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Volume 25, Number 65, 1981

URI: <https://id.erudit.org/iderudit/021515ar>

DOI: <https://doi.org/10.7202/021515ar>

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Publisher(s)

Département de géographie de l'Université Laval

ISSN

0007-9766 (print)

1708-8968 (digital)

[Explore this journal](#)

Cite this article

Norcliffe, G. B. (1981). Industrial Change in Old Port Areas, the Case of the Port of Toronto. *Cahiers de géographie du Québec*, 25(65), 237–253.
<https://doi.org/10.7202/021515ar>

Article abstract

L'association classique entre les ports et les industries doit être réexaminée. Traditionnellement, les industries situées dans les zones portuaires étaient dépendantes du fonctionnement du port lui-même, des navires, et des marchandises transportées par ces navires. Récemment, par suite de changements technologiques, la zone située à proximité des quais centraux a vu apparaître des usages résidentiel, récréationnel, commercial et institutionnel, alors que de nouvelles industries ont été attirées par les vieilles zones portuaires qui sont contiguës. Ces nouvelles industries ont un rôle tout différent, car elles sont associées aux fonctions de la ville elle-même. Elles comprennent les industries associées au marché urbain régional, les industries nuisibles pour l'environnement et les industries étroitement dépendantes de la main-d'oeuvre. Beaucoup d'industries dépendant directement du port ont émigré dans les zones situées en aval ou dans des sites d'eau profonde à proximité d'espaces vacants. Ces changements sont illustrés à l'aide du cas du port de Toronto et de l'exemple de quelques grandes villes portuaires canadiennes.

INDUSTRIAL CHANGE IN OLD PORT AREAS The Case of the Port of Toronto

by

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ABSTRACT

The classical association of ports with industry needs revising. Traditionally, industry in the port area was concerned with the port operation itself, with ships, and with the cargoes transported by the ships. In recent years, as a result of technological changes, land use in the central waterfront has tended to switch into residential, recreational, commercial and institutional uses, while new industries have been attracted to the adjacent old port-areas. These new industries have an entirely different role, being much more closely tied to the function of the city itself. They include: industry oriented to serving the local urban market; noxious industry; and labour-oriented industry. Many port-related industries are now located downriver or at deep-water greenfield locations where extensive sites are available. The illustration of these changes is presented with a case study of Toronto and the example of some major Canadian port cities.

KEY WORDS: Industry, ports, urban development, technological change, Canadian port cities, Toronto.

RÉSUMÉ

Transformation des espaces industriels dans les vieilles zones portuaires. Le cas du port de Toronto.

L'association classique entre les ports et les industries doit être réexaminée. Traditionnellement, les industries situées dans les zones portuaires étaient dépendantes du fonctionnement du port lui-même, des navires, et des marchandises transportées par ces navires. Récemment, par suite de changements technologiques, la zone située à proximité des quais centraux a vu apparaître des usages résidentiel, récréationnel, commercial et institutionnel, alors que de nouvelles industries ont été attirées par les vieilles zones portuaires qui sont contiguës. Ces nouvelles industries ont un rôle tout différent, car elles sont associées aux fonctions de la ville elle-même. Elles comprennent les industries associées au marché urbain régional, les industries nuisibles pour l'environnement et les industries étroitement dépendantes de la main-d'oeuvre. Beaucoup d'industries dépendant directement du port ont émigré dans les zones situées en aval ou dans des sites d'eau profonde à proximité d'espaces vacants. Ces changements sont illustrés à l'aide du cas du port de Toronto et de l'exemple de quelques grandes villes portuaires canadiennes.

MOTS-CLÉS : Industries, ports, développement urbain, changements technologiques, villes portuaires canadiennes, Toronto.

Until recently, the prevailing image of a port was of a place of commerce and industry, with an intermingling of ships, wharves, cranes, warehouses, factories, storage tanks, customs sheds and railway tracks. There are numerous literary and artistic references to this image, amongst which New York's grimy industrial port area used in the film *On The Waterfront* is a good example. Another is Fairford's description of the port of Quebec City at the turn of the century: "the whirr of wheels is heard on the streets, clouds of smoke rise from the stacks of varied industries, and the wharves and docks are alive with commerce" (Fairford, 1914, p. 75).

Geographers have also depicted the juxtaposition of ports and industry, though in somewhat more prosaic terms. Thus Allan Pred (1962, p. 78):

In this brief span of years [1868-1890] Göteborg's stature as a port and manufacturing centre was considerably amplified. New docks, some of them equipped with rail facilities, were constructed and the harbor was deepened to take ships with up to nine meters draft. The value of industrial output not only more than doubled, but kept pace with that of Stockholm.

and Frank Walker (1946), p. 174):

The industrial life and development of the City of Bristol and the area immediately surrounding it is very closely linked with its function as a port, and the link of cause and effect is a two-way one. Many aspects of industry in Bristol arise from handling and processing commodities which dominate the trade of the port, whilst on the other hand many of the peculiar features of the trade of the port itself arise from the specialised industrial character of its immediate hinterland.

This historical association of port functions with commerce and industry is well founded¹. In the period from the mid-nineteenth century to the Second World War, all major ports, almost without exception, were also important towns. Conversely, most major towns also had a significant port function, although there were some exceptions. Indeed for historical reasons this is still the case today so that three quarters of the world's one hundred largest cities listed in Kingsley Davis' *World Urbanization* are, or were, sea, river, or lake ports (Davis, 1969)².

In recent years, a profound change has taken place in the relationship between ports and industry. This change is part of an even broader transformation occurring on the urban waterfront (Forward, 1969; Harrison and McLaren 1978; Merrens, 1980). The main purpose of this paper is to outline this change in the structure and function of industry in old port areas, in so doing setting the discussion in the broader context of technological innovation, transportation development, and changes in urban structure. Commercial, recreational, residential and institutional land uses have replaced port-related activities on the central waterfront of many North American port cities. In surrounding old port areas industry not related to the port function has often grown to become a bigger source of employment than port-related industry. These trends are particularly evident in the Port of Toronto which will serve as the main illustration³.

