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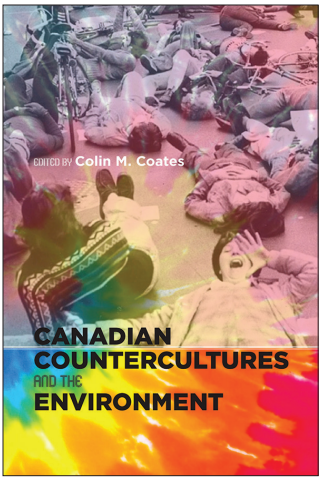

CANADIAN COUNTERCULTURES AND THE ENVIRONMENT

by Edited by Colin M. Coates

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SECTION 2:

PEOPLE, NATURE, ACTIVITIES

7

An Ark for the Future: Science, Technology, and the Canadian Back-to-the-Land Movement of the 1970s

Henry Trim

The future arrived at Spry Point, a secluded area on the eastern end of Prince Edward Island, in September 1976. It came in the form of a "Space Age Ark."[1] A large structure designed to use renewable energy and to provide food for its inhabitants, the Ark bioshelter responded to Canadian concerns about energy use and out-of-control development. This unique building became national news as Premier Alexander Campbell and Prime Minister Pierre Elliott Trudeau flew in by helicopter to attend its opening. Leading members of the "appropriate technology"[2] movement, a goodly number of hippies, and a few somewhat incredulous islanders also attended the opening ceremony, celebrating late into the night.[3] Addressing this diverse group Trudeau proclaimed that the Ark bioshelter would be an example to those who wished "to live lightly on the earth," and Dr. John Todd, the Ark's principal designer, stated that its "small is beautiful" approach

7.1 Opening the Ark on September 21, 1976. Left to right: Premier Alexander Campbell, John Todd, Nancy Jack Todd, Prime Minister Pierre Elliott Trudeau. Source: *An ARK for Prince Edward Island: A Report to the Government of Canada from New Alchemy Institute*, Little Pond, RR4, Souris PEI (902) Cardigan 181, 30 December 1976.

to development would show Canadians how to live within nature's limits.[4]

The Ark, with its space-age technology, scientist designers, and government funding, does not conform to usual expectations of a countercultural project; in fact, it directly challenges the dominant understandings of the counterculture. In 1969, Theodore Roszak—whose work defined initial analysis of the counterculture—described it as a utopian youth movement that opposed Western rationality, particularly science and technology, and sought spiritual enlightenment.[5] Recently, however, historians—led by Fred Turner and Andrew Kirk—have questioned whether romantic youth suspicious of science and technology and out to harass or escape authority really defined the counterculture. The work of these historians has pointed

to a pragmatic side of the counterculture that embraced science and technology and involved scientists, engineers, and government as well as alienated youth.[6]

The Ark challenges those who have applied Roszak's views to the Canadian counterculture.[7] The analysis of this experiment provides a more complete understanding of how some groups employed technological solutions when dealing with environmental challenges. Designed and built by countercultural scientists from the New Alchemy Institute in Cape Cod, Massachusetts, the novel structure highlights the importance of scientific knowledge and technological innovation to the counterculture. For the New Alchemists, this focus on technology proved useful as it expanded the group's influence. In particular, it played an important role in the provincial and federal governments' decision to provide hundreds of thousands of dollars in funding for the Ark. This support also suggests that appropriate technology advocate E. F. Schumacher's small-is-beautiful approach to development in the 1970s enjoyed a substantial degree of popularity among Canadians.[8]

The New Alchemists' technophilia also highlights problems inherent in the counterculture's embrace of technology. Langdon Winner, for instance, has argued that this focus on technology at times became myopic and led some to neglect other avenues for social change.[9] Among the New Alchemists, it inspired technological optimism—specifically, the belief that new technology had the potential to transform Canada into the participatory and sustainable society they desired. This technological optimism resulted in a substantial discontinuity between the New Alchemists' rhetoric and their results, mirroring the broader movement's difficulty in achieving its ambitious goal of setting an example for a better society by going back to the land. Burdened with these high expectations and hampered by technical problems, the Ark would malfunction and disappoint its supporters rather than start the hoped-for transformation of PEI.

Despite its failure, the Ark, and the movement it represented, had a significant impact on Canadian society. Most notably, it helped to introduce Canadians to renewable energy and organic foods as well

as pioneering green architecture, aquaponics, and sustainable farming. As a primogenitor of these developments, and as an example of diversity within the counterculture and the support some of its ideas enjoyed in Canada, the Ark stands as an important piece of Canada's countercultural history. While downplaying the countercultural ethos of the Ark, Alan MacEachern's excellent history of the Institute of Man and Resources and its experiments with renewable energy and alternative development on PEI focuses extensively on the experiment.[10] Expanding upon MacEachern's account, this paper places greater emphasis on the New Alchemists and their technological and countercultural vision, to better connect events on PEI with the wider youth movement and to highlight the importance of technological optimism in the Canadian counterculture.

