peccei convinced Fiat leadership and other major Italian firms to back Italconsult, a new engineering consultancy seeking contracts for development projects in the Global South.[15] An important model for Italconsult was David Lilienthal's Development and Resources Corporation (DRC), founded in 1955 to apply the "TVA model" of large engineering works for rural uplift to various erstwhile allies of the United States, such as Iran, Colombia, and South Vietnam.[16] By 1958, Peccei was personally lobbying Lilienthal to explore possible collaborations between DRC and Italconsult in countries including Egypt, Somalia, and Yugoslavia.[17]

In 1964, Peccei also became involved in founding the Atlantic Community Development Group for Latin America (ADELA). The seeds of ADELA lay in plans hatched by the US Senator Jacob Javits, which were subsequently taken up by a group of industrialists, including Gianni Agnelli of Fiat. This group assembled a four-man team which drew up plans for ADELA. Peccei served as its head. They devised a plan for companies in Europe, North America, and Japan to invest up to USD 500,000 each in the company, in return for a seat on ADELA's board. This money would then flow through ADELA's regional offices ("Adelitas") into relatively small projects around Latin America and the Caribbean.[18] ADELA was created as an investment fund "to foster socio-economic progress in Latin America by stimulating private enterprises through providing development services, technology and financing, including equity as a minority investor."[19]

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14 Gunter A. Pauli, *Crusader for the Future: A Portrait of Aurelio Peccei, Founder of the Club of Rome* (Oxford: Pergamon Press, 1987), 65.

15 Pauli, *Crusader for the Future*, 65.

16 David Ekbladh, "Profits of Development: The Development and Resources Corporation and Cold War Modernization," *Princeton University Library Chronicle* 69, no.3 (2008): 487–506. Gregory Brew, *Petroleum and Progress in Iran: Oil, Development, and the Cold War* (Cambridge: Cambridge University Press, 2022).

17 Letter from Aurelio Peccei to David Lilienthal, 2 December 1958, Box 410, Folder Peccei, A. 1958, David E. Lilienthal Papers, Mudd Manuscript Library, Princeton University; Letter from Aurelio Peccei to David Lilienthal, 6 December 1958, Box 410, Folder Peccei, A. 1958, Lilienthal Papers; Letter from Aurelio Peccei to David Lilienthal, 7 January 1959, Box 415, Folder Peccei, A. 1959, Lilienthal Papers; Letter from from Aurelio Peccei to Raul D. Turdera, 4 November 1960, Box 421, folder Peccei, A. 1960, Lilienthal Papers.

18 For background, see *ADELA 10* (Adela, 1974), Box 1, unfoldered material, Robert Ross Papers on Development and Investment in Latin America and Africa, Mudd Manuscript Library, Princeton University. See also Richard Boyle and Robert Ross, *Mission Abandoned: How Multinational Corporations Abandoned Their First Attempt to Eliminate Poverty, Why They Should Try Again* (Princeton: Robert L. Ross, 2009) and Joseph James Borgatti, *ADELA: The Noble Birth and Costly Death of Early Venture Capitalism in Latin America* (New York: Chapin Publishing, 2018).

19 Quoted from *ADELA 10.*

Backed with the capital provided by the corporate shareholders, ADELA started operations in 1965. It prioritized capital investments in a wide range of promising private enterprises, but without acquiring majority shareholding in those companies. Its core agency became ADELATEC, which in many ways resembled Peccei's Italconsult and provided technical and management assistance to Latin American companies as well as economic and feasibility studies for ADELA management.[20] The investments were often in agribusiness and related animal and forest/plant products, but also in the mining, tourism, textiles and chemical industries.[21] Initially, the company had a total of 124 corporate shareholders from 15 countries. By 1975, that number had ballooned to 233 shareholders and some 105 directors.[22] Given the low cap on investments and large number of directors, few board members gave ADELA much thought. Nor did the board's chair, a rotating position with a roughly two-year term. Real oversight was therefore entrusted to the board's four vice chairmen, one of whom was Peccei for the first decade of ADELA's existence.[23]

To understand the link between ADELA and the founding of the CoR, we turn to a keynote speech Peccei gave at ADELA's official opening in 1965. Critically, Peccei's audience extended far beyond the investors and other dignitaries present in Buenos Aires to hear him speak about "The Challenge of the 1970s for the World of Today."[24] Over the following years, Peccei distributed copies of his speech widely, one of which found its way to Alexander King, the director-general for scientific affairs at the OECD. King subsequently approached Peccei, with whom he was previously unacquainted. Together, they made plans for a "club" of elites to implement the vision Peccei outlined in his speech, thus setting in motion the development of the CoR.[25]

Yet in his Buenos Aires speech, Peccei hardly mentioned the topics for which the CoR would later become famous, like overpopulation, resource scarcity, and

20 ADELA Investment Company S.A., Annual Report (1966), Box 1, unfoldered material, Ross Papers.

21 ADELA Investment Company S.A., Annual Report (1970 and 1973), Box 1, unfoldered material, Ross Papers.

22 That figure is from *ADELA 10*. A slightly different (though mostly overlapping) list is presented in *Mission Abandoned*, but with no date given. An overview of investments by sector can be found in the 1973 Annual Report, 8.

23 Criticism of the rotating chair system and the inattentiveness of directors comes from Borgatti, *ADELA*.

24 The copy of the speech that we quote from is accessible in: Aurelio Peccei, The challenge of the 1970s for the world of today: A basis for discussion, Lecture given at the National Military College, Buenos Aires, 27 September 1965, Box 463, Folder "Peccei, A. 1966," Lilienthal Papers.