THE HISTORICAL SETTING

In an historical review of the intrametropolitan location of manufacturing industry, emphasis has to be given to the port as one of the major manufacturing places within a city. Indeed Pred (1964, p. 174) suggests that in the American case, waterfront industries formed a single cohesive entity:

The commanding position of the waterfront derived from the fact that in every colonial town the principal industries were those that had to do with shipping and the preparation of

provisions or naval stores for export. Ship-building was quickly established as a vital waterfront activity in (the) seventeenth century... Accounts... relate the importance of rum distilling, sugar refining, and rope making. (Pred, 1964, p. 166).

Broadly speaking, three types of industry are located in the port area: those associated with the port operation itself; those related to the ships using the port; and those based upon the cargoes passing through the port. The presence of these three types of industry can be accounted for by different elements of location theory.

Activities such as pilotage, tug operations, stevedoring and warehousing were an integral part of the port operation, hence their location was mandatory. Ship-related industries are of greater interest because they displayed some locational flexibility. Shipbuilding and repairing, sail and canvas making, ships chandlers, rope making and related industries were commonly located in ports, but the relationship was not mandatory as it was for port operations. For instance, shipbuilding and repairing has never been important in the Port of Toronto; the main shipbuilding centre in Ontario throughout the twentieth century has been the small town of Collingwood on Georgian Bay. Despite such exceptions, up until the Second World War there was a fairly strong association between ports and ship-related industries that is explained fairly satisfactorily by three elements of classical location theory—market orientation, agglomeration and labour orientation. Specifically: ships in port obviously constitute a market for ship-related industries; linkages between ports and ship-related industries generate a range of agglomeration economies; and perhaps less obvious is the fact that shipbuilding and repairing are extremely labour-intensive and hence should be attracted to labour locations (Hoover, 1948, p. 103)⁴.

The best theoretical explanation of cargo-related industries is provided by E.M. Hoover (1948, p. 40) in his discussion of industry located at transshipment points where break of bulk takes place. He states:

... by locating the production process at the transshipment point, the total transport costs will be minimized, since neither material nor product will then have to be shifted from ship to car. The material will use water transport only, and the product rail transport only... The principle has an obvious bearing on the strategic advantages of ports... as manufacturing centres.

There are many studies of individual ports which describe the growth of cargo-related industries. To cite just one example, in a study of the port of New York from 1815 to 1860 Albion (1961) identifies a wide range of break-bulk industries based on the port's trade in dry goods, hardware, and wet goods, including the manufacture of: cotton and cloth; furniture; carriages; tobacco; wood products; cordage and canvas; flour; sugar; and leather.

THE IMPACT OF TECHNOLOGICAL CHANGE

With the passage of time, obvious changes took place. Steamships replaced sailing ships, larger docks and deepwater berths were constructed, improved lifting gear was installed, and refrigeration was adopted (Bird, 1971; Slack 1975 and 1980). Nevertheless, the broad patterns of association between ports and industry did not change fundamentally from the early nineteenth century until relatively recently. The exact date which marks the beginning of the new era is difficult to pinpoint but it is quite clear that all three types of industry traditionally present in old port areas have undergone a profound change in recent years.

Table 1
Changes in the number of ships calling and tonnage
of cargo handled at selected Canadian Ports
1967-1977

	<i>Percentage change in number of ships calling (excluding ships in ballast)</i>	<i>Percentage change in total tonnage handled</i>	<i>Percentage change in total tonnage per ship calling</i>
Montréal	-44,5	- 0,2	+ 79,6
Toronto	-66,0	-48,2	+ 52,4
Vancouver	-43,5	+36,1	+140,8
All Canadian Ports	-51,3	+35,6	+178,5

Source : Statistics Canada, Shipping Report; Part II, International Shipping (by Port); and Part III, Coastwise Shipping. (Ottawa: Statistics Canada 54-203 and 54-204) 1867 and 1977.

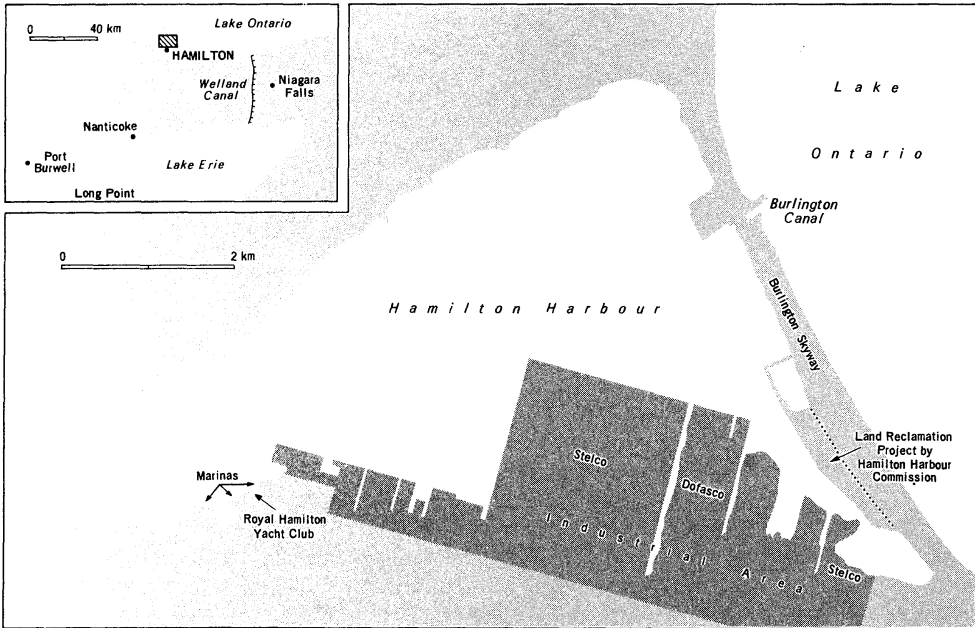
Industries associated with the port operation itself are still in evidence. However, dramatic increases in vessel size have resulted in greater tonnages being handled per ship movement. For instance, even in the short period from 1967 to 1977, the average cargo tonnage handled per ship calling in the ports of Toronto, Montreal and Vancouver increased by 52, 80, and 140 percent, respectively, and in all Canadian ports it nearly tripled (see table 1). This has reduced the demand for such support activities as pilot and tug services, there are fewer movements through lock and tide-water dock gates, and so on. Mechanisation has also drastically altered manpower/tonnage ratios. Bulk cargoes are now typically loaded and unloaded using specialised gear, indeed on the Great Lakes many of the bulkers are self-loading and unloading so that operations require virtually no longshoremen (Darling and Shaw, 1978). A similar development—SPM's (single point moorings)—is described by Slack (1980). These consist of buoys or fixed towers sited offshore, linked by submarine pipelines to the shore. Liquid cargoes and slurries can be loaded or unloaded and again longshore employment is minimised.