THE VISION

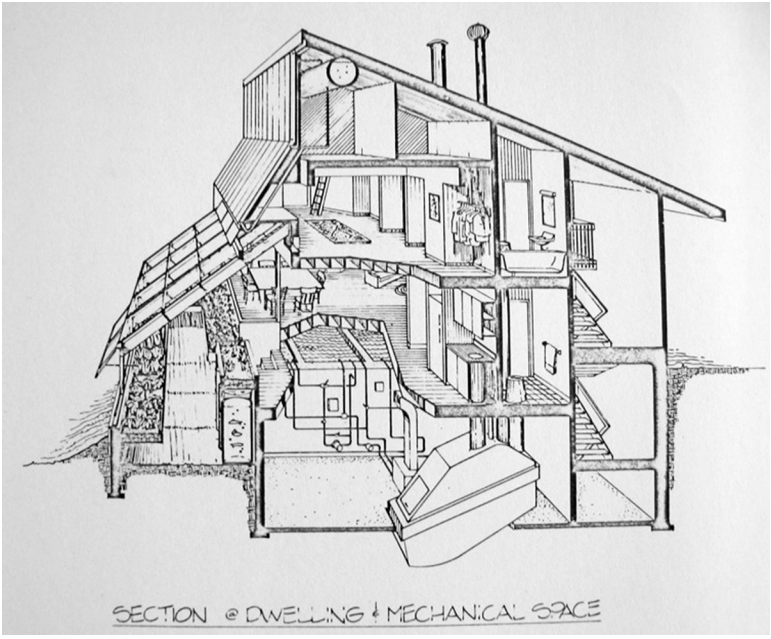
In 1969, Canadian ethologist John Todd and American marine biologist William (Bill) McLarney founded an institute dedicated to providing scientific assistance to the back-to-the-land movement. Motivated both by environmental concerns and by their first-hand experience of the difficulties of going back to the land at a short-lived commune in rural California, the two established the oddly named New Alchemy Institute (NAI).[11] The institute's charter states that the group planned to "engage in scientific research in the public interest on ecologically and behaviourally planned agriculture systems and rural land based communities."[12] As an organization, the NAI united scientists, anti-war protesters, and commune-dwellers to assist in the counterculture's search for social justice and the environmental movement's attempts to protect and restore the environment.[13] To carry out their self-assigned mission, the New Alchemists set up their institute on Cape Cod in 1971, near the Woods Hole Oceanographic Institute, where Todd and McLarney had worked before dedicating themselves full-time to the NAI.[14]

In organizing their institute, the New Alchemists drew heavily upon practices of the counterculture; indeed, they structured it

along the lines of a countercultural commune.[15] Rejecting the hierarchical organization that pervaded the scientific institutions Todd and McLarney had left behind, the NAI adopted an individualistic and egalitarian organizational structure based on the participatory models of the New Left.[16] Every member of the NAI was officially equal and free to pursue what interested him or her. This philosophy attracted members of the counterculture and young scholars who shared Todd's and McLarney's environmental and social concerns and their optimistic view of science and technology. Their fusion of technology and counterculture also enjoyed a good deal of popularity in the 1970s. In fact, the New Alchemists were part of a subsection of the counterculture centred on the *Whole Earth Catalog* that employed a distinctive approach to social and environmental problems.

These "countercultural environmentalists," as Kirk has called them, were enamoured by the possibility of constructing whole systems incorporating man, machine, and nature within a single sustainable structure.[17] In their view, such systems had the potential both to protect the environment and to realize the counterculture's goal of a participatory society. Founded upon arguments popularized by R. Buckminster Fuller and Schumacher, among others, their approach argued that technology had a deep impact on both the environment and society.[18] For them, technology mediated human interactions with nature and formed the foundation of all social structures. Small-scale, easily intelligible technologies, for instance, were viewed as inherently democratic—a form of "technology with a human face"—since they encouraged decentralization and could be understood by everyone.[19] Thus, for these members of the counterculture, technological change played a central role in any social or environmental transformation, since the adoption of new technologies could alter social structures and human relationships with the environment.[20]

Ecology also had a central place in this "countercultural environmentalism." The designs of the New Alchemists and other countercultural environmentalists drew heavily on the systems ecology of Howard T. Odum and Eugene Odum. The Odum brothers employed cybernetics to merge humans, technology, and nature into a single



7.2 Interior of the PEI Ark. Note the spacious rooms and the composting system in the basement connected to the kitchen and bathrooms. Source: *An ARK for Prince Edward Island*.

feedback system.[21] This research suggested the possibility of designing a system to be almost completely self-sufficient, thus sustainable and well suited to a decentralized society. NASA, in fact, attempted something along these lines as it worked with ecologists to design self-contained ecosystems capable of supporting astronauts on lengthy missions.[22] This added further inspiration to countercultural environmentalists' desire for self-sufficient systems. Embracing NASA's research on space capsules as both a design approach and a metaphor for understanding the global ecosystem, Fuller, Stewart Brand, and the *Whole Earth Catalog* helped to popularize the "spaceship earth" concept in the 1960s and 1970s.[23]

The Ark project brought together countercultural environmentalists' ideas about ecology, technology, and society and the back-to-the-land movement's desire to live sustainably on the land in a way that

few other projects did.[24] Building on these ideas, the New Alchemists designed their Ark to achieve the long-standing goal of countercultural environmentalists: to create a technology that allowed back-to-the-landers to combine "agriculture, aquaculture, and power generation . . . to enable [them] to satisfy [their] needs without destroying the resources which provide them."[25] This made the PEI Ark an odd sort of "spaceship to the future," as one journalist dubbed it, since it promised to transport Canadians to a high-tech decentralized society, powered by renewable energy and scientifically managed to maintain the earth's ecological balance.[26] In short, the Ark was to be an elegant method for using technology to remake Canadian society and protect the environment.