25 Moll, *From Scarcity to Sustainability*, 60 – 61.

environmental pollution. Instead, he dwelt on nuclear holocaust, computer-aided pedagogy, the technology gap between the US and Europe, over-abundance of leisure thanks to automation, European unification, disarmament, and rapprochement with the Soviet Union. Those themes were also present in Peccei's book *The Chasm Ahead* (1969), yet they were largely washed away by the *Limits* controversy.[26] However, the 1965 speech *did* signal two aims that were later amplified by *Limits* and which thus (accidentally) became the CoR's signature themes: the need for new forecasting tools and the need for more equitable international development. For Peccei, these two objectives were mutually reinforcing cornerstones of world peace. The developed nations must "generat[e] an analogous transformation of underdeveloped economies," otherwise "the gap between them instead of narrowing is growing wider, so much as to give cause to fear that discontent will end in a cataclysmic explosion." Crucial to preventing such an explosion was "to understand where we are and where we are going. The question that must be set is that already indicated: are we capable of controlling our future, of parrying the threat that the world, even though becoming very small, literally falls to pieces?"

Yet Peccei didn't think that confronting the world's problems required *global* action – at least not initially: "the areas to be interested in development and in coprosperity in the next decade are necessarily and only two: the Soviet area, comprising the USSR and Eastern Europe, and the Latin American area." Regarding the Soviets, Peccei imagined "reciprocal cooperation" among equals, with Western Europe taking the first steps and the US following behind to draw the USSR into "a ten-year program of cooperation … permitting, among other things, the gradual conversion of industries for war into industries for peace."

For the rest of the world, Peccei thought "that the wealthy nations must in the future help much more than in the past those people more derelict than any other," but only if "total foreign aid added to domestic savings [can] reach a certain 'critical volume' over a self-sufficient period." Thus, aid had to flow initially only to regions that could immediately make use of it; all other regions would have to focus first on accumulating sufficient domestic savings before they would be ready to follow the initial aid recipients' lead. In his view, only Latin America was already at the "critical volume" point, while "there are various allied factors which favor Latin America, not met at present in other as yet undeveloped regions," especially "a cultural base homogeneous with the West; about 150 years of independence" and "broad *de facto* experience of economic activities based on private initiative." Thus, "Latin America – and no other undeveloped region

26 Aurelio Peccei, *The Chasm Ahead* (New York: Macmillan, 1969).

– can and must therefore be the test-bench for the practicability of bringing a whole continent within the area of well-being."

Curiously, Peccei claimed that North Africa and the Middle East would develop along with Latin America but would not serve as a development test-bench because "the Mediterranean cannot be considered extraneous [to Europe] and hence the people around its shores must be called upon to share in its development." Development plans for sub-Saharan Africa and the rest of Asia, however, were "clearly an objective for a second period. The prerequisite … will be the consolidation of a large area of prosperity from Siberia to Patagonia and from the Nile delta to Alaska." Once that had been achieved then the ADELA model could be applied to other regions.

This was, indeed, what ADELA's supporters later attempted to do. In 1970, an overlapping group of investors, in cooperation with the African Development Bank, established the *Société Internationale Financière pour les Investissements et le Développement en Afrique* (International Financial Group for Investment and Development in Africa, SIFIDA), which they explicitly modeled on ADELA. SIFIDA's advocates argued that Africa was not just suffering from a lack of capital investment, but also the accompanying technological expertise, which could only be brought about from a closer relationship between venture capital and industry.[27] Its shareholders represented some of the most powerful names in global industry and finance: IBM, Barclays, Mitsubishi, Deutsche Bank, and Fiat – all shareholders of ADELA as well.[28] The company's USD fifty million capital was designed to support private investment all over Africa, but in practice was used almost entirely by foreign capital in states receptive to external investment, such as Kenya, Zaire, Ivory Coast, and Senegal, where SIFIDA invested primarily in textiles, tourism and forestry, but also other sectors like metallurgy.[29]

Similar ADELA-type models emerged elsewhere, too. In 1969, several early ADELA promoters – joined by David Rockefeller and others – organized the Pri-

27 Henry Phillips, "Venture Capital: Its New Role in Developing Africa," *African Affairs* 70, no.281 (1971): 395–403.

28 Tim Anderson, "Adela: The Violation of the Bond Market," *Euromoney*, September 1981.

29 On SIFIDA, see Mathieu Kaluma, "Une Société Internationale Financière pour les Investissements et le Développement en Afrique: la SIFIDA," *Congo-Afrique: économie, culture, vie sociale* 10, no.49 (1970): 477–484; André Badibanga, "Les fonds africains de développement: annexes du système mondial ou instruments de la croissance auto-entretenue?," *Revue Tiers Monde* 22, no.87 (1981): 655–666. For an overview of investments, see for example SIFIDA Annual Report (1973 and 1982), Box 1, unfoldered material, Ross Papers.

vate Investment Company for Asia (PICA).[30] That year also saw ADELA spin off the Latin American Agribusiness Development Corporation (LAAD; ADELA continued to own a 20 % share).[31] Then in 1974, Adnan Khashoggi spearheaded a Middle East Private Investment Company – "the scope of activities would essentially be identical with that of ADELA" – with the help of ADELA's upper management plus Saudi oil money.[32] Finally, in 1977, LAAD's principals outlined plans for similar capitalist-led development in Egypt, Morocco, Sudan, and Tunisia; while much later – immediately after the end of the Cold War – LAAD was again offered as a model for investment-development for post-socialist Baltic, Balkan, Eastern European, and Central Asian economies.[33] In other words, ADELA's creators (including Peccei) and admirers saw Latin America as the developing region most ripe for productive investment in the 1960s and, consequently, the region that could serve as a testbed for an industry-led development model that could be exported throughout the Global South.

