The Paradox of the Rational Comprehensive Model of Planning

Tales from Waste Management Planning in Ontario, Canada

Charles Hostovsky

Abstract

This study explores the reasons why the failure to site and implement waste disposal facilities in the United States and Canada has become commonplace, using the example of waste environmental impact assessment (EIA) programs in Ontario, Canada. The inability of governments to site new waste disposal facilities can be traced to a slavish adherence to planning's most common paradigm, the rational comprehensive model. The article also addresses whether the extensive public consultation programs associated with waste EIAs are effective. The study concludes with a discussion of how the communicative action of planning should be researched in waste management to develop more efficient and less socially divisive planning programs.

Keywords: *waste management; environmental impact assessment; planning theory*

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Over the past three decades, many millions of dollars have been invested in siting waste disposal facilities in the United States and Canada. However, in some jurisdictions, this massive outlay of time and money has resulted in few new waste-disposal facilities. The failure to create new facilities has been blamed on NIMBY activists, political interference, false or overestimated perceptions of risk, inadequate public participation, and overly rigorous environmental impact assessment (EIA) regulations (Jackson and Wright 1987; Blumberg and Gottlieb 1989; Jackson 1991; Pushchak and Rocha 1998; Temmemagi 1999; Shaw 2000; Levy 2002).

Some of these factors have come into play in waste-planning decisions in Ontario, Canada, but lack of new facilities is mostly due to a slavish adherence to the rational comprehensive model (RCM) of planning, as expressed in EIA regulations. The RCM is planning's predominant paradigm, "a common basis for most municipal planning decision making and, arguably, the closest thing planners have to a planning paradigm" (Seasons 2003, 431).

The rational comprehensive model takes a scientific/rational approach to problem solving and, in its purest application, would result in a full analysis of all possible factors affecting a given set of circumstances and of all possible alternatives to resolving the problem under study. The objectivity and complexity of the rational comprehensive model thus represent its greatest strength and its greatest weakness. Theoretically, it results in the "best" solution because it has taken into account the widest variety of variables. In practice, the processes it engenders can be overly complex, redundant, time-consuming, and expensive.

In this article, the history of the application of RCM-based environmental impact assessments will be examined in terms of their effect on the management of three types of waste—municipal solid waste, hazardous wastes, and high-level radioactive waste[1]—to answer the following research questions:

- Why do massive investments of time and money in environmental impact assessments often result in no new waste disposal facilities, and what are the implications for waste management of a process that does not produce waste disposal facilities?
- Are the extensive public consultation programs associated with EIAs effective?

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The article also explores the phenomenon of "failure-as-success" in planning, which appears to be endemic in Ontario waste planning. In other words, although landfill siting has largely failed, waste continues to be efficiently managed, even demonstrating increased diversion rates. Finally, a post-positivist approach, based on the "communicative action" of planning, is presented as a means to explain how this dichotomy is occurring. Communicative planning works in conjunction with scientific rationality but has the potential to redefine success based on mutual understanding; an understanding developed through the interplay of communication, vested interests, politics, and negotiation.

► EIAs, Waste Planning, the RCM, and Participatory Planning

Before the passing of EIA legislation in Canada and the United States in the late 1960s and early 1970s, waste planning was conducted in an ad hoc manner (Andrews 1971; Anderson and Greenberg 1982; Tarr 1985; Bryson and Crosby 1989). The primary role of the waste planner in that era was to "collect then dispose of waste as efficiently as possible by burning or burying it" (MacLaren 2004, 371).

The passing of the U.S. National Environmental Policy Act in 1969 created a more complex and systematic approach to waste management planning through the introduction of EIA regulations. American planners began advocating more comprehensive approaches to waste planning (Andrews 1971; Bower 1971). In particular, the need to assess the impacts of "alternatives" was encouraged. These alternatives included what are known as the 3Rs[2]—reduction, reuse, and recycling.

In 1976, the United States passed the Resource Conservation and Recovery Act,[3] requiring individual states or regions to prepare comprehensive solid waste plans. In Canada, the federal government introduced the Environmental Assessment and Review Process[4] (EARP) in 1973 (Couch 1985). Following the federal government's leadership, individual provinces passed their own EIA regulations for provincial and municipal facilities. Ontario was the first, introducing the Environmental Assessment Act (EA Act) in 1975.

Ontario's EA Act greatly increased the level of planning detail and analysis required in waste planning, in contrast to ad hoc methods or simple site-specific EIAs. In their simplest incarnation, EIAs require only the justification of an "adequate" site for an "adequate" technology, and evidence that the proposal will not have "significant" environmental impacts (Beanlands and Duinker 1983; Glasson, Therivel, and Chadwick 1995; Dearden and Mitchell 1998; Levy 2002). Thus, a simplified EIA may correspond to Herbert Simon's (1976) notion of "satisficing"—looking for a course of action that is "good enough."

By comparison, the following requirements of the EA Act demonstrate its reliance on the RCM:

- a "holistic" definition of the environment, including bio-geo-physical and socioeconomic factors;
- goal setting (Hudson 1979; Briassoulis 1989);
- justification of project need and rationale;
- "net-effects" analysis (i.e., impact assessment) for functionally different alternatives to the undertaking, and alternative methods of implementing the preferred undertaking, including analysis of alternative sites to find a preferred (best) site;
- an assessment of the consequences of the do-nothing alternative (the null hypothesis);
- the selection of a preferred alternative after comprehensive review of all alternatives (Hudson 1979; Briassoulis 1989);
- a preference for quantitative methods and feedback loops (Hudson 1979; Briassoulis 1989; Ministry of the Environment and Energy 1994); and
- fully integrated public consultation (initially required by policy and now required by the 1996 revisions to the EA Act).

The EA Act's requirement for a wide array of objective data places it in the context of the classic RCM. However, integrating public consultation suggests a departure from pure positivism, since subjective perceptions may be considered a barrier to purely objective or scientific decision making. Ontario's EA Act appears to incorporate Herbert Simon's (1976) vision of the RCM, which includes full information about the values of stakeholders and citizens.