Handling general cargo, was, in the past, the main source of longshore employment. The container revolution, which Wallace (1975) dates to the mid 1960's in Canada, brought about precipitous changes both in the way goods are handled and the ports involved in the trade (Hayut, 1981). Thus in the early 1960's Halifax and Saint John were reduced to handling small amounts of general cargo following the extension of St. Lawrence winter navigation up-river to Montreal. However, with the subsequent construction of container terminals, Halifax and Saint John have recovered as major general cargo ports, although this has not created a great deal of local employment⁵ (Norcliffe, 1980). Containerisation and roll-on roll-off (RoRo) technologies have focussed much of Central Canada's general cargo trade on Montreal, and the two major Atlantic ports, in so doing depriving the Port of Toronto of much of its former trade⁶ (Ramlal-singh, 1975).

Equally profound have been the changes in ship-related industries. Many traditional activities such as rope making have long since disappeared from most ports. The major changes in shipbuilding occurred in the wake of the Second World War. Western shipyards declined in a disorderly manner as the Japanese, and subsequently the Korean shipbuilding industry went from strength to strength. To cite just one example: employment in shipbuilding in Great Britain declined at a compound negative growth rate of -2,6 percent per annum from 1954-1973, and from 1956 to 1976 employment in shipbuilding and marine engineering declined from 302 000 to 171 000

Figure 1

T H E P O R T O F H A M I L T O N



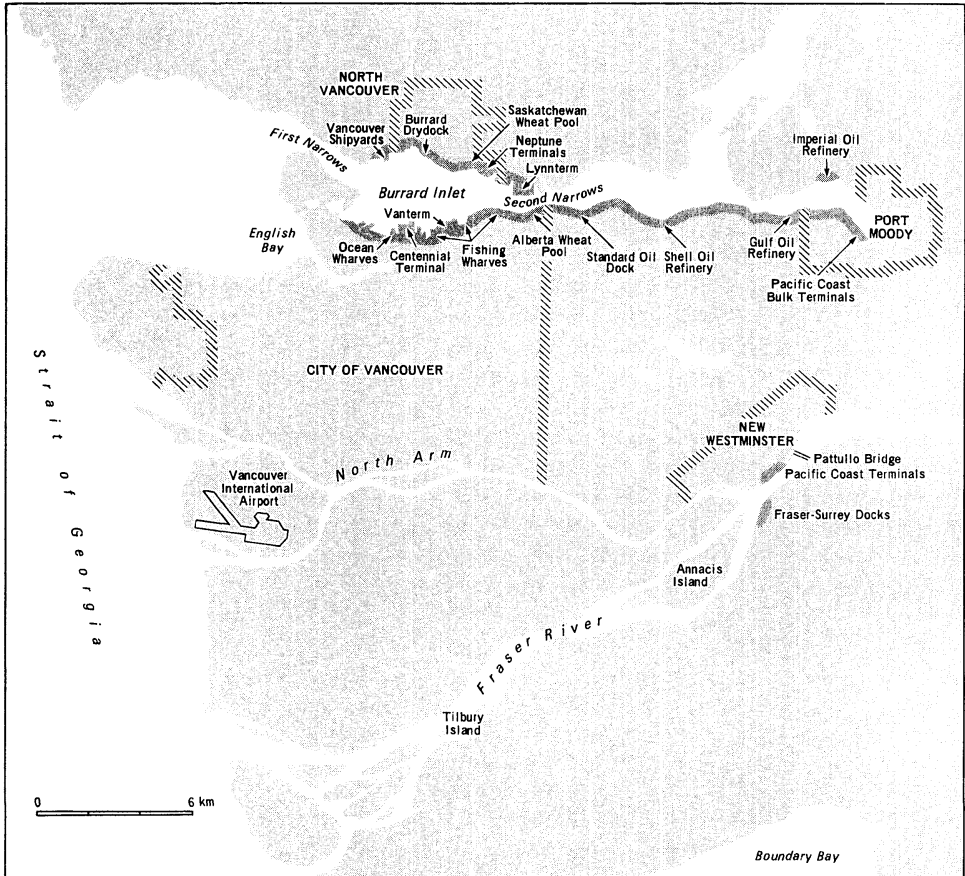
(Wragg and Robertson, 1978). Ship repairing was less affected, except that the launching of so much new shipping in the 1960's and 1970's led to the scrapping of numerous older vessels which had previously needed regular repair work. The upshot of these developments has been a decline in employment in ship-related industries in most ports.

No less substantial are the changes in industries associated with the cargoes passing through ports. Least affected are industries that have long been established and which are subject to considerable inertia. For instance, Hamilton is still Canada's leading steel-making town, with virtually all of its coal and ore inputs transported by ship. Sugar refining is still an important industry in the port area of Toronto. Fish packing plants and sawmills are in evidence on the waterfront of Vancouver. Nevertheless, even these long established industries are subject to change. For instance, one of Hamilton's major steel makers has located a major new plant on a greenfield site at Nanticoke on Lake Erie, while the other leading Hamilton steel maker owns a large undeveloped lakeshore property at Port Burwell on Lake Erie (figure 1). Similarly, a number of resource-based waterfront industries formerly situated in Central Vancouver have relocated elsewhere on the Burrard Inlet or along the North and South Fraser River (figure 2) (Steed, 1973). In Montreal there has been a general shift of port industry downriver (Slack, 1975), including the construction of Sidbec's steel plant at Contrecoeur, 30 miles below Montréal (figure 3). At present new quays are being constructed at Longue Pointe to make this the main area for handling break-bulk and container traffic in the Port of Montréal.