Latin America also figured prominently in early recruitment for the Club of Rome. By 1971, there were five members based in Latin America, some of whom would be instrumental in Club activities focused on that region, including (as we will see) its patronage of a Latin American World Model.[34] Compare that with what Peccei called the "Soviet area," which had only one member as late as early 1974. The Latin American cohort was also larger than those for sub-Saharan Africa or Asia, if Japan is excepted.[35] Overall, then, we can infer that throughout his time with Italconsult, ADELA, *and* the Club of Rome – from the 1950s until

30 Senator Jacob Javits of New York, "The Private Investment Company for Asia," 10 January 1969, remarks on the floor of the Senate, 91st Congress – 1st Session, *Congressional Record*, 115, pt. 1: 1255.

31 Borgatti, *ADELA*, 44 and 77.

32 Ernst Keller (president of ADELA), prospectus for Middle East Private Investment Corporation, December 1974, Box 3, unfoldered material, Ross Papers.

33 Robert Ross (president of LAAD), report on "Agribusiness in Central Asia: Opportunities and Constraints," August 1998, Box 1, unfoldered material, Ross Papers; "Central European Agribusiness Development Corporation (CEAD): A Concept Paper," August 1991, Box 1, unfoldered material, Ross Papers; and Ross and Elsayed G. Shoreibah, "Report on North Africa: Preliminary Report on Creating a Regional Agribusiness Development Corporation," 1977, Box 1, unfoldered material, Ross Papers.

34 Membership as of 24 June 1970, Box 17, Folder 684, Gordon S. Brown Papers, Massachusetts Institute of Technology, Department of Distinctive Collections, Cambridge, Massachusetts.; membership as of 18 March 1971, Box 42, Folder "Club of Rome, Membership, 1984," Jay W. Forrester Papers, Massachusetts Institute of Technology, Department of Distinctive Collections, Cambridge, Massachusetts.

35 Compare Membership as of 25 January 1973 with Membership as of 31 July 1974, both in Box 29, Folder 6, Elizabeth Mann Borgese Fonds, Dalhousie University Libraries.

his death in 1984 – Latin America was Peccei's "test-bench" for refining methods of applying Global North investment, technology, and expertise to the development of the Global South.

2 Modeling the future of development: The limits to growth debate and the Latin American World Model, 1968–1973

When *The Limits to Growth* was released in 1972, the German magazine *Der Spiegel* spoke for many in labelling the Club of Rome and MIT's modeling study "A Computer's Vision Of Doomsday."[36] Almost overnight, the CoR and the MIT team became famous for fueling a debate about physical limits to economic and population growth, even though the Club's core members, above all Peccei and King, had rather argued in favor of economic growth in the past. Working with its World3 computer model, the MIT team had in fact simulated different scenarios for the future of the world system, but the diagram that stood out was the "standard run," which projected that if current growth trends (or "business-as-usual") in population, industrialization, pollution, food production and resource exhaustion continued to push the planetary boundaries, society would be heading for collapse. The authors questioned technological optimist claims of human ingenuity overcoming those ultimate limits to the availability and affordability of food, minerals, and clean air and water.[37] The CoR thereby made the research method of systems analysis with the aid of computer modeling both famous *and* relevant to debates about development.

By questioning growth and technological optimism, and showing a new sensibility for environmental and resource issues, *Limits* was very different from Peccei's earlier thinking. Even though both looked at a series of interconnected problems and uncertainties that confronted mankind – termed the world *problématique* – the assumptions and arguments were fundamentally different. The reasons for this change lie partly in shifts in the thinking of Peccei, who in 1965 anticipated neither the rise of popular environmental movements in the following years nor the pessimistic turn in the outlook for resource availability, especially given the uncertain outlook for world oil supply as OPEC gained in confi-

36 Kupper and Seefried, "A Computer's Vision of Doomsday," 61.

37 Meadows et al., *The Limits to Growth.*

dence.[38] Published in 1968, Paul and Anne Ehrlich's book *The Population Bomb* fueled a debate between resource optimists (the "cornucopians") and pessimists (the "cassandras").[39] Already by 1970, Peccei adapted his *problématique* thinking and included population growth and "growing environmental pollution" in his list of critical problems.[40]

But the making of *Limits* was also shaped by contingencies in the CoR's broader activities, rather than the vision of Peccei alone. In the early years, the CoR set out to study a set of interconnected world problems, which became the first phase of the "Predicament of Mankind" project. To that end, the Club searched for a method of analyzing and raising awareness of the *problématique*, whereas later phases would focus on providing solutions to those problems. At a meeting in Bern, Switzerland, in June 1970, the search for a methodology led to a competition between two approaches. On one side, economist and early CoR member Hasan Özbekhan pushed for a cybernetic study of world problems. The other approach, presented by MIT professor, computing pioneer and systems dynamics researcher Jay Forrester, entailed a computer-aided analysis of world system dynamics. Forrester attended the meeting on the invitation of his MIT colleague Carroll L. Wilson, an early member of the CoR. Apparently, because Özbekhan's funding proposal had been rejected by the German Volkswagen Foundation, the CoR chose Forrester's approach instead.[41] Forrester soon wrote the first two models (World 1 and World2), but then delegated the task to Dennis and Donella (Dana) Meadows and their team to refine the World3 model and write *Limits*, which became an instant bestseller upon release in March 1972.[42]

While the *Limits* study was embraced by many people – ranging from scientists to environmentalists – it also stirred up a controversial debate. Critics brought up methodological critiques of the computer model as well as technological optimist and resource cornucopian rejections of its core arguments.[43] But the most politically forceful dissent came from the Global South, where there was

38 Seefried, *Zukünfte*, 263–267; Giuliano Garavini, *The Rise and Fall of OPEC in the Twentieth Century* (Oxford: Oxford University Press, 2019); Christopher R. W. Dietrich, *Oil Revolution: Anticolonial Elites, Sovereign Rights, and the Economic Culture of Decolonization* (Cambridge: Cambridge University Press, 2017).

39 Paul R. [later also credited to Anne H.] Ehrlich, *The Population Bomb* (New York: Sierra Club, 1968).

40 The Club of Rome, The Predicament of Mankind: Quest for Structured Responses to Growing World-wide Complexities and Uncertainties: A Proposal, 1970, Box 12, Folder 12, Forrester Papers.