► Case Studies from Ontario[5]

Municipal Solid Waste Planning: The Ontario Waste Management Master Plan Program and the Interim Waste Authority[6]

In 1982, the Ontario Ministry of the Environment (MOE) developed a voluntary program known as the Waste Management Master Plan (WMMP). The program provided municipalities with the financial and technical assistance necessary to develop a comprehensive waste plan, including disposal (incineration and/or landfill) and opportunities for reduction, reuse, and recycling (Ministry of the Environment 1984). The WMMP was funded up to 50 percent by the MOE, the rest by the municipalities. To be eligible for grant monies, municipalities were to form groups (or "clubs") so that they could benefit from economies of scale and reduce the number of new landfills required. Public consultation was also required.

A major review of the program was conducted after eight years (Hostovsky 1990). At that time, forty-two clubs had been initiated, including one for Toronto, Durham, and York Regions known as SWEAP (Solid Waste Environmental Assessment Plan). These clubs were involved in developing master plans, with the average plan taking five years at an average cost of $322,000, for a total of $13.5 million. Yet only two new landfill sites and one waste-to-energy incineration facility had been approved.

At this point, most municipal partners began to question the cost, the time, and the public and political unrest associated with siting waste facilities. Nevertheless, several municipalities embarked on a second, third, or fourth landfill site selection process after failing to achieve approval through their initial siting process. The city of Guelph undertook three separate siting processes over ten years, while Metro Toronto conducted four over fifteen years—all unsuccessful and all generating extensive public and political controversy. Still, no major changes were made to the planning process, nor was there any attempt to modify or abandon the RCM.

In 1990, the socialist New Democratic Party (NDP) was elected for the first time in Ontario's history. NDP candidates had made campaign promises about abandoning the WMMPs in the Greater Toronto Area and taking the candidate landfill sites (which had been strongly opposed by thousands of voters) "off the table." The new minister of the environment, Ruth Grier, created a new bureaucratic entity—a Crown corporation known as the Interim Waste Authority (IWA).[7] The IWA was empowered to establish three landfill sites for three regions in the Toronto area (Ministry of the Environment and Energy 1992). "Garbage," Grier said, "should be disposed of close to the people who generated it, as a means of encouraging better packaging and recycling" (Hunter 1993).

As it happened, one of the preferred sites was on beautiful farmland north of Toronto. In the public tumult that followed, thousands of protesters opposed the IWA's choices. An environmental journalist noted,

> Grier found herself up against an unbeatable foe. TV cameras cannot resist the lure of third-generation farmers out with picket signs to stop the drilling rigs in places as pastoral as Caledon or out around Whitevale. My God, it's gorgeous countryside! Absolutely classic Canadiana. Anybody who would put a dump there is automatically on the side of Mordor and the Toxic Swamp Thing. As images, those lovely farms and fields and streams have become the seal pups of the 1990s. (Hunter 1993)

By that time, the IWA environmental impact assessments had cost Ontario taxpayers approximately $85 million (Davey 1996).

In 1995, the Progressive Conservative Party returned to power. Following up on campaign promises, the new Premier repealed the Waste Management Act, disbanded the IWA, and abandoned further study of the three preferred landfill sites. The IWA's rational approach was replaced with something closer to Simon's (1976) satisficing method. The MOE granted interim expansions for municipal waste at existing, near-capacity landfills. The EA Act was also revised in 1996 to permit "scoping," which allows for the assessment of a reduced number of alternatives (Beanlands and Duinker 1983), provided there is sufficient justification for such a reduction.

Meanwhile, amounts of residential waste had been considerably reduced. By 1990, the MOE had announced that a 25 percent provincial diversion rate had been achieved (Ministry of the Environment 1999). This was partly an intended consequence, since waste diversion was part of the WMMP. It was also partly an unintended consequence: because of limits on disposal capacity, high tipping fees were forcing municipalities to reduce wastes sent to landfills.[8]

The MOE took a combined RCM/satisficing approach to dealing with the planning and decision-making crisis by creating a detailed guidebook of best practices for waste management planning, known as the Sectoral Environmental Assessment Proposal (Ministry of the Environment and Energy 1994).[9] It was believed that step-by-step instructions would make the EIA process more efficient and thereby render the approvals process less risky while reducing unwelcome political intervention in waste planning. The original terms of reference for the WMMP, consisting of nine pages of general guidance and policy direction, were now replaced by three hundred pages of detailed instructions.

The Sectoral Environmental Assessment Proposal (SEAP) also required a split in the planning process halfway through the plan. After a waste technology system had been identified, and while the landfill site selection process was being initiated, proponents were required to "implement the 3Rs system." Either MOE planners assumed the delay or failure of a significant number of landfill site selection processes, or they felt that the rigors of landfill-siting decision making should not delay the implementation of recycling facilities.

The MOE abandoned the WMMP program in 1997.[10] By that time, more than seventy-five master plans spawning more than two hundred individual waste disposal EAs had been initiated, and eight new "greenfield" landfill sites and four expansions to old landfill sites had been approved in Southern Ontario[11] (Ministry of the Environment and Energy 1998). Toronto's successive plans had all been withdrawn as a result of changes in provincial governments—the Solid Waste Environmental Assessment Plan and the Solid Waste Interim Steering Committee by the NDP Premier in the 1980s, the IWA in the

1990s by the Progressive Conservative Premier, and the Toronto Integrated Solid Waste Resource Management Process recommendation in the 2000s to rail-haul waste six hundred kilometers north to an approved private sector landfill in an abandoned mine (Adams Mine) was repealed by the new Liberal Premier in 2004. As of 2005, the Greater Toronto Area, with a population of about 5 million, still has no new approved landfill capacity. Its municipal solid waste is currently being exported to private sector landfills in Michigan (Hostovsky 2005). This export became the subject of much controversy, garnering significant attention in Michigan and Ontario during the 2004 presidential election campaign:

> U.S. presidential hopeful John Kerry has vowed to immediately ban Toronto's trash shipments into the border state of Michigan if he wins the Nov. 2 election. "It's time to end Canadian trash dumping in Michigan," Kerry said in a news release yesterday. U.S. President "George W. Bush has let Michigan become Canada's landfill." (Maskoll 2004)

The WMMP program demonstrated one of the key weaknesses in the rational comprehensive model: problems are more difficult to solve when grouped together. The "club" approach and the analysis of functionally different waste technologies added layers of complexity that contributed to another RCM weakness: circumstances and problems change over time, rendering some planning recommendations irrelevant.