Aside from the secular trends of mechanisation and job-elimination three other new developments have affected cargo-related industries. Growth of vessel size has

Figure 2

PORTS IN THE GREATER VANCOUVER REGIONAL DISTRICT

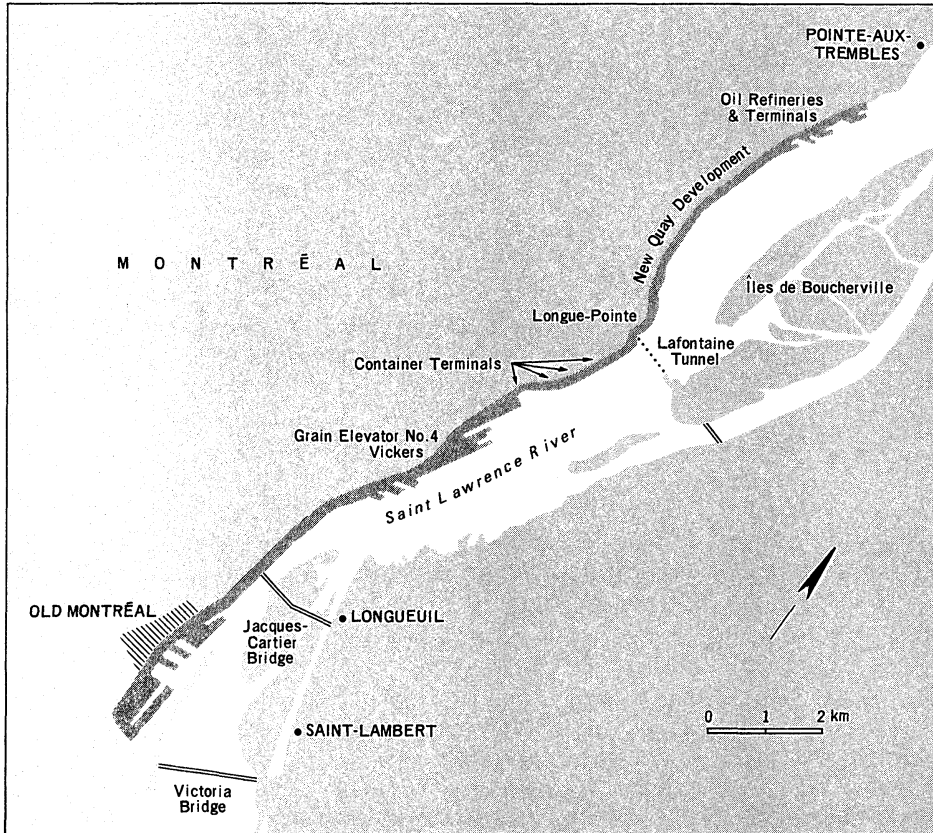


had a profound effect on the shipping industry, with the need for progressively deeper berths altering the status of many ports. Thus Halifax's magnificent harbour can only accommodate ships which draw up to 60 feet, meaning that the largest supertankers have to go elsewhere. Port Hawkesbury, 100 miles further north, can accommodate supertankers, and Gulf Oil have located a major oil refinery there⁷. Other major industrial establishments at Port Hawkesbury make pulp and paper, heavy water, repair ships and a thermal electric generating station uses oil from the adjacent refinery (figure 4). In terms of value added, Port Hawkesbury has become an industrial centre of regional significance. However, like many modern ports, the industries located there are very capital intensive. Direct employment in the five major establishments in 1975 was close to 1 500 which is not great given that the capital investment in these five establishments approaches one billion dollars (Canada-Nova Scotia Strait of Canso Environment Committee, 1975).

The second change is the increase in the value of central waterfrontland. This often needs coupling with the lack of back-up space in old port areas. Montréal is a