GOVERNMENT INTEREST

The 1970s energy crisis provides the essential backdrop for Canadian government interest in the New Alchemists' experiments. In a decade largely defined by the rise of environmentalism and the neo-Malthusian "limits to growth" thesis and oil shocks, advocates of small-is-beautiful ideas were able to force their way into the discussion of Canada's future.[27] Even the Science Council of Canada, an elite technocratic advisory body founded in 1966, became a strong advocate of alternative energy; in 1973, it devised the "conserver society" and championed sustainable development for the rest of the decade.[28] As a result, the question of whether Canada would continue down the "hard technology" and "high energy" path it had followed since the end of World War II or shift toward the "soft technology" small-scale development strategy advocated by countercultural environmentalists became a point of national discussion.[29]

While the energy crisis explains interest in the "conserver society" and renewable energy, three further reasons led federal and provincial governments to fund the New Alchemists specifically. First, Canadian media explained the group's work in very positive terms. Journalist Barry Conn Hughes, for example, told Canadians that the New Alchemists had devised a system "which could feed itself"

without relying on oil.[30] Second, Todd's salesmanship and his ability to fascinate an audience as he expounded upon the bright future of renewable energy and small-is-beautiful development brought him to the attention of Canadian governments and helped him to make contacts in Ottawa and Charlottetown.[31] Finally, and most importantly, Todd's scientific credentials and the New Alchemists' innovative experiments with self-sufficiency carried weight with government officials. For instance, visiting the NAI and talking with Todd convinced Robert Durie, the director of the Advanced Concepts Centre at Environment Canada, that the New Alchemists' work could help Canada deal with its energy needs, and he avidly supported funding the group.[32]

Electoral politics assisted the group as well. As historians Wayne MacKinnon and Alan MacEachern suggest, funding groups such as the New Alchemists allowed Prime Minister Trudeau and Premier Campbell to win support among both environmentalists and members of the counterculture with little risk.[33] In economically depressed Atlantic Canada, funding the New Alchemists' project could also contribute to the Trudeau government's efforts to spark regional economic development.[34] In short, as federal and provincial governments searched for new approaches to energy use and economic development, the countercultural scientists of the NAI seemed to offer credible solutions and possible political gains at little cost.

The New Alchemists' promises had the greatest appeal in PEI. Completely reliant on imported oil, the province faced a bleak future as it seemed that oil prices would climb indefinitely. Oil had jumped from about three dollars a barrel in 1973 to eight dollars a barrel by 1975, making the prospect of further price increases very likely.[35] Concerned by the future of his province, and uneasy about the sustainability of the high-energy society in general, Liberal Premier Campbell and his closest advisor, Andy Wells, began to examine alternative paths of development.[36] The decentralized and small-scale approach advocated by Schumacher became Wells's and Campbell's preferred approach to island development.[37] This small-is-beautiful development model emphasized renewable energy, local resources,

and simple, labour-intensive technologies.[38] Eager to begin experimenting with strategies for alternative development, Campbell began calling for greater support for renewable energy at the federal level.[39] In PEI, he founded the Institute of Man and Resources (IMR), a research institution meant to spearhead the development of renewable energy and locally appropriate industry. The IMR quickly launched Energy Days, a four-day investigation and discussion of PEI's energy future and Canada's energy options held in the summer of 1976.[40] These efforts gained results as Ottawa agreed to fund the development of renewable energy on the island early in 1977.[41] Although largely forgotten outside the province, the Canada-PEI Agreement on Renewable Energy Development briefly made PEI a leading centre of renewable energy research and development within Canada.[42]

During this push to investigate and experiment with alternatives, Campbell and Wells invited the New Alchemists to set up an institute in PEI. Initial funding came from Environment Canada and Urban Affairs Canada through Canada's UN Habitat 1976 project.[43] The Ark's proposed self-contained food-producing systems fit well with Habitat's focus on sustainable urban development, giving the two ministries and the province of PEI an opportunity to share the costs of a project that was of interest to all.[44] With funding secured, the New Alchemists' Ark quickly became a central, or at least the most publicized, component of PEI's efforts to apply small-is-beautiful thinking to the challenges of the energy crisis.[45]

Todd pragmatically seized the opportunity to work with the provincial and federal governments and gain access to the funds necessary to make his ideas a reality. Optimistic about the project, Todd promised that the New Alchemists would provide Prince Edward Islanders with a low-cost ecologically derived structure "designed to sustain their food, shelter, and power needs."[46] With such statements about the Ark, Todd downplayed its experimental nature and portrayed it as a straightforward solution to the problems facing islanders. The financing the Ark received illustrates the important role the Canadian federal and provincial governments occasionally played in the Canadian counterculture and back-to-the-land movement.

However, this support exposed the movement to public scrutiny. If groups such as the New Alchemists could not achieve their stated goals, they risked dismissal as failures and squanderers of public funds.

PUBLIC VS. PRIVATE

In 1975, even before construction of the Ark, the New Alchemists began to have problems. The first was a clash of cultures between conventional islanders and the countercultural New Alchemists.[47] Attempting to assuage local fears, Todd and his colleagues held town hall meetings to explain the New Alchemists' work and their desire to assist the small-scale farming communities on PEI with their research at the forthcoming Ark. Most islanders, however, remained unconvinced that the New Alchemists' work would be of any use to them and were suspicious of the primarily American group that had landed in their midst. Such tension between locals and back-to-the-land groups did not occur everywhere, but when it did, it could easily derail countercultural attempts to construct a better future.[48]

Problems with the public continued as the Ark gradually took shape over the summer of 1976, stemming primarily from the New Alchemists' complete surprise at the nation-wide interest in their work and their inability to benefit from this attention.[49] Curious locals, tourists, and travelling hippies visited the site, interested in the odd futuristic structure and the reasons for its construction. This level of interest in a solar- and wind-powered structure may seem odd today, but it was the first building of its kind in Prince Edward Island and one of the very first "green" buildings in Canada. Unfortunately, rather than engaging visitors, the New Alchemists worried that they would not complete construction on schedule; trying to stretch their resources as far as possible, they responded by putting up signs instructing visitors not to talk to the carpenters.[50]

Canadians' curiosity grew even greater after the Ark opened, as the grand opening, attended by Prime Minister Trudeau, generated national media coverage. Stories about the Ark and its promise of a

7.3 The PEI Ark viewed from the south. The greenhouse is in the right foreground and the living area in the left background. Source: *An ARK for Prince Edward Island*.

sustainable future quickly appeared in national and regional magazines such as *Chatelaine*, *Harrowsmith*, and the *Atlantic Advocate*.[51] In response, thousands visited the Ark every year, and it became something of a pilgrimage site among the back-to-the-land movement. Unable to cope with this number of visitors and still carry out their research, the New Alchemists living and working in the Ark began barring the gate in an attempt to restrict visitation to Wednesday afternoons and Sundays. This seemed a reasonable decision from their perspective, since they saw the Ark as a private research facility and believed the research they conducted there would lead to a broader social and environmental transformation of the island. By dismissing visitors to focus on developing their technology, the New Alchemists

7.4 The PEI Ark's greenhouse. The large plastic cylinders are solar algae ponds for raising fish and moderating the greenhouse temperature. Source: *An ARK for Prince Edward Island*.

passed up a rare opportunity to build public support for their work and their goals of social transformation.