41 Seefried, *Zukünfte*, 252–253.

42 Baker, "World Processors," 20–21.

43 For overviews, see Seefried, *Zukünfte*, 270–292; Walter E. Hecox, "Limits to Growth Revisited: Has the World Modeling Debate Made Any Progress?' *Environmental Affairs* 5, no.1 (1976): 65–96.

deep concern for the implications of the findings of *Limits* for the future of development. These emerged even prior to the publication of *Limits*. In April 1971, the CoR discussed the preliminary findings of the MIT study – then still entitled "Dynamics of Global Equilibrium" – at a meeting near Montréal.[44] Latin American members raised concerns about the study's fundamental assumptions and suggested holding a special meeting in the region to address its flaws.

In mid-1971, the CoR and the Instituto Universitario de Pesquisas sponsored a meeting of around twenty Latin American scientists in Rio de Janeiro.[45] When Dennis Meadows presented the World3 model, the audience reacted very critically. Instead of making predictions based on current trends, they felt it was necessary to examine the potential for fundamental changes in institutions and values. For them, the predicted problems in the future were outlined from the perspective of the developed world, which neglected that two-thirds of the population were already struggling with crises similar to those anticipated by the MIT study. There were also concerns that policies aimed at a "state of global equilibrium" would, in reality, perpetuate existing global inequalities. The study's proposed no-growth economics to prevent a planetary catastrophe would therefore deny the developing world its chance to develop and, in many ways, "colonize" its future.[46]

In light of this feedback, the CoR's leadership grew more critical of the *Limits* report's implications for development in their internal discussions. Shortly before the release of the report in 1972, Carroll Wilson wrote to Peccei that the study's implications for developing countries were a serious concern, as the hostile reception in Brazil had revealed:

> I might also add my own view that the implications of 'The Limits to Growth' for the less developed countries are very disturbing and generate great hostility. Those who are perceptive can see through the arithmetic and understand just what it means in terms of their as-

44 Dennis L. Meadows, The Club of Rome Project on the Predicament of Mankind. Preliminary Draft: Phase One: Dynamics of Global Equilibrium, Material prepared for the Club of Rome Meeting, Montebello, Canada, 4–6 April 1971, Box 55, Folder 2106, Carroll L. Wilson Papers, Massachusetts Institute of Technology, Department of Distinctive Collections, Cambridge, Massachusetts.

45 See an interview with Jorge A. Sabato: Willem L. Oltmans, *On Growth* II (New York: Capricorn, 1975), 38–39. The date for the Rio meeting is sometimes given as 1970 but can only have occurred in 1971.

46 Donella H. Meadows, John Richardson, and Gerhart Bruckmann, *Groping in the Dark: The First Decade of Global Modelling* (Chichester: John Wiley, 1982), 45. See also: Seefried, *Zukünfte*, 276.

> pirations for material standards of living comparable with those of the highly developed countries. Nothing we say in our rhetoric is going to make any impact on these people.[47]

Club leaders expressed their sensitivity to these concerns by adding a disclaimer at the back of the *Limits* study, which noted that the report's conclusion applied to all peoples, no matter their level of development, but that the "major responsibility must rest with the more developed nations, not because they have more vision or humanity, but because having propagated the growth syndrome, they are still at the fountainhead of the progress that sustains it." That way, the developed countries would need to create a world of stability and work towards creating a "more equitable distribution of wealth and income worldwide."[48] Still, the awareness of critiques, blind spots, and the admitted need to differentiate the developed and developing world, were not implemented in the MIT team's World3 computer model.

The initiative for taking a different approach to *Limits* came instead via Latin America. After the Rio meeting, a group of nineteen interdisciplinary researchers, mostly from Argentina, Brazil and Chile, some of whom had standing relationships with Peccei and the CoR, decided to conduct the study on an alternative world model. They did so under the auspices of the Fundación Bariloche, an Argentine research foundation established in 1963.[49] The Fundación's computer – the first in the city of Bariloche – was crucial to the committee's proposal for a study that would examine the *problématique* from a different perspective than *Limits*, but with a comparable systems and modeling approach.[50] That was much closer to Peccei's original vision as laid out in the 1965 speech than the path the CoR had followed in the early 1970s. Thus, initially the Bariloche group received funding from the CoR to conduct a feasibility study,[51] and later asked

47 Carroll L. Wilson to Aurelio Peccei, 2 February 1972, Box 38, Folder 1574, Wilson Papers.
48 Meadows et al., *The Limits to Growth*, 185–197, quote on 194.
49 See Grondona, "Latin American World Model," who helpfully situates the Fundación Bariloche's history within the context of Argentina, but not the active role the CoR played in the development of the LAWM.
50 Aurelio Peccei, Note for Hulio Jaguaribe, Jorge Sabato, Victor Urquidi: Latin American Project for Phase Two, 13 April 1971, Box 38, Folder 1574, Wilson Papers.
51 Herrera, Amílcar O., Hugo D. Scolnik, Graciela Chichilnisky, Gilberto C. Gallopin, Jorge E. Hardoy, Diana Mosovich, Enrique Oteiza, Gilda L. de Romero Brest, Carlos E. Suárez, and Luis Talavera, *Catastrophe or New Society? A Latin American World Model* (Ottawa: International Development Research Centre, 1976), 4.

the Canadian International Development Research Centre (IDRC) for a grant that would cover the costs of the LAWM study, estimated at USD 81,000.[52]