Clearly, the politicization of the planning process, exacerbated by successive changes in provincial governments, also contributed to increased costs and the failure to approve disposal sites. However, this political opportunism would not have been possible without many of the flaws in the process originating in the RCM approach.

Hazardous Waste: The Ontario Waste Management Corporation[12]

For most of the twentieth century, Ontario had no regulations to control hazardous wastes. The Environmental Protection Act was introduced in the mid-1970s, and its associated Regulations 309 and 347 did not appear until the early 1980s.

In 1980, Dr. Harry Parrott, minister of the environment, announced publicly that a hazardous waste disposal facility would be built on government-owned land in the Niagara Peninsula without a full environmental assessment (Rabe 1994). The minister had vetoed an EA, in a move that evoked the ad hoc environmental decision making that had prevailed before the 1970s. A tremendous public outcry eventually led the province to abandon its plans for the site.

A study funded by Ontario Hydro[13] identified six main reasons for the Ontario Waste Management Corporation's (OWMC's) failure (Hostovsky 1986):

1. The public is more knowledgeable and sophisticated in environmental matters than the province had anticipated.
2. Affected communities will not tolerate surprises.
3. There was no early or extensive public consultation.
4. The NIMBY syndrome has become a powerful force, influencing political decisions.
5. The media and NGOs have extensive influence on public opinion.
6. Exemptions from the Environmental Assessment Act for large-scale public facilities are no longer socially acceptable.

Clearly, such "decide-announce-defend" approaches would no longer be tolerated.

As a direct result of this event, the Ontario Waste Management Corporation Act was passed in 1981, inaugurating a thirteen-year odyssey to find a new site. The weaknesses of the rational comprehensive model revealed themselves again, as eight years of planning passed before an EA was submitted to the MOE for government review. It contained a thorough scrutiny of many hazardous waste treatment technologies/systems and candidate sites throughout southern Ontario and initiated one of the most intensive public consultation programs ever conducted in an Ontario EA (Rowe 1992, 1995). The MOE's EA reviewer noted that "the Corporation appears to have made major efforts to inform the public and give them an opportunity to make comments on its proposals" (Ministry of the Environment 1989, 167).

The OWMC proposed to manage three hundred thousand tons of hazardous waste a year through a physical/chemical treatment plant, an incinerator, a solidification plant, and a landfill in the rural, agricultural Township of West Lincoln, Niagara Region. It arrived at this proposal after thirteen years and an expenditure of $150 million by the OWMC.[14]

Nonetheless, on November 24, 1994, the Joint Board[15] refused to accept the application (Joint Board 1994), and the OWMC was dissolved. The minister of the environment at the time noted,

> The ceasing of OWMC operations will mean a saving of more than one million dollars annually to Ontario taxpayers—There is no need for a government agency like OWMC to exist; the main responsibility for managing these wastes rests not with the government, but with those in the private sector who generate them. It is the Ministry's role to ensure that the private sector manages this waste according to prescribed standards and policies. (Ministry of the Environment 1995)

Once again, a key weakness in the RCM was exposed: the problem had changed during the thirteen-year planning

period. Because of the lack of a hazardous waste facility, high treatment and disposal costs were maintained, and potential users of the projected hazardous waste facility were forced to reduce and recycle the amount of waste they generated. As a result, less capacity was needed, and the OWMC plan became redundant. Also, the complexity of the process caused problems. For example, the Joint Board pointed to problems interpreting waste quantity data and the lack of justification for excluding some disposal technology options.

The redundancy of the facility was corroborated in a survey commissioned by the OWMC (R. Cave & Associates 1994),[16] which estimated the composition and quantities of hazardous waste[17] six years into the future. Ontario's EA Act requires proponents to establish the prima facie need for their proposals. Overall, the companies surveyed predicted significant reductions in waste quantities for many hazardous materials, in contrast to the OWMC's hypothesis, owing to recycling, reduction of waste generation, and the replacement of higher toxicity materials with less toxic alternatives.[18]

Pushchak and Rocha (1998) have suggested that hazardous waste problems are not a locational problem but an industrial production problem, as no community is willing to accept certain types of hazardous wastes. They argue that "siting failure may be one of the critical turning points on the road to sustainable production" (p. 25). Not implementing the recommendations of the OWMC's complex, expensive, and time-consuming RCM approach to planning may have prevented the siting of an unneeded facility.

The Canadian Nuclear Fuel Waste Management Program[19]

In 1982, Atomic Energy of Canada Limited (AECL) and Ontario Hydro formed a partnership to plan for the disposal of high-level nuclear waste (uranium dioxide) generated by Canada Deuterium Uranium (CANDU) reactors in Ontario, Quebec, and New Brunswick. In that year, the Canadian Nuclear Fuel Waste Management Program was launched. Wary of NIMBYism and the intensely negative perception of risks associated with radioactive waste, AECL decided to use a two-stage model for their environmental assessment:

1. Under the federal Environmental Assessment and Review Process,[20] an Environmental Impact Statement (EIS) would be prepared to deal with functionally different approaches to radioactive waste management (i.e., different technologies).
2. After approval of the recommended disposal technology, a separate EA, under Ontario's EA Act, would be initiated to find a site for that technology, using a "willing host" site selection process. (Allan and Simmons 1996; Robbins 1998)

The partners submitted an EIS to the Federal Environmental Assessment and Review Office, which established a Review Panel (the Seaborn Panel) to conduct public hearings. The EIS examined three main types of disposal technologies to manage more than 1 million bundles of spent nuclear fuel, including transport into outer space, transmutation (i.e., changing radioactive elements into different elements to reduce the half-life of the radioactive waste), recycling, and deep geologic disposal (AECL 1994).