Unsurprisingly, this disregard frustrated those interested in the Ark. The New Alchemists' stance particularly rankled because they had received government funding to demonstrate self-sufficient methods of living. Curious to see what their tax dollars had paid for, visitors viewed the Ark as a fully public facility, and they responded to the New Alchemists' limitation of visitation by demanding entry to the Ark. When New Alchemists tried to turn away *Harrowsmith* reporter David Lees, even this ardent supporter of the back-to-the-land movement argued that his taxes granted him a right to enter the building.[52]

Confusion over whether the Ark was a private research facility or a public site stemmed partly from the differing goals of the New Alchemists and Canada's federal and provincial governments. The New Alchemists, seeing their mission as one of research and development, had little interest in using the Ark as a demonstration project for renewable energy and sustainable living; however, demonstration played a key role in their federal sponsors' hopes that the Ark would help to educate Canadians about these issues.[53] An emphasis on demonstration pervaded the press coverage of the Ark as well. Constance Mungall's article in *Chatelaine*, for example, depicted the Ark as a domestic space that represented a new type of home for Canadians.[54] Confusion over its goals also led to internal conflicts between New Alchemists and their provincial managers in the IMR.[55]

This conflict came to a head in late 1977. Frustrated by the never-ending stream of visitors into their home and workspace, David Bergmark and Nancy Willis—the New Alchemists who had been living in the Ark to assess its utility as a house—moved out. With their departure, the hope that the Ark would showcase sustainable family living ended. The couple's departure undermined a fundamental reason for the building the Ark and damaged the province's faith in the countercultural group's ability to run the structure successfully.

TECHNOLOGIES

While the New Alchemists faced difficulties with the public and confusion about their mission, considerable problems also beset the technologies they attempted to develop. In fact, despite Todd's downplaying of the Ark's experimental nature and his assurances that earlier prototypes had perfected the technology, the structure never functioned properly. Designed using a "spaceship approach," the Ark recreated the intricate systems of a stable ecosystem.[56] The New Alchemists believed their design would allow them to mimic the self-sufficiency of natural ecosystems while providing food and shelter for its inhabitants.[57] The New Alchemists also hoped the design would demonstrate that Canadians could live within the limits of a

closed ecosystem. Drawing inspiration from Schumacher, the New Alchemists saw the Ark as an "adaptive structure" capable of transforming Canada into a sustainable and participatory society.[58]

At the core of the Ark lay a solar greenhouse irrigated by an interconnected series of fishponds. The focus of years of research at the NAI, the solar greenhouse's combined aquaculture and agriculture system worked very well.[59] In an elegant system of the New Alchemists' own devising, the aquaculture ponds played a central role in a managed nutrient cycle: pond water fertilized plants while plants and bacteria filtered the pond water for fish. To ensure that the system continuously recycled nutrients as effectively as possible, the New Alchemists managed their greenhouse system entirely without pesticides or synthetic fertilizers.[60] Although not quite "the world that feeds itself" that some claimed, the New Alchemists' integrated system recorded substantial levels of fish and vegetable production with minimal inputs.[61]

Unfortunately, not everything worked quite so well for the New Alchemists. Embarrassingly for the group, some of the technological components, which they claimed to have thoroughly tested, failed to function. The integrated systems of the Ark exacerbated these problems as the building's complex internal feedback systems conflicted with each other, further damaging its operation. One of these malfunctioning subsystems was the solar heating and air circulating system. In an effort to understand and manage these systems, the New Alchemists installed a state-of-the-art computer in 1976.[62] At the time, computers were expensive and delicate pieces of hardware largely unknown outside science labs. The installation of one pushed the cost of the Ark into the hundreds of thousands of dollars, far beyond the means of most Canadians. Although necessary, installing the computer weakened the credibility of the New Alchemists, since they had always claimed that their technology could easily be adapted for broad adoption. Indeed, this had been the fundamental point of the Ark's "adaptive" design and the method through which they hoped to change Canadian society.[63] The structure's complexity also meant that managing it required a considerable degree of training

and knowledge, which further undermined the New Alchemists' stated desire to produce easily intelligible technologies that everyone could use.

Even more damaging to both the Ark and the New Alchemists' reputation was the failure of the Ark's wind turbines. Meant to demonstrate the Ark's self-sufficiency and launch the island toward a wind energy program, the turbines were central to the New Alchemists' research as well as to the broader small-is-beautiful development program for PEI.[64] Wells, for instance, specifically highlighted the New Alchemists' turbines when discussing the Ark with islanders, arguing that the turbines had the potential to start a wind industry on PEI.[65] Completely designed by the New Alchemists, the turbines employed a novel system using hydraulics to control the blades and generate electricity.[66] In an effort to construct the Ark as quickly as possible and meet the September opening deadline set by Prime Minister Trudeau, the New Alchemists deployed their experimental turbine without extensive testing.[67] Overwhelmed by PEI's high winds, the turbine's untested hydraulics soon seized up, forcing the Ark ignobly to draw electricity from PEI's grid.[68]

As frustrating as these failures were, they might not have damaged the project had Todd not optimistically assured locals of success nor consistently de-emphasized the experimental nature of the Ark. With expectations further raised by the initially laudatory media attention, Prince Edward Islanders expected great things from the Ark. Instead, the Ark experienced a cascade of problems, as experiments often do. For islanders who had been all but promised success, and even a new industry, the malfunction of the New Alchemists' turbines and the Ark's reliance on PEI's grid defined the project as a failure.