Figure 3

THE PORT OF MONTREAL

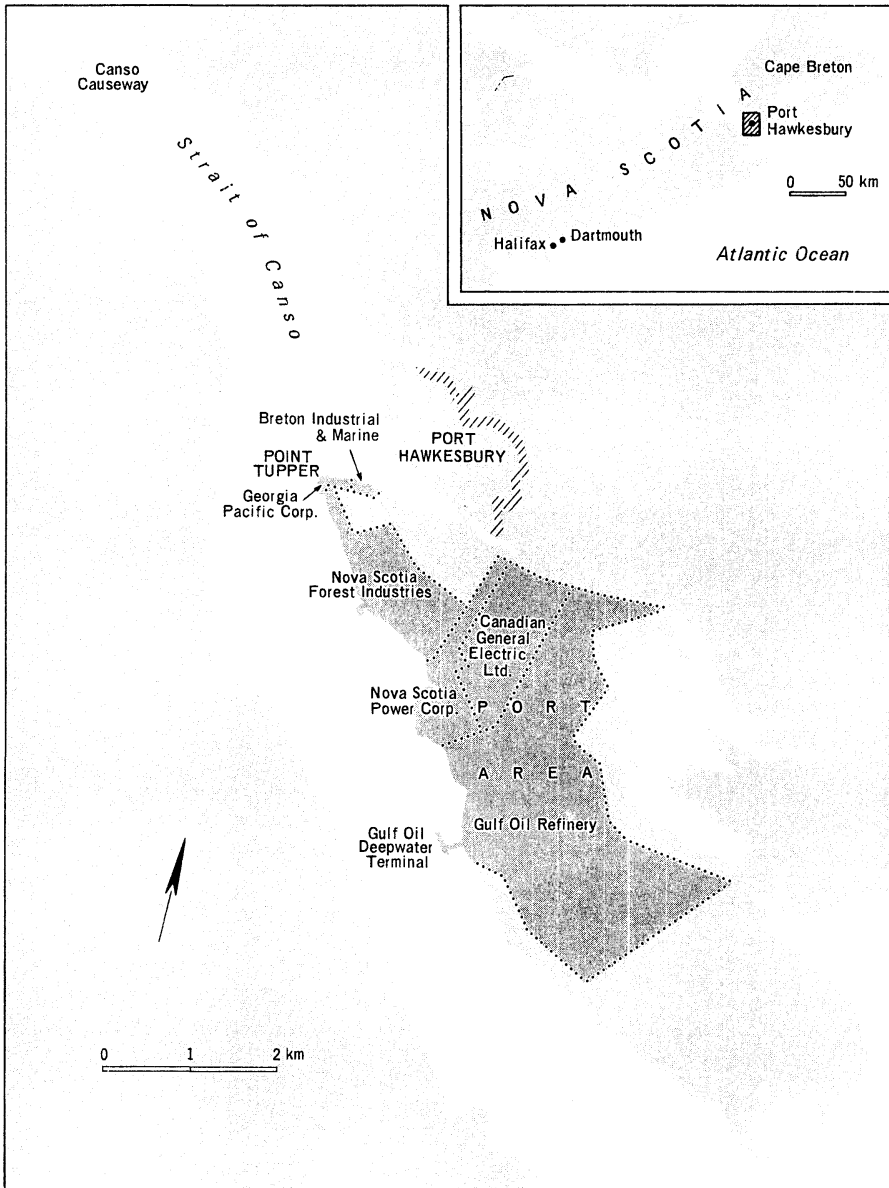


good example of this process, with port activities moving downriver in part because the berths there are deeper, and in part because of the very restricted storage space on wharves in the old port area (Slack, 1975). The central waterfront of Toronto has likewise witnessed the progressive moving out of port industries, to be replaced by Harbourfront Park, the Harbour Castle Hilton Hotel and similar developments.

The third change in cargo-related industry is the decline in the use of ports for warehousing and related activities following containerization. Thus, whereas general cargo ports were formerly important warehousing and storage locations, the essence of a container operation is to move boxes through a port with minimal delay. The Canadian Department of Regional Economic Expansion (1975) has suggested that a major "gateway" warehousing centre be created outside Halifax. One of the reasons for arguing that this concept is unlikely to succeed is that its operation is inimical to the operation of a modern container port. It would involve opening containers, and repacking them in a peripheral port located nearly one thousand miles from the centre of the North American market (Norcliffe, 1980).

Figure 4

PORT HAWKESBURY AND NOVA SCOTIA'S NORTH SHORE



The foregoing discussion has ranged widely, but it is directed to the following conclusion: that the original association between ports and industry has, to a considerable degree, evaporated. Some port-related industries are still to be found in old port areas,

partly for economic reasons, and partly because of locational inertia. But mechanisation and other technical changes have greatly reduced employment in the port operation itself; ship-related industries have waned; and while some cargo-related industries have survived, many new establishments have been located at new sites, either down river (in the case of many estuarine ports) or at new deepwater harbours.

Yet despite these changes, substantial concentrations of industry are still found in old port areas. This may appear to be an anachronism in view of the evident decline of traditional port industries, but new kinds of industries have moved in to replace the old. The remainder of this paper is concerned with these new industries. The discussion will focus on the Port of Toronto which manifests many of these trends.

LOCATIONAL FACTORS IN THE EMERGENCE OF NEW PORT-AREA INDUSTRIES

Three new types of industry have appeared in old port areas: industries serving the local urban market; noxious industries; and labour-oriented industries. Rarely do these three new types of industry use the port itself to transport inputs or outputs. In many instances they have simply occupied sites vacated by declining port industries. In some cases, however, new port industrial sites have been created adjacent to the waterfront in the belief that their availability would generate new port industries. Quite often, the supposed demand has turned out to be illusory, and the sites have eventually been let or sold to the new types of port-area industries which do not use port facilities.

The growth of industries serving the local urban market, particularly the inner city market, must be set in the context of modern changes in urban structure. The massive suburbanization of industry is widely recognised (Hamer, 1973; Keeble, 1978). Meanwhile white collar employment has grown at the centre of most western cities as high office blocks have sprouted skywards (Daniels, 1979; Gad, 1975). The city as a whole, and the burgeoning office industry in particular, generate demands for a variety of industries and services, that need to be located in close proximity and which, therefore, are strongly market-oriented. The optimum location is generally one close to, but not actually in the inner city. For reasons well-known the bid-rent for sites in, and immediately adjacent to the CBD is very high indeed, and is sufficient to deter these industries from locating there. But land prices and rents in the port-area tend to be considerably lower. For instance, in the case of Toronto in 1979, land in the Spadina industrial district (immediately to the west of the CBD) sold for prices in the range from 30 \$ to 40 \$ per square foot, compared to 3 \$ to 8 \$ in the port industrial area which is situated roughly 2 miles from the CBD. The port area therefore constitutes a reasonably priced land market for industries serving the inner-city. Moreover, with the decline of traditional port industries, sites and premises zoned industrial have become available.

The location of noxious industries in the port area can be explained better in terms of conflict theory than in terms of economic location theory. One of the more pertinent remarks made by Galbraith (1977) in the *Age of Uncertainty* is that when modern light industry is located in landscaped industrial parks it can be visually quite appealing. For such industries the term "park" is not entirely a misnomer, indeed the main undesirable environmental spin-off is traffic. But there remain many industries which are not at all attractive, including the majority of public utilities. Meanwhile, people have become more demanding about the types of industry that they will tolerate close to residential areas. This conflict is resolved by locating noxious industries—those that

Table 2
Total cargo handled in the Port of Toronto
selected years

Year	Tonnage (short tons)
1957	5 007 228
1961	5 079 433
1965	6 070 743
1969	6 345 854
1973	3 415 721
1977	2 982 199
1979	2 724 947
1980	2 797 482

Source : Statistics Canada, Shipping Report; Part II, International Seaborne Shipping (by Port); and Part III, Coastwise Shipping (Ottawa: Statistics Canada 54-203 and 54-204) various years.

are noisy, produce smoke, dust, steam and offensive smells, are dangerous or flammable, generate heavy traffic, look ugly or simply have a bad image—in areas separated from residential, commercial and recreational areas. Since port industries themselves generally fit in this category, old port areas have increasingly become a refuge for noxious industries. The process of segregating noxious industries has often been accelerated by municipal zoning regulations.