From the outset, the LAWM study was proposed as one that would start out with a "critical analysis" of the MIT model, followed by a "disaggregation" of the model.[53] The CoR, therefore, presented LAWM as part of a second wave of studies on the global *problématique* that would take into account the "specific problem complex of the less developed countries and their plea for planetary socio-economic justice."[54] Yet the Bariloche group's approach was very different from the MIT system dynamics group in that they started from the assumption that the main problem was not physical limits but social and political inequalities, both at an international and national level.[55] Moreover, rather than offer an ostensibly value-neutral exploration of what might happen if present trends continued, the LAWM model was explicitly normative. That is, the group first defined what kind of future was desirable and then used the computer model to calculate how that vision could be achieved. By separating those two steps, the Bariloche team made two models: a conceptual model that sketched out a desirable future for all people, especially the Global South; and a mathematical model to demonstrate the feasibility of the conceptual model.[56]

The conceptual model further challenged World3's global view by dividing the world into four regions, not dissimilar to Peccei's regional differentiation in the 1965 speech: the Global North and three regions with significantly different development status in the Global South (Latin America and the Caribbean, Asia and Africa).[57] In each of those regions, the primary aim of economic activity was to satisfy basic needs for all, such as nutrition, housing, health and education. The LAWM sketched a future non-consumerist society, where production would be determined by social needs rather than profit. In such a society, irrational and wasteful consumption would be reduced, and thus the "limits to growth" would

52 Aurelio Peccei to Club of Rome Executive Committee members, 7 July 1972, Box 38, Folder 1574, Wilson Papers.

53 Amílcar O. Herrera to Aurelio Peccei, 4 August 1972, Box 55, Folder 1207, Wilson Papers. Quotes in Spanish: "Análisis crítico del modelo MIT," "desagregación del modelo MIT."

54 Club of Rome: Technical Symposium, Tokyo, Japan, 24–25 October 1973, Box 55, Folder 2109, Wilson Papers.

55 Amílcar O. Herrera, "Introduction and Basic Assumptions of the Model," in *Latin American World Model: Proceedings of the Second IIASA Symposium on Global Modelling*, ed. Gerhart Bruckmann (Laxenburg: IIASA, 1974), 3–8, here 5.

56 Herrera et al., *Catastrophe or New Society?*, 44–46.

57 Graciela Chichilnisky, "Latin American World Model: Theoretical Structure and Economic Sector," in *Latin American World Model: Proceedings of the Second IIASA Symposium on Global Modelling*, ed. G. Bruckmann (Laxenburg: IIASA, 1974), 115–133, here 124.

never be reached. The Bariloche group also envisioned each regional unit as nearly self-sufficient in education and housing but allowed for a degree of international trade in food, other commodities and capital goods.[58]

Yet despite rejecting the consumer society, the Bariloche group did not problematize environmental pollution as a potential side-effect of population growth and economic growth in the LAWM. Rather, it suggested that the basic-needs society without excessive growth could be assumed to be "intrinsically compatible with its environment."[59] More fundamentally, their model also rejected the notion of fixed physical limits for resources. Instead, it approached resource availability as a question of demand and technological exploitability, rather than pure availability of resource stocks.[60] The Bariloche group also saw technology generally as a liberating tool for humanity. In contrast to *Limits*, "the danger" was "not in the continuation of technological progress but rather in its social use."[61] Their model outlined different technological progress rates specific to the four regions. However, the modeled technological progress rates were lower than the ones the group observed in empirical historical data.[62]

With the corresponding mathematical model, the Bariloche team ran computer simulations on its own world model with the four regions as sub-models to evaluate under what conditions it would be feasible "to achieve the proper satisfaction of the basic needs."[63] Their simulations found that if the suggested policies were implemented in 1980, Latin America would be able to reach the stage of satisfactory basic needs in the early 1990s, Africa by 2010, and while the computer model initially did not see the goal as feasible in Asia due to population growth and increased cost of food production, the problem could be fixed by allowing food imports to Asia from in-principle self-sufficient regions, which enabled Asia to reach the basic-needs rate by 2020 – i. e., much the same sequence of development that Peccei had outlined in 1965.[64] In the future, as their calculations suggested, economic growth should persist but eventually slow down.

As expressed in the title of its report, *Catastrophe or New Society?*, the Bariloche group did not project a future "catastrophe" if current trends continued, but instead envisioned a "new society" that facilitated development. Based on their fundamentally different imaginary, the Bariloche group has been called

58 Herrera et al., *Catastrophe or New Society?*, 43.
59 Herrera et al., *Catastrophe or New Society?*, 24.
60 Oltmans, *On Growth* II, 37–43.
61 Herrera, "Introduction and Basic Assumptions of the Model," 5.
62 Herrera et al., *Catastrophe or New Society?*, 41–42.
63 Herrera et al., *Catastrophe or New Society?*, 42.
64 Herrera et al., *Catastrophe or New Society?*, 83–93.

the "anti-club of Rome."[65] Yet the whole project of an alternative Latin American World Model was actively encouraged and supported by the CoR during, and even prior to, the *Limits to Growth* debate. The CoR and, particularly, Peccei were informed about the progress of the study and commented on early drafts.[66] In the end, though, the CoR did not publish the report in its name but left publication to the study's main funder, IDRC.[67]

The publication of *Catastrophe or New Society?*, however, became overshadowed by the 1976 military coup in Argentina, which meant that the debate over the LAWM was far more muted than that over *Limits.* The coup brought major difficulties for the Fundación Bariloche, which had mainly relied on government funding, but could not expect the military government to continue supporting its research activities with 220 full-time employees. Mobilizing its international network, the Fundación's leaders reached out to international organizations and supporters, among them Peccei, in the hope of securing further foreign funding.[68] Despite those difficulties, the core idea of LAWM, that "basic needs" had to be met, was adopted by several sub-organizations of the UN, such as the ILO, UNESCO, and CEPAL, while "basic needs" also found its way into the continued debate about the *Limits* study, as Dana Meadows and colleagues acknowledged.[69]

3 Beyond the limits to growth: The Club de Dakar, 1974 – 1980

While Latin Americans took the lead in developing a response to *Limits*, they were not its sole critics in the Third World. As we have seen, even before the publication of *Limits*, leading CoR members had acknowledged the need to address its implications for the Global South. An internal report for members from 1973 lamented that the study had serious limitations:

65 Pauli, *Crusader for the Future*, 79.

66 Aurelio Peccei to Carlos A. Mallmann, 10 January 1975, Box 55, Folder 2098, Wilson Papers.

67 The Fundación Bariloche had hoped to receive an official resolution or approval of the CoR, but following the CoR's Berlin meeting in October 1974, Fundación representatives gained the impression that the CoR did not fully endorse its approach and declined to include an official commentary of the CoR leaders. See Jorge. A. Sabato to Carlos A. Mallmann, 11 December 1974, Box 55, Folder 2098, Wilson Papers.