A degree of prejudice among some islanders also sped their dismissal of the Ark. As Wells later recalled in an interview, some islanders harboured deep suspicions about the small-is-beautiful approach and happily criticized the Ark at every opportunity.[69] Jim MacNeil, the editor of the *Eastern Graphic* and the unofficial leader of skeptical islanders, had been critical of the Ark from the very beginning. His editorial on the opening of the Ark focused on the fuel wasted by

flying Trudeau to the opening ceremony.[70] With the very public airing of the Ark's growing problems, the structure's $354,000 price tag and the tens of thousands of dollars spent on annual costs began to rankle.[71] By 1978, the New Alchemists faced suggestions in the local press that they had wasted tax dollars and even swindled the Canadian government.[72] This bad press, compounded by the New Alchemists' fumbling public relations and narrow focus on research, did little to change islanders' view of the Ark, and the project gradually turned from an asset to a political liability that threatened the provincial government's hopes for a small-is-beautiful approach to development.[73]

Disenchanted by the partial successes of the New Alchemists, Environment Canada distanced itself from the Ark and began to withdraw funding from the program in 1978.[74] Faced with financial difficulties and increasingly strict oversight from the IMR, along with mounting technical and public relations problems, the New Alchemists decided to abandon their work at the PEI Ark and concentrate instead on their institute at Cape Cod. In February 1978, they handed over the Ark to the IMR.[75] This marked the end of the New Alchemists' time on PEI and the end for one of Canada's best-known examples of the small-is-beautiful approach to development.

The Ark itself continued to function for another two years, under the direction of Ken MacKay, a biologist the IMR hired to take over its supervision. Research into organic gardening, non-chemical pest control, and small-scale aquaculture as well as tours and demonstration projects continued with relatively little interruption. However, with government money for novel solutions to the energy crisis drying up and the election of a new and unfriendly provincial government in 1980, the Ark entered a period of financial limbo; it closed permanently in 1981.[76] After sitting vacant for nearly two decades, the Ark was demolished in 2000 to make room for the Inn at Spry Point.[77]

CONCLUSION

Despite its ultimate failure, the PEI Ark had a considerable impact during the 1970s and left a significant legacy. In the turbulent 1970s,

the Ark helped to popularize the concepts of renewable energy and sustainability among Canadians. Environmental groups showed particular interest in the New Alchemists' work, as it seemed to offer a reasonable solution to pressing concerns about natural limits and energy conservation. In fact, Pollution Probe of Toronto put many of the New Alchemists' ideas to work in their ecology house project, which included both energy conservation and a solar greenhouse.[78] Research conducted at the Ark also led directly to improvements in natural pest control, a significant development for organic gardeners and farmers.[79] The New Alchemists even briefly enjoyed a reputation as national experts on renewable energy and sustainability. When the Department of Energy, Mines, and Resources began to consider a federal program for renewable energy in 1977 it sought out Todd to serve on the National Advisory Committee on Conservation and Renewable Energy.[80] In short, the Ark became a widely known, if flawed, example of the small-is-beautiful approach in Canada.[81]

The New Alchemists themselves learned a great deal from the Ark and its problems. Immediately following their departure from PEI, the group began to distance themselves from their overly optimistic goal of self-sufficiency. Instead, they concentrated on what had worked in the Ark—the solar greenhouse with its combined aquacultural and agricultural systems—and used this "living technology" to design ecologically sustainable urban farming and waste management systems.[82] Marking the completion of this transition in 1981, the New Alchemists published a special issue of their journal focused on urban agriculture and solar design.[83] In fact, the feedback loops designed into the Ark's greenhouse directly prefigured the emergence of "aquaponics," a highly efficient approach to greenhouse agriculture that combines aquaculture and hydroponics.[84] Building on their work on the PEI Ark, John Todd and Nancy Jack Todd went on to play a significant role in the American "green architecture" movement.[85]

Beyond their direct and indirect legacies, the New Alchemists and their Ark encourage historians of the counterculture and the back-to-the-land movement to recognize the important role science and technology played within both. Together, science, technology, and the

counterculture shaped how countercultural environmentalists, such as the New Alchemists, attempted to change Canadian society for the better. Besides revealing the technological side of the counterculture, the Ark's failure warns against technological optimism and underlines the importance of local politics and social engagement to any attempt to effect social change. The example of the New Alchemists also reveals the maturity and pragmatism of the Canadian counterculture and back-to-the-land movement. Ready to work with provincial and federal governments to further their goals, the New Alchemists were not the young, romantic, anti-authority hippies who too often overshadow images of the Canadian counterculture. The history of the Ark also illustrates the different levels of government recognition of the counterculture and the concerns of governments as they directly supported some of the efforts to change Canadian society and protect the environment. This willingness, particularly on the part of Premier Campbell, demonstrates the influence of small-is-beautiful ideas during the crisis-wracked 1970s as one of Canada's provinces made such ideas a central part of its energy and development policy.

NOTES

1 Constance Mungall, "Space Age Ark: A Brave New Home," *Chatelaine*, November 1977, 52–53, 103–9.

2 The appropriate technology movement combined an antipathy towards large technological systems, such as nuclear power, with a belief that small technologies, such as solar panels, could both protect the environment and rejuvenate society. Its most prominent leader was E. F. Schumacher, while Stewart Brand's *Whole Earth Catalog* provided its main voice. For a general discussion of the appropriate technology movement, see Jordan Kleiman, "The Appropriate Technology Movement in American Political Culture" (PhD diss., University of Rochester, 2000).