Scott (1980) has recently shown that the urban labour market has an orderly spatial structure, with low wage rates for manual labour prevailing in the inner city and high wage levels in the suburbs. Conversely, capital costs—especially for land—are much lower in suburban areas than in the city Centre. Scott then applies the Heckscher-Ohlin theory at the intra-urban scale to explain the attraction of labour-intensive industries to the city centre, and capital-intensive industries to the suburbs. This theory of production is also used to interpret intra-urban locational dynamics: industrial suburbanisation is a direct consequence of the adoption by manufacturers of increasingly capital-intensive technologies.

Despite this evident shift to suburban locations, there remain a variety of industries which are characterised by labour-intensive technologies, short-production runs, low levels of inventory, and specialisation in custom-work. For these industries, the inner city is the preferred location. Within the inner city, these industries seek out areas with relatively low site costs, including old port areas. Thus to use Weber's terminology, the port area has become a labour location.

INDUSTRIES IN THE PORT AREA OF TORONTO

The recent history of the Port of Toronto is checkered. Following the opening of the St. Lawrence Seaway in 1959, there was a modest upswing in the Port's trade as ocean-going vessels entered the Great Lakes. Throughout the 1960's the total annual trade hovered around 6 million tons a year, but it began to decline after 1970. As table 2 shows, in recent years the tonnage handled has been only half the amount handled a decade ago. Indeed in terms of gross tonnage loaded and unloaded, Toronto no longer appears amongst Canada's top twenty ports, although if emphasis is put on general cargo, then its status is a bit higher. What does, in a sense, identify Toronto as a major port is the very substantial industrial area adjacent to the Harbour

Table 3
Characteristics of Port and Port-Area Industries, Toronto, 1978

Type	Frequency	Employment		Area occupied (acres)	Employment per acre	Depreciated value per employee \$000
		total	%			
<i>Port Industries</i>						
Port operations	1	250	4,2	120	2,1	n/a
Ship related	1	38	0,6	5	7,6	n/a
Cargo related	21	960	16,1	199	4,8	304
<i>Port-Area Industries</i>						
Market-oriented	8	1 441	24,1	45	32,2	53
Noxious	8	831	13,9	230	3,6	320
Labour oriented	3	2 458	41,1	26	93,0	49

Source: Interview data.

which is nearly 700 acres in extent. Traversed by the Ship Channel, and with quays along the Harbourfront, East Bayfront, and Keating Channel, approximately 12 kilometers of dockwall are potentially available for industry (figure 5).

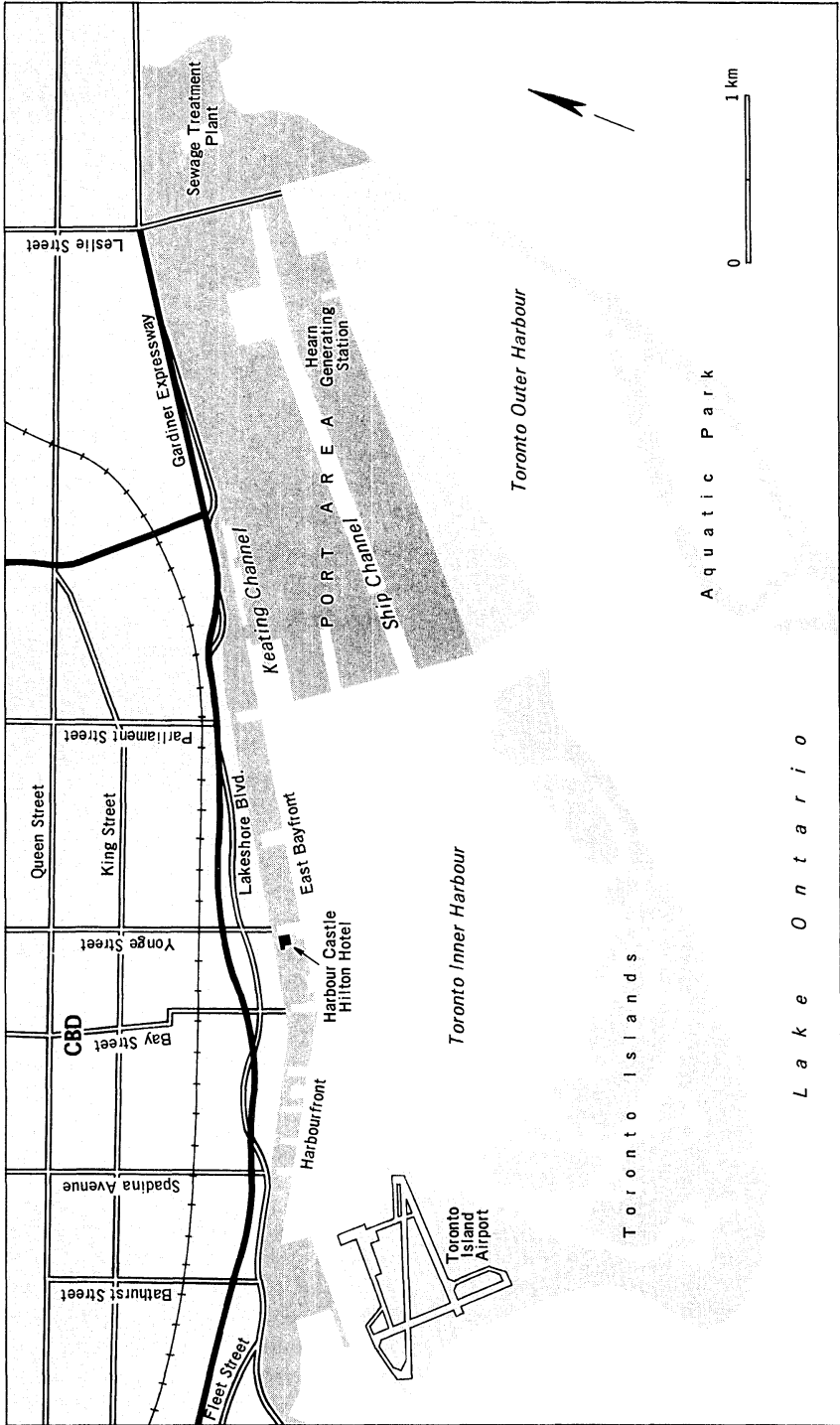
The analysis that follows is based on a structured interview survey in 1978 of 42 establishments located in the three industrial areas of the port⁸. The largest of these, known as the Port Area, has some 600 acres of industrial land. East Bayfront extends along the north side of the Inner Harbour with some 40 acres of industrial land. To the west of this is the 94 acre federally-owned Harbourfront, now occupied by non-industrial users. To the west again is Fleet street with some 22 acres of land used for industry. The make-up of industry in the Port Area of Toronto in 1978 is given in table 3. The industries are grouped into the six proposed categories, and a few key statistics are recorded for each category. The characteristics of each category will be considered in turn. The port operation is run by Toronto Harbour Commission, while one small firm did repair work to ships. With only one observation in each category, it is difficult to generalize.