Deep geologic disposal in the kilometers-thick granite of the Canadian Shield was selected as the preferred alternative. Although an intensive public consultation program was initiated by AECL and Hydro, the lack of a site selection process altered the form of the consultations. The Review Panel heard mainly from interest groups with a stake in nuclear waste management; potential NIMBY activists were not present at the hearing.

After sixteen years, $700 million spent on research on deep geologic disposal (Ontario Power Generation 2000),[21] and $7 million spent on public consultation, culminating in a yearlong hearing, the Federal Review Panel turned down the AECL/Ontario Hydro plan in March 1998. While the panel believed that the technical safety of deep geologic disposal had been adequately demonstrated, it did not believe that the concept had broad public support (Review Panel 1998). In response to this decision, the government of Canada created the Nuclear Waste Management Organization under the auspices of the Nuclear Fuel Waste Act in 2002.[22] The organization has a mandate to recommend an appropriate technology for Canadian nuclear waste disposal by November 15, 2005.

It appears from the Seaborn Panel's conclusion that public consultation, conducted early on in the process, could have determined whether the public was ready for burial of nuclear waste in the Canadian Shield, before so much time was spent on technical research. Indeed, Murphy and Kuhn's (2001) analysis if the Canadian Nuclear Fuel Waste Management Program (CNFWMP) indicated that although the EIS was ostensibly a technical study as required by their terms of reference, the Seaborn panel went well beyond its technical mandate in making recommendations and pointed to the social implications of the proposal. Stakeholders, NGOs in particular, had argued "that the ramifications of this decision are beyond the normal decision-making context of government. When the risks associated with a complex, technological undertaking have the potential to affect both a large geographic area as well as those yet unborn, there is the need to engage in a transparent, inclusive social discourse" (Murphy and Kuhn 2001, 262). Clearly the review panel agreed, which gives further evidence of the limits of technical arguments and scientific positivism, pointing to the need for a more communicative approach.

Table 1.
Fiscal and temporal planning results of Ontario waste environmental impact assessments.

Waste Plan	*Approximate Cost of Planning Activities*	*Number of Years Planning*	*Net Results in Approved Disposal Facilities*
Hazardous waste: Ontario Waste Management Corporation	$150,000,000	14	Environmental assessment (EA) turned down by Joint Board in 1995 after 2-year public hearing
Municipal solid waste—Greater Toronto Area (GTA: Toronto, York, Peel, Durham): Interim Waste Authority (IWA)	$85,000,000	5	3 landfill EAs abandoned by province; IWA disbanded
Municipal solid waste—Ontario: Waste Management Master Plan Program (>75 landfill EAs)	$ hundreds of millions	16	75 EAs initiated; 5 "greenfield" landfill sites approved
High-level nuclear waste: Atomic Energy of Canada Limited (AECL)/Ontario Hydro—Canadian Nuclear Fuel Waste Management Program	$700,000,000	16	Environmental Assessment and Review Process (EARP) Review Panel turned down application in 1998 after 1-year public hearing

It seems that the Canadian government has learned from this process by creating the post-Seaborn Nuclear Waste Management Organization. The NWMO is in the process of creating a process that is implementable by integrating communicative approaches to EIA planning.

> We have begun to engage interested Canadians, stakeholders and the best experts in the world to develop a solution that safeguards the public in a way that is sustainable, ethically and socially acceptable, and respectful of the environment now and in the future.[23]

The WMO has reversed the timing and orientation of public participation by putting an emphasis early in the planning process, evidenced by the four major phases of the program: (1) Conversations about Expectations—Canadians are introduced to NWMO, asked to help define its process and issues and encouraged to participate. (2) Exploring the Fundamental Issues—dialogue to explore key questions and issues and to develop an analytical framework that reflects stakeholder values and priorities. (3) Evaluation of Management Approaches—applying the analytical framework and research findings to waste management approaches and engaging stakeholders in an in-depth review leading to a draft study report. (4) Finalizing the Study Report—target date: November 15, 2005.

Waste Management Planning: Ambiguous Results

All three of the extensive plans developed in Ontario to deal with municipal solid waste, hazardous waste, and radioactive waste relied heavily on the rational comprehensive model of planning. In addition, all three processes operated within the context of a "holistic" definition of the environment, including both socioeconomic and bio-geo-physical parameters. Finally, all three of the programs included some form of public consultation. The very thoroughness of all three EIAs resulted in the expenditure of hundreds of millions of dollars and decades of planning effort, but this investment did not result in the creation of new waste disposal systems. Table 1 sums up the costs and results.

Comparing Waste Management Programs: A Common Analytic Context

The three waste management programs can be examined in terms of a ten-step environmental planning analytical framework distilled from the author's years of reflective EIA practice and the EIA literature (see, for example, Munn 1979; Finsterbusch and Wolf 1981; Beanlands and Duinker 1983; Couch 1985; Gibson and Savan 1986; Glasson, Therivel, and Chadwick 1995; Dearden and Mitchell 1998; Levy 2002). This analytical framework, outlined in Table 2, is based on a generic approach to the rational comprehensive model expressed in the EIA literature and found in Ontario's Environmental Assessment Act. Hence, the framework provides a common analytic context within which to compare and contrast the three waste management programs.

This framework, as applied in Table 3, demonstrates the extent to which the RCM affected the environmental impact assessments of all three waste management programs. Most features of the rational comprehensive analytical framework are evident in the three programs, although fully integrated public consultation did not occur in every instance.

Table 3 shows that waste management planning in Ontario over the past three decades has conformed to the rational comprehensive model. However, massive investments of time and money in RCM-based environmental impact assessments have

Table 2.
The ten steps in environmental planning and their relationship to the Environmental Assessment Act (EA Act).