3 Nancy Jack Todd, "The Opening of the Arks," *Journal of the New Alchemists*, no. 4 (1977): 10–17.

4 Stewart Brand, "From Urgencies to Essentials," *CoEvolution Quarterly*, no. 13 (Spring 1977): 166–67; N. Todd, "The Opening of the Arks,"16; Alan MacEachern, *The Institute of Man and Resources: An Environmental Fable* (Charlottetown, PEI:

Island Studies, 2003), 35; Andrew Kirk, *Counterculture Green: The Whole Earth Catalog and American Environmentalism* (Lawrence: University of Kansas Press, 2007), 147.

5 Theodore Roszak, *The Making of a Counterculture: Reflections on the Technocratic Society and Its Youthful Opposition* (New York: Anchor, 1969).

6 Kirk, *Counterculture Green*, 12; Fred Turner, "Where the Counterculture Met the New Economy: The WELL and Origins of Virtual Community," *Technology and Culture* 46, no. 3 (2005): 485–512; Fred Turner, *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (Chicago: University of Chicago Press, 2006); Peter Braunstein and Michael William Doyle, "Introduction: Historicizing the American Counterculture of the 1960s and '70s," in *Imagine Nation: The American Counterculture of the 1960s and '70s*, ed. Peter Braunstein and Michael William Doyle (New York: Routledge, 2002), 1–14.

7 Roszak's misinterpretation of the counterculture has influenced some important Canadian analyses. See Brian Palmer, *Canada's 1960s: The Ironies of Identity in a Rebellious Era* (Toronto: University of Toronto Press, 2009), 205–9; and Doug Owram, *Born at the Right Time: A History of the Baby Boom Generation* (Toronto: University of Toronto Press, 1996), 185–87.

8 E. F. Schumacher, *Small Is Beautiful: A Study of Economics as if People Mattered* (London: Blond & Brigs, 1973). Schumacher's ideas were often combined with energy analyst Amory Lovins's "soft path" to form a relatively well-developed alternative approach to economic and energy development. Amory Lovins, *Soft Energy Paths: Toward a Durable Peace* (San Francisco: Friends of the Earth, 1977). The "small is beautiful" approach adhered to a few fundamental concepts that both the New Alchemists and PEI's provincial government regarded as important. The most fundamental principle was that a network of small, simple technological systems was both more efficient and more durable than a large, complex, centralized technology. Networks of simple technologies, according to the theory, also had the added advantages of encouraging extensive local development and increasing local political power as well as decreasing environmental impacts. A good illustration of this approach can be seen in the comparison of a nuclear power plant with a network of user-operated photovoltaic arrays and solar heaters. Both systems provide electricity and heat but use a very different organizational approach, with divergent levels of technological complexity, and have (theoretically) contrasting political consequences.

9 Langdon Winner, *The Whale and the Reactor: The Search for Limits in an Age of High Technology*

(Chicago: University of Chicago Press, 1986), 58–84.

10 See MacEachern, *Institute of Man and Resources*. I would also like to thank Dr. MacEachern for his assistance with the research for this paper.

11 John Todd, "Introduction," *New Alchemy Institute Bulletin*, no. 1 (Fall 1970): 1; John Todd, "The New Alchemists," in *Design Outlaws on the Ecological Frontier*, ed. Chris Zelov and Phil Cousineau (Easton, PA: Knossus, 1997), 175.

12 New Alchemy Institute, *Articles of Incorporation*, San Diego, CA, 1970, box 1, folder 11, New Alchemy Institute Records, MS 254, Special Collections, Iowa State University Library, Ames, Iowa.

13 Nancy Jack Todd, "Readers Research Program," *New Alchemy Newsletter*, no. 1 (Spring 1972): 11; John Todd, "A Modest Proposal," *New Alchemy Institute Bulletin*, no. 2 (Spring 1971): 1–12.

14 Nancy Jack Todd, "New Alchemy Institute—East: Cape Cod," *New Alchemy Newsletter*, no. 1 (Spring 1972): 4.

15 Timothy Miller, *The 60s Communes: Hippies and Beyond* (Syracuse: Syracuse University Press, 1999), 139–42, 149–50.

16 John Todd, "Realities from Ideas, Dreams and a Small New Alchemy Community," *New Alchemy Newsletter*, no. 2 (Fall 1972): 5–6. For a discussion of Cold War universities, see Rebecca Lowen, *Creating the Cold War University: The Transformation of Stanford* (Berkeley: University of California Press, 1997). For a discussion of the participatory models of the New Left, see Francesca Polletta, *Freedom Is an Endless Meeting: Democracy in American Social Movements* (Chicago: University of Chicago Press, 2002), 122–30; and Myrna Kostash, *Long Way from Home: The Story of the Sixties Generation in Canada* (Toronto: J. Lorimer, 1980), 7–8, 133–34.

17 Kirk, *Counterculture Green*, 17.

18 Schumacher, *Small Is Beautiful*, 21, 167; R. Buckminster Fuller, *Operating Manual for Spaceship Earth* (Carbondale: Southern Illinois University Press, 1969). See also Lewis Mumford, "Authoritarian and Democratic Technics," *Technology and Culture* 5, no. 1 (1964): 1–8; Jacques Ellul, *Technological Society*, trans. John Wilkinson (New York: Vintage, 1964); Barry Commoner, *The Closing Circle: Nature, Man, and Technology* (New York: Knopf, 1971); and Herbert Marcuse, *One Dimensional Man: Studies in the Ideology of Advanced Industrial Society* (Boston: Beacon, 1964).

19 Schumacher, *Small Is Beautiful*, 138.

20 There is some debate over the degree to which the appropriate technology movement actually held deterministic views, but it is beyond the scope of this paper. See Frank Laird, "Constructing the Future: Advocating Energy Technologies in the Cold War," *Technology and Culture* 44, no. 1

(2003): 27–49; Langdon Winner, "The Political Philosophy of Alternative Technology," *Technology in Society* 1, no. 1 (1979): 75–86.