Cargo-related industries constituted the largest group of establishments. Specific activities included malting barley, soya milling, sugar refining, rendering animal fats and oils, manufacturing chemicals, distributing molasses, storing coal and salt, and (the largest sub-group) distributing oil and petroleum products. Because storage is important to these activities they are big space consumers. They do not, however, generate much employment per unit area. Capital inputs tend to be quite large, mainly in the form of plant and equipment, although considerable commodity capital is locked up in stored inputs and inventory.

For nearly all of these cargo-related industries, the stated reason for originally choosing a location in the Port of Toronto was because of the importance of lake transportation for shipping inputs and/or outputs, and the advantage of proximity to the Toronto market. Many of the firms were long established, and several suggested that they would make a different locational choice if given the option today. Two firms said they would prefer to move to smaller ports on Lake Ontario where land costs were cheaper. The most interesting sub-group consisted of 11 oil distributing firms. Originally, most of the oil was transported by water, but the vast majority of the inputs are now brought to the port by pipeline from Sarnia. Indeed, heavy fractions such as bunker C

Figure 5

T O R O N T O ' S P O R T A R E A



oil are the only types of oil now transported to Toronto by ship. Given the expansion of Toronto's suburban market, two of the oil companies were in process of relocating to suburban Downsview at the time of the interviews, and several others said they were considering following suit. It is anticipated that within a few years oil distributing firms will have largely quit the port area due both to the change from ships to pipelines for transportation, and the availability of cheaper land in suburban areas.

Market-oriented industries located in the port area included a major truck delivery firm, printing, engineering, oil recycling, the manufacture of paper boxes and corrugated containers, pipe fitting, and warehousing steel parts. Only one of the 8 enterprises made any use of the port, and for that one firm the port accounted for only 20 percent of the inputs (by weight). All of these firms stated that centrality with respect to the Toronto market was the primary reason for locating in the port area. The firms were generally satisfied with their choice of location, and only one was actively considering relocating to the suburbs. Consistent with the interpretation offered above, these firms made comparatively intensive use of space, and they were labour rather than capital intensive (table 3).

The noxious industries fall into two sub-groups: public utilities, and re-cycling operations. Somewhat different locational factors apply to the three utilities. The Hearn generating station was fuelled by coal, transported by ship, until the early 1970's when natural gas was chosen as the major fuel. A port location has therefore become somewhat incidental for the generating station, although the lake is important as a source of water for cooling. Lake water is also essential for the Ashbridge's Bay Sewage Treatment Plant. The City of Toronto incinerator makes no use of the port, and in this and other respects has much in common with the recycling operations, including auto wreckers, scarp metal dealers and fibre recyclers. Overall, this group makes extensive use of space, is capital intensive, does not generate a great deal of employment and makes minimal use of the port.

The final group consists of labour-oriented activities. These are firms which identified access to the inner city labour market as the key locational factor. Although only 3 firms belong to this group, they account for more jobs than any other group. They have much in common with the market-oriented industries, having similarly low capital inputs and even larger labour inputs. Indeed the firms concerned, a brewery, a tailoring firm, and a manufacturer of asphalt shingles, indicated that market access was a factor in their choice of location.

It would seem that as far as employment is concerned, "port-related" industries account for under 25 percent of jobs in the port area. Industries not related to the port account for over three-quarters of port area employment, they use space much more efficiently than port industries, and involve smaller capital outlays. The relative unimportance of port industries in Toronto can be illustrated in other ways. Of the 42 firms interviewed, only 17 (40 percent) make any use of marine transportation and for some of these the use is minor. The breakdown of inputs and outputs by transportation mode is revealing (table 4). In 1978 the greatest input, by weight, was transported by pipeline with almost double the tonnage that was transported by ship. Outputs are distributed overwhelmingly by truck. The date of establishment of firms that do, and do not use the port is also of interest (table 5). Only one port user operating in 1978 had located in the port area in the 1970's.