Stage	*Process*	*The EA Act*
1. Stakeholder preconsultation	Stakeholders, including special interest groups, decision makers, technocrats, bureaucrats, consultants, etc., are identified and consulted before irreversible decisions are made.	Holistic definition of environment, including socioeconomic parameters; fully integrated public consultation
2. Problem identification	Problems are defined in such a way that planners are able to recommend solutions that allow decision makers to apply policy intervention or to act upon solutions through the political process.	Goal setting; justification of need and rationale; fully integrated public consultation
3. Goal and objective formulation	Goals and objectives are identified and formulated. Often technocrats and bureaucrats draft the goals and objectives, while stakeholders and the public "fine-tune" them.	Goal setting
4. Analysis	The problem situation is analyzed and modeled. The geographic/political boundaries and population groups are defined, background data are collected, regulatory processes (including documentation requirements) are identified, policy instruments are highlighted, methodologies are presented, and formal stakeholder/public interaction is initiated.	Holistic definition of the environment, including bio-geophysical and socioeconomic parameters; net-effects analysis, quantitative methods, and feedback loops; fully integrated public consultation
5. Identification and design of alternative courses of action	Identification and design of major alternative courses of action.	"Net-effects" analysis of alternatives
5.1. The "null alternative"	Often referred to as the "do-nothing" alternative.	The "null alternative"
5.2. Functionally different alternatives	Cost-benefit analysis and environmental impact assessment are commonly used to compare each alternative. Stakeholder and public scrutiny may identify new alternatives or eliminate unreasonable ones.	Quantitative methods and feedback loops
5.3. Spatially different alternatives	The selection of geographic "sites" or "routes" is one of the sources of greatest controversy in the planning model. Therefore, a rank ordering of potential locations for the preferred functional alternative is necessary for comprehensive rationality.	Considered alternative "methods"
6. Effects assessment	The predicted effects of each alternative are identified. This information is used to rank-order choices in stage 5. Effects are usually examined in terms of economic impacts, social impacts, and environmental impacts.	Holistic definition of the environment, including bio-geo-physical and socioeconomic parameters; "net-effects" analysis of alternatives; quantitative methods and feedback loops
7. Evaluation	Evaluation of the effects of the alternatives in terms of the goals and objectives. Consequences are usually examined in the light of political implications. Feedback mechanisms are often used, especially in terms of public consultation processes, to provide input into evaluation.	Feedback loops; fully integrated public consultation
8. Decision	A decision based on the selection of the most desirable alternative is made. A decision made not to proceed with the preferred alternative may ultimately be considered a "rational" choice.	"Net-effects" analysis of alternatives, including the "null alternative" forms basis for decision
9. Implementation	In rational comprehensive models, decisions are meaningless unless they are implementable. Usually three stages are required: (1) documentation: the plan is submitted to regulatory agencies as a formal document or documents; (2) approvals: the documentation is scrutinized through a regulatory filter (sometimes involving public hearings) and bureaucrats or judicial authorities provide permits, licenses, etc.; and (3) the policy action is put into effect.	The EA Act prohibits proponents from "proceeding with the undertaking" unless the minister grants approval

(continued)

Table 2 (continued)

Stage	*Process*	*The EA Act*
10. Monitoring and feedback	Monitoring and feedback of the results of implementation vis-à-vis original goals and objectives and impact assessment are made by the planner.	Other regulations, such as Ontario's Environmental Protection Act, require post–Environmental Assessment Act (EAA) approvals monitoring of landfill sites.

Table 3.
Comparison of Ontario waste management environmental impact assessments (EIAs) in terms of the rational comprehensive model of planning.

Waste Management Master Plan (WMMP) and Interim Waste Authority (IWA) (Approximately Seventy-Five Individual Plans)	*Ontario Waste Management Corporation (OWMC)*	*Canadian Nuclear Fuel Waste Management Program (CNFWMP)*
Stage 1. Stakeholder preconsultation		
Significant consultation develops informally with some stakeholders (i.e., municipal bureaucrats, citizens adjacent to existing landfills) over the years Little preconsultation with public interest groups and affected communities	Province initially tries to exempt the facility from environmental assessment (EA) requirements without environmental site selection process. Significant public input prompts full EA.	Major decisions regarding nuclear power made in the 1950s and 1960s without public and affected community preconsultation (i.e., regarding burial of nuclear waste)
Stage 2. Problem identification		
Lack of available capacity at existing landfills, especially large urban centers such as Toronto, Mississauga, etc. Too many existing solid waste landfills servicing municipalities Poor environmental suitability of many existing landfills—leachate and off-gassing problems impacting the environment Lack of stakeholder input into problem identification	No available disposal capacity through provincial facilities Only one private sector hazardous waste disposal facility, in Sarnia High cost to dispose of hazardous waste Illegal dumping	No disposal technology or sites for high-level nuclear waste in Canada Spent nuclear fuel rods stored temporarily at generating stations Waste is highly radioactive for 10,000 years, representing an environmental and public safety risk
Stage 3. Goal and objective formulation		
Provide disposal capacity for municipal solid waste that minimizes environmental impacts for a 20- to 40-year period Provide cost-effective disposal capacity Meet all regulatory requirements	Select best available technologies Provide disposal capacity for hazardous waste (Regulation 309/347) that minimizes environmental impacts for a 20- to 40-year period Provide cost-effective disposal capacity Meet all regulatory requirements	Select a technology that can provide disposal capacity with today's technology Meet regulatory requirements
Stage 4. Analysis		
Description of the existing environment Population and geographic boundaries defined Waste audit—composition and quantities Net environmental and socioeconomic impacts of alternatives identified in 5.1/5.2 and 5.3, below Significant public input	Description of the existing environment Population and geographic boundaries defined Waste audit—composition and quantities Net environmental and socioeconomic impacts of alternatives identified in 5.1/5.2 and 5.3, below Significant public input	Description of the existing environment Population and geographic boundaries defined Waste audit—composition and quantities Net environmental and socioeconomic impacts of alternatives identified in 5.2, below Very little public input

(continued)

Table 3 (continued)