68 Carlos A. Mallmann to Maurice Strong, 23 September 1976, Box 69, Folder 668. Maurice F. Strong Papers. Environmental Science and Public Policy Archives, Harvard College Library.

69 Jacques Havet, "UNESCO Secretariat," in *Models, Planning and Basic Needs,* ed. Sam Cole and Henry Lucas (Oxford: Pergamon, 1979), xv–xvi. Here xv.; Meadows et al., *Groping in the Dark*, 46.

> One of the defects of the Limits to Growth model is that it can say little about the differences in the behaviors of various regions of the world because the model is essentially global. Gaps between developed and developing countries and even within the same country, however, are so wide that the existence of such gaps may be considered in itself one of the most serious worldwide problems.[70]

These gaps only widened further in the context of the first oil crisis, which broke out in late 1973. In February 1974, Peccei organized an informal meeting to discuss the "world *problématique*" and North-South issues in Salzburg, which brought together half a dozen CoR members with six heads of state. The latter, whom Peccei had personally approached, were deliberately chosen from smaller countries, such as Mexico and Senegal, plus representatives from Algeria and Pakistan.[71]

Conversations in Salzburg informed the CoR's largely overlooked follow-up report to *Limits.* CoR members Mihaljo Mesarovic and Eduard Pestel attended the meeting, having just completed a draft of a report entitled *Mankind at the Turning Point*, which was subsequently revised in light of proceedings at Salzburg.[72] Unlike the generalized predictions of *Limits*, this "Second Report to the Club of Rome" again used computer modeling, but did so to provide an aid for policymakers to evaluate their future strategies. The World Integrated Model, as it became known, reflected Pestel's and Mesarovic's concerns with the monolithic World3 model and the techno-pessimist arguments of *Limits.* Rather than treat the planet in its totality, *Mankind at the Turning Point* disaggregated the world into seven interdependent sub-regions, thus allowing growth in underdeveloped areas to be offset by no-growth in more developed areas. While still concerned with collapse, they did not argue against growth but introduced the concept of healthier "organic growth" within the bounds of the global system. Together, these features were designed to allay concerns about "zero growth" in the Third World. To avoid "world-shattering catastrophes," they argued, the gaps "at the heart of mankind's present crises: the gap between "North and South," rich and poor" needed to be bridged.[73] The revised *Mankind at the Turning Point* report was then presented at the CoR's general assembly in Berlin in October 1974, along with three other computer modeling studies that had been supported by the Club in the second phase of

70 Club of Rome: Technical Symposium, Tokyo, Japan, 24–25 October 1973, Box 55, Folder 2109, Wilson Papers.

71 Alexander King, "The Club of Rome: A Case Study of Institutional Innovation," *Interdisciplinary Science Reviews* 4, no.1 (1979): 54–64.

72 Eduard Pestel, "Modellers and Politicians," *Futures* 14, no.2 (1982): 122–128.

73 Mihajlo D. Mesarović and Eduard Pestel, *Mankind at the Turning Point: The Second Report to the Club of Rome* (New York: Dutton, 1974), ix.

its *Predicament of Mankind* project: North-South Economic Relationships and Industrial Transfer by a Japanese team, the World Food Model of Hans Linnemann, and the Latin American World Model.[74] More generally, the CoR made a pronounced effort to diversify participation at its Berlin meeting the following October by inviting more attendees from the Third World, including Africa.

Even before these overtures, African leaders had engaged with the implications of *Limits*. At a colloquium on Third World industrialization in Dakar in 1972, Senegal's president, Léopold Senghor, challenged the implications of the CoR's report. Reframing its essential *problématique*, Senghor argued that the issue was not growth itself, but rather "a certain *type* of growth, which generates waste and tensions." Those problems would not be resolved until the West recognizes that the Third World was "entitled to develop."[75] The conclusions *of Limits*, he told an interviewer, were a problem for the West. "Western man stuffs himself with fat and sugar: we have not yet reached that stage," Senghor said. "We need a minimum of growth."[76] Once again reflecting the interpersonal connections between the CoR and dissenters to its landmark, Senghor became drawn into Peccei's circles and attended the Salzburg meeting of heads of state.

Where, though, was this renewed growth to come from? Whereas other African states had sought to build socialist economies around principles of self-reliance after independence, Ivory Coast, like Senghor's Senegal, had welcomed foreign investment, especially from France. Its minister of planning, Mohamed Tiékoura Diawara, believed that Africa needed to cooperate with European industry, rather than challenge it, to facilitate the transfer of technological capital and restructure African economies around export-led growth. At the Dakar colloquium in 1972, he proposed that an international group of experts be drawn from the public and private sectors to reflect on these challenges.[77] Against the backdrop of a worsening global economic situation over the next two years, Diawara recruited members into his venture, with Senghor's blessing.

Launched in the Senegalese capital in December 1974, the Club de Dakar was clearly inspired in form and name by the CoR. Indeed, Diawara cited the impact of

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74 Roberto Vacca, Some Operational Considerations Prompted by the Club of Rome Symposium Held in Berlin, 24 November 1974, Box 55, Folder 2112, Wilson Papers.