21 Sharon Kingsland, *Evolution of American Ecology, 1890–2000* (Baltimore: Johns Hopkins University Press, 2005), 190–92; Howard Odum, *Environment, Power, and Society* (New York: Wiley-Interscience, 1970); Eugene Odum, *Fundamentals of Ecology*, 3rd ed. (Philadelphia: Saunders, 1971).

22 Kirk, *Counterculture Green*, 170–81; Allen Brown, "Regenerative Systems," in *Human Ecology in Space Flight*, ed. Doris Calloway (New York: New York Academy of Sciences, 1963), 82–119, esp. Eugene Odum's comments on 85–87.

23 Peder Anker, "Ecological Colonization of Space," *Environmental History* 10, no. 2 (2005): 239–68. Fuller's compelling vision inspired the architecture of many other designs similar to the New Alchemists' Ark, such as the recent Eden Project in Britain. See Nicholas Grimshaw, *The Architecture of Eden* (London: Eden Project, Transworth, 2003).

24 Robert Angevine, Earle Barnhart, and John Todd, "New Alchemy's Ark: A Proposed Solar Heated and Wind Powered Greenhouse and Aquaculture Complex Adapted to Northern Climates," *Journal of the New Alchemists*, no. 2 (1974): 35–44.

25 J. Todd, "Introduction," 1–2; Nancy Jack Todd, "Bioshelters and Their Implications for Lifestyle," *Habitat International* 2, nos. 1–2 (1977): 87–100.

26 Walter Stewart, "The Ark: PEI's Spaceship to the Future," *Atlantic Advocate*, September 1976, 42–44.

27 Barry Conn Hughes, "The World that Feeds Itself," *Canadian Magazine*, 9 February 1974, 2–6; Harry Bruce, "Gardener of the Gulf: The Greening of Alex Campbell and the Preserving of PEI," *Canadian Magazine*, 3 April 1976, 4–8; Lynne Douglas and Martha Pratt, eds., *Energy Days*: *Proceedings of an Open Seminar of the Legislative Assembly of Prince Edward Island* (Charlottetown, PEI: Institute of Man and Resources, 1976); Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, and William Behrens III, *The Limits to Growth* (New York: Universe, 1972).

28 Science Council of Canada, *Natural Resource Policy Issues in Canada* (Ottawa: Science Council of Canada, 1973), 39; Science Council of Canada, *Canada as a Conserver Society: Resource Uncertainties and the Need for New Technologies* (Ottawa: Science Council of Canada, 1977).

29 Hughes, "The World that Feeds Itself"; Bruce, "Gardener of the Gulf." Amory Lovins popularized the terms "hard technology," "high energy," and "soft technology" during the 1970s, and they were widely used to discuss energy policy during the decade. See Lovins, *Soft Energy*

Paths. Perhaps the best example of the application of Lovins's soft path to Canada is a study carried out by Friends of the Earth for the Department of Energy, Mines, and Resources in 1983. David Brooks, Ralph Torrie, and John Robinson, *2025: Soft Energy Paths for Canada* (Ottawa: Energy, Mines, and Resources, 1983).

30 Hughes, "The World that Feeds Itself."

31 Andy Wells, interview by Alan MacEachern, 27 July 1999, series 11, IMR Fonds, Prince Edward Island Public Archives, Charlottetown (hereafter IMR Fonds).

32 Robert Durie to John Todd, 28 October 1974, Background 1974–1981, series 5, subseries 2, IMR Fonds.

33 Alan MacEachern, *Institute of Man and Resources*, 35–36; Wayne MacKinnon, *Between Two Cultures: The Alex Campbell Years* (Stratford, PEI: Tea Hill, 2005), 244–45.

34 Donald Savoie, *Visiting Grandchildren: Economic Development in the Maritimes* (Toronto: University of Toronto Press, 2006), 85–86.

35 MacEachern, *Institute of Man and Resources*, 62. For a discussion of Canada energy policy, see G. Bruce Doern and Glen Toner, *The Politics of Energy: The Development and Implementation of the NEP* (Toronto: Methuen, 1985); and John Fossum, *Oil, the State, and Federalism: The Rise and Demise of Petro-Canada as a Statist Impulse* (Toronto: University of Toronto Press, 1997).

36 Bruce, "Gardener of the Gulf"; MacKinnon, *Between Two Cultures*, 239.

37 Alexander Campbell, "The Politics of Power," 16 June 1976, PEI Speeches Vertical File, PEI Collection, Robertson Library, University of Prince Edward Island, Charlottetown (hereafter PEI Collection); Alexander Campbell, "An Energy Strategy for Prince Edward Island," 19 January 1977, PEI Speeches Vertical File, PEI Collection.

38 Schumacher, *Small Is Beautiful*, 145–47.

39 MacEachern, *Institute of Man and Resources*, 20–21.

40 See Lynne Douglas and Martha Pratt, eds., *Energy Days: Proceedings of an Open Seminar of the Legislative Assembly of Prince Edward Island* (Charlottetown, PEI: Institute of Man and Resources, 1976). Discussions of "conservation," "energy alternatives," and "energy futures" are of particular note. John Todd, Amory Lovins, and George McRobbie (who worked closely with Schumacher) led the discussion of "energy futures."

41 MacEachern, *Institute of Man and Resources*, 33.

42 Canada-PEI Agreement on Renewable Energy Development, 1 October 1976, Phase II File, 1976–1980, series 3, subseries 4, IMR Fonds.

43 John Todd, "An Ark for Prince Edward Island: A Family Sized

Food, Energy and Housing Complex including Integrated Solar, Windmill, Greenhouse, Fish Culture and Living Components," New Alchemy Institute Vertical File, PEI Collection.