Waste Management Master Plan (WMMP) and Interim Waste Authority (IWA) (Approximately Seventy-Five Individual Plans)	*Ontario Waste Management Corporation (OWMC)*	*Canadian Nuclear Fuel Waste Management Program (CNFWMP)*
Stage 5. Identification and design of alternative courses of action		
Existing waste management infrastructure: Usually sanitary landfill(s) at or near capacity and a simple recycling program (i.e., Recycling Box) or export of waste to private landfill sites	Existing waste management infrastructure: One private facility in Sarnia and export of some hazardous waste to sites in the USA On-site storage of PCBs at many locations	Existing waste storage infrastructure at nuclear generating stations in Ontario Quebec, New Brunswick
5.1/5.2. Functionally different alternatives		
The null alternative Reduction Reuse Recycling Composting Incineration Waste-to-energy (EFW) Refuse-derived-fuel (RDF) Landfill Export	The null alternative Reduction Reuse Recycling Incineration Chemical treatment/solidification Waste-to-energy (EFW) Landfill	The null alternative Transmutation Eject waste to outer space (i.e., into Sun) Recycling—breeder reactors Deep geologic disposal in Canadian Shield
5.3. Spatially different alternatives		
Alternative landfill sites identified using McHargian mapping techniques Long list identified and short-listed using multicriteria decision making (MCDM) methods combined with public input, including facilitated workshops	Alternative landfill sites identified using McHargian mapping techniques—restricted to Southern Ontario Long list identified and short-listed using MCDM methods combined with public input	No site selection considered although preferred technology requires a deep geologic vault 1 kilometer deep in the stable granite of the Canadian Shield—assumed to be in Ontario Site selection to take place after approval of technology
Stage 6. Effects assessment		
Extensive on-site field investigation used to conduct impact assessment on short-listed sites Sites rank-ordered, based on field work to recommend preferred site More detailed impact assessment (i.e., to the Environmental Protection Act level, which is needed to acquire a Certificate of Approval [i.e., permit]) conducted on preferred site	Extensive on-site field investigation used to conduct impact assessment on short-listed sites Sites rank-ordered based on field work to recommend preferred site More detailed impact assessment (i.e., to the Environmental Protection Act level) conducted on preferred site, which is needed to acquire a Certificate of Approval [i.e., permit])	EIA described on a hypothetical reference site (i.e., "concept") using typical Canadian Shield geologic scenario
Stage 7. Evaluation		
Most master plans abandoned by their municipal councils after site selection due to the political implications of NIMBY 3Rs alternatives considered preferred route in most plans	2-year-long provincial Consolidated Hearings Board public hearing	1-year-long federal Review Panel public hearing
Stage 8. Decision		
Several sites turned down by the Consolidated Hearings Board after public hearings Several sites approved by the Consolidated Hearings Board or by the minister of the environment	Provincial Consolidated Hearings Board turned down the application in 1995 OWMC terminated by Act of Provincial Parliament	Federal Review Panel under the Environmental Assessment and Review Process turned down the application in 1998 New environmental assessment deferred for future generation

(continued)

Table 3 (continued)

Waste Management Master Plan (WMMP) and Interim Waste Authority (IWA) (Approximately Seventy-Five Individual Plans)	*Ontario Waste Management Corporation (OWMC)*	*Canadian Nuclear Fuel Waste Management Program (CNFWMP)*
Stage 9. Implementation		
Handful of new greenfield landfills and expansions to existing landfills approved and built 2 waste-to-energy incinerators approved and built Many recycling programs initiated throughout the province Some centralized composting projects initiated	Not applicable, plan abandoned De facto adoption of the status quo—the null alternative	Not applicable, plan abandoned De facto adoption of the status quo—the null alternative
Stage 10. Monitoring and feedback		
Mature and extensive monitoring system in place through regulatory processes Extensive monitoring required as conditions issued with the Certificates of Approval under the Environmental Protection Act for landfill, incineration, Material Recycling Facilities and Centralized Composting	Not applicable	Not applicable

resulted in almost no new waste disposal facilities in the province. Disposal requirements have largely been met through expanding old landfills that planning had previously identified as unsuitable and through export to landfills in the United States. It appears that incrementalism, or "satisficing" (the classic rival to the RCM) has gained the upper hand.

Moreover, because the RCM requires such detailed, time-consuming analysis, its conclusions are particularly prone to being swept aside by changing political priorities. This situation is exacerbated by a regulatory characteristic in the province of Ontario, where municipalities do not have full control over their own decision making, as they are creations of the province through the Ontario Municipal Act. Thus, even if a municipality accepts a waste management facility recommended through the EIA's rational model, Ontario's minister of the environment may override that decision.

The RCM, with its emphasis on rational conclusions arrived at by bureaucrats, tends not to take political considerations into account and is therefore prone to failure in terms of managing waste technology. In the case of the Interim Waste Authority (IWA), for example, Toronto's Solid Waste Environmental Assessment Plan was overturned first by the New Democratic Party. Subsequently, the Progressive Conservatives and Liberals dissolved the newer processes. Hence, each political party took advantage of the long time horizons in waste planning and exploited NIMBY sentiment by making election campaign promises to voters upset by candidate landfill sites in their communities.

► Public Consultation

The second research question posed at the beginning of this study asked whether extensive public consultation programs are effective. A recent literature review (Hostovsky 2000) suggests that the RCM and participatory planning are becoming synonymous in waste management EIAs, even though planning theorists usually present them as separate models. In the case of the OWMC's proposal, for instance, the Joint Board praised the Crown corporation for the level of effort put into effective and meaningful public participation.

But if public participation improves the quality of environmental planning, what led to the rejection of the waste management plans? Despite prolific empirical and theoretical research on citizen participation, little research has been done on the effectiveness of such programs. A number of planners question the usefulness of planning's preoccupation with participation (Day 1997). They argue that public participation may be counterproductive to plan implementation, especially when NIMBYism rears its head. This approach is consistent with the cynicism of the waste management literature regarding public involvement, which uses terms such as "public relations" (Burkart 1994) or managing "public reaction" (Shaw

2000) as part of an "efficient, linear, goal-oriented" engineering approach (Zeiss 1996).