75 Léopold Sédar Senghor, "Statement by the President of the Republic of Senegal," in Republic of Senegal and CEDIMOM [European Centre for Overseas Industrial Progress and Development], *Colloque international sur le développement industriel africain, Dakar, 20–25 novembre 1972* (Dakar: Nouvelles Editions Africaines, 1973), 279–280.

76 Oltmans, *On Growth* II, 107.

77 Diawara, Mohamed T. "Étude des voies et moyens pratiques de l'industrialisation en Afrique," in *Colloque international*, 131–39.

the CoR on European public opinion as evidence for the importance of "kindling ideas capable of stimulating minds [*frapper les esprits*]."[78] Like the CoR, it was unabashedly elitist, assembling prominent politicians, businessmen, scientists, economists, and technocrats from mostly Western Europe and Western Africa. They touted the "club" model as a fresh form of internationalist thinking which could transcend the deadlocked, confrontational politics of the North-South debate that dominated the 1970s. There was significant overlap between the European membership of the two groups. Peccei himself was invited to become a member of the Club de Dakar (though his actual contribution appears to have been nominal). Members took their cue from the Fundación Bariloche, too. The Burkinabé historian Joseph Ki-Zerbo had attended the CoR general assembly in Berlin two months earlier. He told the audience in Dakar that he had been impressed by representatives of the Fundación, whose work he said aimed "to define a new type of social and civilizational development in Latin America."[79]

Yet Club de Dakar members were also keen to differentiate themselves from their Roman counterpart. The Club de Dakar's principal members emphasized their distinctive mission. "The Club de Dakar is not the African twin of the Club of Rome," stressed the French futurologist and dual club member Pierre Piganiol.[80] Rather than diagnose the causes of global inequalities and particularly underdevelopment in Africa, the Club de Dakar set out to develop solutions to address them. Following Diawara's own vision, members concentrated on how the expatriation of European capital investment to Africa would regenerate growth on both continents that had broken down amid the economic turmoil of the 1970s. Whereas *Limits* had rung alarm bells about global demographic growth, Diawara argued that the African continent's young population represented an untapped pool of labor which could be harnessed by capitalists from the developed world through investment in industries based in Africa. Over time, this would enable the transfer of technology and expertise to African economies, providing them with a stronger basis for export-led growth. This would alleviate racial tensions in Europe created, as Diawara saw it, by the influx of migrant workers from the former colonies.[81] This emphasis on externally financed industrialization sat

78 Siradiou Diallo, "Mohamed Diawara: l'imagination au service du développement," *Jeune Afrique*, 28 December 1974, 65.

79 Club de Dakar, Réunions constitutives: compte rendus des débats', Dakar, 2–3 December 1974, mimeograph, 86, 93.

80 Pierre Piganiol, "Le 'Club de Dakar' veut favoriser un développement harmonieux de la production africaine," *Le Figaro*, 14–15 December 1974.

81 This general argument can be found throughout press coverage of the Club de Dakar and its own publications. See for example Diallo, "Mohamed Diawara."

alongside a more general blueprint for global economic redistribution, which shared much ground with the principles of the New International Economic Order. Technology, in this sense, was conceived much more in terms of the transfer of industrial machinery for manufacturing, rather than computer-driven modeling.

Drawing on the distinctive trajectories of Senegal and Ivory Coast since independence, the Club de Dakar linked national development to an openness to foreign investment. The French economist Maurice Guernier, another dual Rome/Dakar member, had previously argued that the Third World must abandon its "outdated socialist anticapitalist complex," since industrial progress was impossible "without a massive appeal to foreign industries [...] for they alone have the necessary dynamism, technical expertise, and sense of organization."[82] In putting this logic into practice, the Club de Dakar explored mechanisms for channeling private industrial investment into Africa. ADELA represented a potential model. Guernier, who had himself been involved in ADELA, suggested that a similar institution "could constitute an interesting solution for African countries if it is shaped by African conditions."[83] The Club's general assembly in Luxembourg in 1977 meeting concluded that SIFIDA (the investment fund set up in 1970) represented a promising institution for achieving the goals of the Club de Dakar, which concluded that "[t]o refuse for ideology's sake investment in one country amounts to giv[ing] up a developmental potential which, impulsed by the search for profit, continually imagines new solutions for existing problems."[84]

The Club de Dakar also took up Peccei's original vision that technology could alleviate the world's problems so long as no region outraced the others in technological development – a vision set aside in *Limits*, which was oft-criticized for neglecting innovation's contribution to overcoming scarcity. Thus, although the Club de Dakar continued to argue the case for global economic redistribution, it also began to explore new avenues opened by technological developments in the North. In 1980, the Club stated that "[t]he new technological revolution, notably computing [*micro-information*] and biotechnology, opens to all the countries of the world the possibility of a new leap forward which can only be collective."[85]

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82 Josué de Castro and Maurice Guernier, "Manifesto for the Third World," *CrossCurrents*, 18, no.1 (1968): 1–10, here 5.

83 Ernst H. Plesser, Activation of Financing for Industrial Development in Africa, report to the Club of Dakar Annual General Assembly, 27–29 November 1978, Libreville, PP MS 53/1/1, William Black-Campbell Papers, Special Collections of the School of Oriental and African Studies, London.