The foregoing has considerable bearing upon the current debate on the future use of land in Toronto's port area. Much of the land is owned by Toronto Harbour

Table 4

**Transportation mode for inputs and outputs:
Industry in the Port-Area of Toronto, 1978**

Mode	Inputs		Outputs	
	tonnage (000 short tons)	%	tonnage (000 short tons)	%
Trucks	959,5	18,1	3 919,9	85,9
Rail	497,5	9,4	417,5	9,2
Ship	1 799,8	33,9	223,8	4,9
Pipeline	2 048,0	38,6	—	—
	5 304,8	100,0	4 561,2	100,0

Commission which has generally leased, but occasionally sold land in the Port Area. In 1980, close to 100 acres of existing industrial land lay vacant. Yet at the same time options were being considered to develop a further 400 acres of land adjacent to the Outer Harbour, and in October 1980 a Task Force recommended the creation of a 100 acre Industrial Park which involved landfilling and the creation of new dock-wall on the Outer Harbour (Port Industrial Development Task Force, 1980). Potentially, up to 10 000 jobs could be created if this whole area were developed (Goodspeed, 1980).

Table 5

Date of establishment of firms by Port use

	Year established			
	Pre 1950	1950's	1960's	1970's
Port using	5	7	3	1
Non-port using	10*	5	3	5

* 3 of these firms were formerly port using.

One of the central issues in the debate to develop these lands concerns what kind of industry should be located there. The Toronto Harbour Commission is the dominant land owner. Given its responsibility for the port, and the importance of port charges as a source of revenue, the Harbour Commission is anxious to attract new port-using industries. It has reservations about giving up much space to industries that do not use port facilities. The City Planning Department, in contrast, is more concerned about the loss of 78 100 industrial jobs from the City between 1950 and 1971. They see little future for port-related industries and their main priority is to create new industrial jobs in the city. The Task Force recommendations represent a compromise between these two points of view. Faced with 20 \$ million in short term debt and owning considerable idle land, Toronto Harbour Commission finally accepted that a park for industries that will not make use of the Port was desirable, and also agreed to sell some of its own lands. At the same time the City of Toronto accepted the Commission's plan for additional landfilling and the creation of new dockwall, both of which would appear to be unnecessary.

CONCLUSION

It is abundantly evident that the central waterfront is not what it used to be. In almost every major North American port, and many minor ones too, there have been very substantial land use changes in the last decade⁹. Perhaps the key element in these changes is the squeezing out, or voluntary departure of many traditional port industries which were related to the port operation itself, to the ships, and to the cargoes. On the central waterfront, a large proportion of the vacated land has been switched to non-industrial uses. In places a little removed from the central waterfront, land has generally remained in industrial uses, but a new generation of industries have infiltrated these old port areas. These newer industries are either oriented to serving the inner city market, are noxious, or are attracted by the opportunities to employ relatively cheap labour. Very rarely are they port users.

The major processes which underpin these changes have been identified elsewhere (Norcliffe, 1981). They include: capital intensification and job elimination; greater space consumption by port industries; greater land-use competition within port areas; and the growth of the newer industries identified above which are not related directly to the port. In concert, these processes have resulted in a transformation of the waterfront in port cities.

A case study of Toronto was presented to illustrate these changes. In this respect, two local circumstances are important: the port has experienced a substantial decline in its trade in the last decade; and Toronto is a major industrial city. If anything, these circumstances have accentuated changes in port industry, and therefore make more evident the processes that are also observable in a number of other ports.

These changes in the role of port industry are important not only for an understanding of the geography of the modern port city, but also for the planning of cities, and particularly for the creation of jobs. In many modern cities, planners are trying to create inner city blue collar employment so as to mitigate the unemployment problem, and to correct the bias in favour of white collar employment at the city centre (Eversley, 1980). In port cities there is often an opportunity to create a substantial amount of industrial employment on lands discarded by traditional port industries. In the case of Toronto, this opportunity has, until recently, been exploited only half-heartedly because of a jurisdictional conflict: the Harbour Board, which is the major land-owner, sees its major responsibility as promoting port-related industries, but unfortunately effective demand from this group is close to zero. As a result much land zoned industrial lies vacant. Even so, industries which are not port-users account for a clear majority of the jobs in the old port area, and will undoubtedly grow at the expense of port-related industries in the near future¹⁰.

At a greater level of generality, it is evident that industries in old port areas are decreasingly associated with the port and its trade. Industries that have recently located in old port areas are much more strongly linked with activity in the central city itself which on the supply side is a provider of cheap labour, and on the demand side is a consumer of goods and services. It follows that as technological changes have weakened the links between ports and related industries, so new industries have been established that relate much more closely to the internal structure and functioning of the city itself.

NOTES

¹ The clustering of industry around the Port of London is noted in Martin (1964). A useful theoretical statement which recognizes the role of port industry is to be found in Fales and Moses (1972).

² The exact proportion of towns which are major ports is debatable, for definitional reasons.

³ I wish to thank Philip Ainlay, who conducted the interviews; Dr. H. Roy Merrens for his thoughtful comments on a draft of this paper; and the Transport Canada Research and Development Centre, and the University of Toronto/York University Joint Program in Transportation for financial support.

⁴ Hoover identifies shipbuilding as being amongst the most labour-intensive of industries with wages and salaries accounting for between 70 and 80 percent of total value added.

⁵ Currently (June 1981) Dart are considering switching their Canadian Container traffic from Halifax to Montréal: if implemented, this would deprive Halterm of its leading customer.

⁶ Québec City was the terminus for CP Containers from 1969 until 1979, when operations were transferred to Montréal.

⁷ In September 1980 Gulf Oil announced its intention to mothball this refinery, while retaining the storage and distribution operation.

⁸ The sample is almost fully representative. To the best of our knowledge it includes all firms operating in the study area, with the exception of 4 small firms which, for varying reasons, we were unable to interview.

⁹ Interestingly, there appears to have been less change in many European ports, probably because much of the affected land is in public ownership. See some of the essays in Hoyle and Pinder (1981).

¹⁰ In April 1980 the Toronto Harbour Board belatedly switched its policy by seeking to sell certain lands to any industrial users. This change of heart was brought about more by the need of the Board to reduce its 20 \$ million short-term debts than by an acceptance of the inability to attract new port customers and port-related industries.

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Conception et réalisation : Isabelle DIAZ.
 Photographie : Serge DUCHESNEAU.