44 United Nations, *UN-Habitat* 12, no. 2 (2006): 4, 16; MacEachern, *Institute of Man and Resources*, 23.

45 Robert Durie, "Technical Review Meeting: Ark for Prince Edward Island," New Alchemy Institute Vertical File, PEI Collection.

46 J. Todd, "An Ark for Prince Edward Island."

47 Editorial, *Eastern Graphic* (Charlottetown, PEI), 25 May 1975.

48 Douglas Smith, "Quicksilver Utopias: The Counterculture as a Social Field in British Columbia" (PhD diss., McGill University, 1978); Miller, *The 60s Communes*, 219–20.

49 N. Todd, "The Opening of the Arks," 14.

50 David Lees, "Aboard the Good Ship Ark," *Harrowsmith*, September/October 1977, 52.

51 Mungall, "Space Age Ark," 103; Susan Soucoup, "Prince Edward Island's Ark," *Harrowsmith*, July/August 1976, 32–35; Lees, "Aboard the Good Ship Ark," 48; Stewart, "The Ark," 42.

52 Lees, "Aboard the Good Ship Ark," 49.

53 J. Todd, "An Ark for Prince Edward Island"; Durie to Todd, IMR Fonds; Durie, "Technical Review Meeting."

54 Mungall, "Space Age Ark," 104.

55 David Catmur to Nancy Willis, "Re: the organization of the Ark" [memo], 4 July 1977, series 5, subseries 2, IMR Fonds.

56 J. Todd, "An Ark for Prince Edward Island."

57 Ron Zweig, "Bioshelters as Organisms," *Journal of the New Alchemists*, no. 4 (1977): 107–13.

58 John Todd, "Tomorrow is our Permanent Address," *Journal of the New Alchemists*, no. 4 (1977): 89.

59 William McLarney, "New Alchemy Agricultural Research Report No. 2: Irrigation of Garden Vegetables with Fertile Fish Pond Water," *Journal of the New Alchemists*, no. 2 (1974): 73–79; William McLarney and John Todd, "Walton Two: A Complete Guide to Backyard Fish Farming," *Journal of the New Alchemists*, no. 2 (1974): 79–117.

60 Angevine, Barnhart, and Todd, "New Alchemy's Ark," 36–37.

61 "The New Alchemists," *Time*, 17 March 1975, 100; Hughes, "The World that Feeds Itself."

62 David Bergmark, interview by Alan MacEachern, 29 July 1999, series 11, IMR Fonds; Durie, "Technical Review Meeting."

63 J. Todd, "Tomorrow is our Permanent Address," 96.

64 J. Todd, "An Ark for Prince Edward Island."

65 Andrew Wells, "Discussion of the New Alchemy Institute's ARK in PEI and the Institute of Man and

Resources," 19 November 1975, IMR Vertical File, PEI Collection.

66 Joe Seale, "New Alchemy Hydrowind Development Program," *Journal of the New Alchemists*, no. 5 (1979): 44–52; J. Todd, "An Ark for Prince Edward Island."

67 J. Todd, "Tomorrow is our Permanent Address," 93–94.

68 Durie, "Technical Review Meeting." Wind energy would eventually come to PEI under the supervision of the IMR. MacEachern, *Institute of Man and Resources*, 43.

69 Wells, interview.

70 Editorial, *Eastern Graphic*, 22 September 1976.

71 Durie, "Technical Review Meeting."

72 Editorial, *Eastern Graphic*, 11 January 1978.

73 MacEachern, *Institute of Man and Resources*, 53.

74 Durie, "Technical Review Meeting."

75 John Todd to Andy Wells, February 1978, series 5, subseries 2, IMR Fonds.

76 Rob Dykstra, "The Ark Sinks," *Atlantic Insight*, August/September 1981, 30–32; Silver Donald Cameron, "Floundering of the Ark," *Maclean's*, 1 June 1981, 13–14.

77 "PEI Ark Demolished," *Guardian* (Charlottetown, PEI), 14 March 2000.

78 Energy Probe, "Ecology House: A Project of the Pollution Probe Foundation," 1 March 1979, vol. 310, file 210, Alistair Gillespie Fonds, Library and Archives Canada (hereafter Gillespie Fonds).

79 See Linda Gilkinson, *West Coast Gardening: Natural Insect, Weed, and Disease Control* (Victoria, BC: Trafford, 2006).

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81 Alexander Campbell, "Address to the Science Council of Canada," 19 June 1975, PEI Speeches Vertical File, PEI Collection.

82 John Todd and Nancy Jack Todd furthered this transition with the publication of their widely read book *Bioshelters, Ocean Arks, and City Farming* (San Francisco: Sierra Club, 1984).

83 Nancy Jack Todd and John Todd, "Special Report: The Village as Solar Ecology," *Journal of the New Alchemists*, no. 7 (1981): 135–74.

84 James Rakocy, Michael Masser, and Thomas Losordo, "Recirculating Aquaculture Tank Production Systems: Aquaponics—Integrating Fish and Plant

Culture" (Southern Regional Aquaculture Center Publication No. 454, November 2006), http://www.aces.edu/dept/fisheries/aquaculture/documents/309884-SRAC454.pdf; Elizabeth Royte, "Street Farmer," *New York Times*, 5 July 2009. Although the New Alchemists' work is not cited, their integration of aquaculture, greenhouse agriculture, and hydroponics is identical to the "aquaponic" systems discussed.

85 Peder Anker, *From Bauhaus to Ecohouse: A History of Ecological Design* (Baton Rouge: Louisiana State University Press, 2010); Nancy Jack Todd, *A Safe and Sustainable World: The Promise of Ecological Design* (Washington, DC: Island Press, 2005); John Todd, "The Innovator's Sense of Urgency," in Zelov and Cousineau, *Design Outlaws on the Ecological Frontier*, 40–45; J. Todd, "The New Alchemists," 172–83.