84 Ibid.

85 Club de Dakar, "Une coopération internationale pour sortir de la crise," (1980), PP MS 53/1/1, Black-Campbell Papers.

The Club's general assembly in Vienna in 1981 featured presentations on computing, biotechnology, and information systems, including from IBM. The Club de Dakar did not see the import of such new technologies as a panacea, however. Diawara stressed new technologies needed to be grounded and developed in the specific cultural contexts of Third World countries, to promote not just economic progress, but allowing peoples to develop their "cultural personalities." Following the Vienna meeting, the Club de Dakar identified collaborative research projects on biotechnology, data processing, and new systems of education in the Third World.[86]

The Club's leadership sensed that this engagement with technology offered it new purpose in the rapidly changing international business environment of the early 1980s. Diawara developed a close association with the international technological park at Sophia Antipolis in the Côte d'Azur, which hosted several Club de Dakar seminars that brought together European businesses and African clients. Sophia Antipolis had opened its doors in 1974 as "a utopian vision of a rural *Quartier Latin*, a City of Science of Wisdom" inspired by Silicon Valley.[87] Much like the Club de Dakar, it brought together networks drawn from academic research, industrial capital, and civil service policymakers, with a focus on high-technology activities. The Club also began planning a world fair of technologies for development – Technodev – which would facilitate dialogue between producers and users and provide developing states with a full choice of technological options, which, the Club argued, "in the modern world, is the first condition of any true autonomy." The inaugural Technodev was slated for Paris in 1986.[88]

However, as plans for Technodev were being drawn up, Diawara – the founder, president, and chief animator of the Club de Dakar – was sensationally arrested in 1984 for embezzling regional development funds in West Africa. In truth, the Club had been struggling for a role since the collapse of the North-South debate. But Diawara's conviction and the fifteen-year prison sentence he received from a Burkina Faso court prompted the Club's swift dissolution.[89]

At roughly the same time, the other initiatives surveyed here suffered from the effects of global economic transformation and were marginalized by right-

86 "The Club's work programme 1982," n.d., PP MS 53/1/1, Black-Campbell Papers.

87 Christian Longhi, "Networks, Collective Learning and Technology Development in Innovative High Technology Regions: The Case of Sophia-Antipolis," *Regional Studies* 33, no.4 (1999): 333–342, here 334.

88 "Technodev," 23 September 1983, enclosed in Guillon to Black-Campbell, 23 December 1983, PP MS 53/1/2, Black-Campbell Papers.

89 See Philippe Gaillard, "Les bons placements de Mohamed Diawara," in G*rands procès de l'Afrique contemporaine* (Paris: Jalivres, 1990), 113–137.

ward political turns. Having expanded rapidly with the founding of dozens of "Adelitas," when the post-1973 economy turned, ADELA suddenly found itself on the verge of bankruptcy. No new investments were made after 1980, although the company did not formally close until the 1990s. More dramatically, under the junta that came to power in Argentina in 1976, the Fundación Bariloche was reduced to just fifteen staff members, and its output closely monitored. Many of the LAWM team's members spent years in exile from the right-wing military regimes in Chile and Brazil, as well as Argentina. Although the Fundación Bariloche revived with the fall of the dictatorship in 1983, it did not regain its earlier prominence.

Similarly, the Club of Rome never again attained anything like the notoriety it enjoyed following the publication of *Limits* in 1972. Though Peccei individually remained prominent on the world scene, collectively the focus shifted from the central Club to various national Clubs of Rome, especially those in the US, Canada, the Netherlands, and Japan. Those, in turn, suffered from their countries' rightward political shift around 1980. The USA CoR was closely associated with the Global 2000 report commissioned by the Carter administration, which Ronald Reagan's campaign fiercely criticized. With Reagan's election, USA CoR gradually became moribund, and the other national Clubs declined as well. With Peccei's death in 1984, King attempted to formalize the central Club's operations. However, the transition from charismatic to bureaucratic authority faltered and the Club steadily dwindled.

Conclusions

As the wind came out of the sails of these overlapping organizations, the obscurity into which they meandered might explain the limited interest which historians have shown in them. But recovering their histories shows how, between the 1960s and 1980s, ideas and debates about the role of technology in facilitating development saw both notable continuities and fundamental transformations. The Club of Rome and MIT's landmark study *The Limits to Growth* implied that there had to be limits to economic and population growth in the developing world. But situating this report in a longer historical arc allows us to demonstrate how the ideas and initiatives of the Club of Rome and Aurelio Peccei were rooted in earlier development research and corporate ventures in Latin America in the 1960s. ADELA propagated foreign direct investment and technology transfers as a development model, which Peccei also addressed in his influential 1965 Buenos Aires speech about the impending challenges facing the world. In these early interventions, Peccei and his allies initially argued for economic growth and indus-

trial development but then re-evaluated their arguments about growth in light of the resource scarcity and environmental debates of the 1970s, which were incorporated into the computer modeling of *Limits.*

Facing the critique of *Limits* from the Global South, the Club of Rome supported the critical re-evaluation presented by the Argentine Fundación Bariloche, which in 1976 produced an alternative, regionally nuanced, and explicitly normative computer modeling study that rejected resource limitations, was aimed at fulfilling basic needs, and envisioned the developing world to develop. The Eurafrican initiative of the Club de Dakar, while taking its cue from the Club of Rome, similarly questioned the notion of *Limits* and propagated foreign direct investment and technology-aided industrial development in a conscious echo of ADELA. Even though all of these organizations and their development imaginaries were sidelined in the course of the 1980s, they exemplified the links between technology, environment and development in the 1970s and important influences on the debates that emerged from this nexus. They demonstrate how the belief that technology transfers would (continue to) enable economic growth was challenged by the notion of "limits to growth," but also refined into alternative proposals of technology-aided development that rejected the notion of physical limitations for the developing world.

The interwoven histories mapped out here not only reveal the fundamental conflicts between industrial development priorities and considerations about environmental and planetary limits in the 1970s, but also the link to and persistence of the corporate development model propagated by Peccei, ADELA, and the Club de Dakar. In the end, technology assumed many roles, as technology transfers and innovation were praised for enabling industrial development, but also identified as a problem for creating an imbalance between humans and environment, as well as the developed and developing world. At the same time, the technology of computer modeling became a crucial tool for conceptualizing and simulating the future of growth and development, not only through the Club of Rome's famous *Limits to Growth*, but also through the lesser-known work of the Fundación Bariloche.