"Failure" as Social Learning

Although the three waste management plans failed to live up to the success criteria associated with the RCM, the literature provides an alternative approach to plan evaluation—a social learning approach based on the traditions of advocacy and transactive and communicative planning. If citizen participation does promote better decision making and if most participatory waste plans have been abandoned, it may be possible that the failure to site facilities represented "correct" decisions. Although there are few new municipal waste disposal sites, Ontarians have increased their waste diversion rates. When the Joint Board turned down the OWMC's proposal for a hazardous waste disposal facility, waste quantities were already declining. In the case of Atomic Energy of Canada Limited, the Federal Review Panel made it clear that Canadians do not consider the deep geologic concept for nuclear waste disposal to be "socially acceptable."

This points to a need to understand de facto processes that may be at work in waste management planning. While the planning literature is preoccupied with rationality and participatory models, the waste management literature argues the benefits of alternative planning models such as incrementalism and modeling coupled with public relations.

Thus, one approach to explaining the paradoxes posed in the research questions is to reevaluate the model of incremental decision making. One of the beauties of incrementalism is that opportunities can be seized as they arise. Required Ontario regulatory compliance to EIAs may have helped to create new market opportunities in the private sector for waste management. The city of Toronto in 2005 boasted a 32 percent diversion of solid waste.[24] The Ontario Ministry of the Environment[25] also claims that between 1987 and 1997 (most updated MOE data available), Ontarians had reduced their wastes by 35 percent (despite population and economic growth) and between 1994 and 1998:

- municipalities increased their waste diversion by 45 percent, from 860,000 tons to more than 1.25 million tons;
- the backyard and central composting of organic materials increased by 57 percent from 300,000 tons to 470,000 tons (central composting grew by 95 percent); and
- materials collected through recycling programs (50 percent of the waste diverted from disposal), have increased by 43 percent from 450,000 tons to 650,000 tons.

Furthermore, the city of Toronto claims a 25 percent household recycling rate with a commitment from the council for 50 percent diversion by 2006 and 100 percent diversion by 2010.[26] A citywide source-separated composting initiative has also been implemented. The city of Guelph is achieving 56 percent overall diversion (i.e., combined residential and industrial-commercial-institutional) through its wet/dry recycling program (McGaritty 2000), despite three failed EIA landfill site searches and a failed incineration proposal. Guelph has now abandoned all new "greenfield" sites. It applied to expand its existing Eastview landfill, but subsequently abandoned the Eastview expansion and entered into a contract to export its residual waste to the United States (Hostovsky 2005).

Meanwhile, garbage continues to be picked up at Ontario curbsides, liquid industrial waste is not pouring indiscriminately into waterways, and nuclear fuel rods stored on-site at generating stations have not irradiated their host communities. Where is the waste "crisis"?

In fact, the so-called "waste crisis" has more to do with the inability to implement EIA decisions than with the lack of disposal capacity available to Ontarians. Disposal capacity is lacking only because waste planning places great importance on political boundaries. Ruth Grier's dictum, "Waste should be disposed of close to the people who generated it," still holds sway. But NAFTA has created a situation in which cost-competitive disposal capacity is available in the United States. Ontario may have entered into an age of de facto incremental planning by political decision makers, who nonetheless pay "lip-service" to participatory EIAs.

However, even if most of the Ontario case study decisions were "correct" in hindsight, we cannot ignore the bottom line. Waste planning needs to be more efficient in terms of time and money spent and in avoiding siting-related psychosocial impacts. This is especially true for Canadians who are busy with capacity building in waste management in the developing world. Poor countries in Southeast Asia cannot afford to spend the time and money Ontario does on a waste EIA.

► Conclusion—An Alternative Approach: Communicative Action

Despite the lack of a "waste crisis," we still have a waste problem:

> Public hysteria . . . has resulted in hundreds of millions being wasted. The Interim Waste Authority and the Ontario Waste Management Corporation cost Ontarians over $225 million without a spoonful of waste being treated or an ounce of solid waste being interred. And it would be easier and cheaper to locate gold, then mine it, than fund the environmental assessments of many landfill proposal hearings which drag on for years, costing many more millions. (Davey, 1996, 8)

Davey's (1996) assessment of failure is based on traditional outcome-oriented methods underlying plan evaluation. However, Faludi and Altes (1997, partly quoting Bardach) offer an alternative approach for plan evaluation:

> We should not necessarily count as a failure of the implementation process a result that originates in a more fundamental conceptual defect in the policy design. . . . "Good" implementation cannot by itself offset the ill effect of "bad" policy any more than a more perfect compass and straight edge can help us to square the circle. . . . It is necessary to recognize this special case of *failure-as-success* because policy making is often not a straightforward matter. . . . The upshot is that non-conformance of outcomes with the plan, conventionally counted a "failure," is not necessarily a bad thing. Also, implementation of a plan in conformance with original intentions, normally regarded a "success," can lead to undesirable outcomes. (p. 3)

Hence, departing from a plan can be as rational as implementing it. Faludi and Alters (1997, 5) go on to explain that in this special case, "planning raises choice to a higher level of awareness."

Alternatively, Healey (1996, 239) suggests that planners need a new planning paradigm, a "communicative conception of reality, to replace that of the self-conscious autonomous subject using principles of logic and scientifically formulated empirical knowledge to guide actions." She suggests that planning focus on mutual understanding, which will result in goals and objectives being discovered in a collaborative process.[27]

Communicative theory rejects the RCM's search for the "Holy Grail," since planning exists in a realm of competing political decision-making interests. Rationality tends to ignore the reality of modern politics, on the assumption that politicians will make the "best" decision (i.e., at the planner's recommendation) from a set of alternatives analyzed in the plan. Baum (1996, 371) states emphatically that this "assumption is unrealistic, and yet theorists continue to hold it."

Baum (1996) suggests that problems exist only in context, and that decisions should be made in that context, reflecting the interplay of communication, vested interests, politics, and negotiation. Healey (1996) adds that

> the reasoning employed can escape the confines of rational-scientific principles to include varying systems of morality and culturally specific traditions of expressive aesthetic experience. "Right" and "good" actions are those we can come to agree on, in particular times and places, across our diverse differences in material wants, moral perspectives, and expressive cultures and inclinations. (p. 243)

In communicative planning, the planner seeks to convey to decision makers a better understanding of the planning problem.

The rational model and communicative planning are not mutually exclusive; it appears that they may coexist and may already be operating in waste management programs in Ontario. Alexander (1996) reminds us that

> the reciprocal gap in the rationality model and the theory of communicative action is compelling. One paradigm cannot supplant another. Rather, these two models are complementary, each covering an aspect of the process that transforms ideas into reality that the other does not. (p. 54)

Waste planning does not have to repeat the same mistakes over and over again. In particular, public participation programs may require a different emphasis, which has less to do with project approval and more to do with the discovery of stakeholder values early in the planning process. Proactive, rather than reactive, consultation programs that rely on facilitation and negotiation techniques to develop consensus in decision making is one important prescription (rather than presenting decisions at large public meetings). This change will allow waste planning processes to build into their terms of reference explicit criteria that can terminate a siting process should it appear that the site is not socially acceptable. Finally, decision making needs to be depoliticized to rely more heavily on the influence of those who are skilled in interpreting the results of communicative planning (e.g., facilitators).

Future research in waste planning should focus on designing a rational comprehensive approach that would move beyond mere consultation to a form of communicative planning—understanding that the positivist approach and communicative planning work hand in hand. Hopefully, this will lead to consultation that is less socially divisive by integrating techniques that resolve disputes rather than escalate conflict.[28]

► Notes

1. MacLaren (2004) has identified these three categories of waste classification, based on technical reasons requiring that different types of waste be kept separate for disposal purposes. Each type has its own set of management technologies (sewage sludge is not be considered in this study).

2. The 4th R, "recovery" (of energy from waste through incineration), was dropped in Ontario in 1992 when Ruth Grier, minister of the environment, banned new incineration of municipal waste.

3. The 1976 Resource Conservation and Recovery Act (RCRA) was an improvement on the original 1970 Resource Conservation Act, which was not enforced and largely ignored (see Tarr 1985).

4. The Environmental Assessment and Review Process (EARP) was superseded by the Canadian Environmental Assessment Act of 1995.

5. The author draws information on the three case studies from empirical doctoral research and from his twenty-plus years of professional planning experience working on all three case studies. He was employed with the Ontario Ministry of the Environ-

ment's Waste Unit, Environmental Assessment Branch, and as a project manager with major consulting engineering firms.

6. The author was involved directly in the administration of the Waste Management Master Plan (WMMP) program while employed with the Ministry of the Environment (MOE) in the 1980s and as a consultant (project manager) to several WMMP clubs in the 1990s.

7. The author was employed at the MOE at the time and was involved in setting up the Interim Waste Authority (IWA). Later he was retained by the town of Caledon and a citizen's group, Bolton PROBE, under the Intervenor Funding Project Act, to review the IWA's Environmental Assessment (EA) and to act as expert reviewer/witness at the Joint Board hearing, which was cancelled in 1995.

8. The author will attempt to explore this interesting development in follow-up study to this paper.

9. The author was retained as a peer reviewer to the MOE for the development of the Sectoral Environmental Assessment Plan.

10. Personal communications, Waste Unit supervisor, MOE EA Branch, April 1998.

11. Ten small, mainly remote, landfills have been approved in Northern Ontario.

12. Over the course of the Ontario Waste Management Corporation (OWMC) study, the author was involved in 1983 as an Environmental Intern with an NGO (Pollution Probe Foundation) providing advice to the Mississauga Citizens' Environmental Protection Association (1984); as an environmental planner reviewing the EA for a government review agency (1986); and finally as the last consultant to work for the OWMC project, managing the Ontario Hazardous Waste Survey in 1994.

13. Ontario Hydro had an interest in the project because of its history of seeking and often receiving ministerial EA Act exemptions for their generating stations and transmission corridors.

14. As reported in the *Globe and Mail*, November 25, 1994. However, these costs are hard to quantify and may be understated, as wages for government employees were not be factored into the estimate.

15. Joint Boards combine members from the Environmental Assessment Board and the Ontario Municipal Board under the auspices of the Consolidated Hearings Act.

16. The author was hired, early in 1994, to project manage this survey.

17. Hazardous waste as defined by Regulation 347, Environmental Protection Act.

18. After reviewing the data from the survey, the author was asked by the OWMC to manipulate the numbers to indicate greater waste quantities. When he refused, the OWMC fired him, quietly terminated the project, and did not enter the data as evidence in the board hearing.

19. The author was part of the research team on the nuclear fuel EA for one year when he was employed at Ontario Hydro.

20. The EA/Environmental Impact Statement (EIS) could have been a joint submission under the Ontario EA Act and the federal EARP process. However, through negotiation, it was determined that the preferred regulatory process was to use EARP only.

21. The United States spent approximately US$2 billion on siting for nuclear waste; see McCombie (1999).

22. http://www.nwmo.ca.

23. http://www.nwmo.ca/ (accessed January 17, 2005).

24. http://www.toronto.ca/reuseit/ (accessed January 17, 2005).

25. "Waste Diversion Information and BlueBox Funding." See http://www.ene.gov.on.ca/envision/news/06099mb.htm (accessed October 23, 2000).

26. Toronto has recently made a commitment to divert 100 percent of the waste stream in ten years. "Backgrounder, August 2, 2000, Toronto's 'TIRM' Project." See http://www.city.toronto.on.ca/involved/swm/disposal_bground.htm (accessed October 23, 2000).

27. This is consistent with Friedmann's (1973) notion of "transactive" planning.

28. The author is already conducting this research through a detailed case study analysis of the Guelph/Wellington Waste Management Master Plan. See Hostovsky (2005).

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