

The Boston Harbor Project

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[Scholars Debate](#)

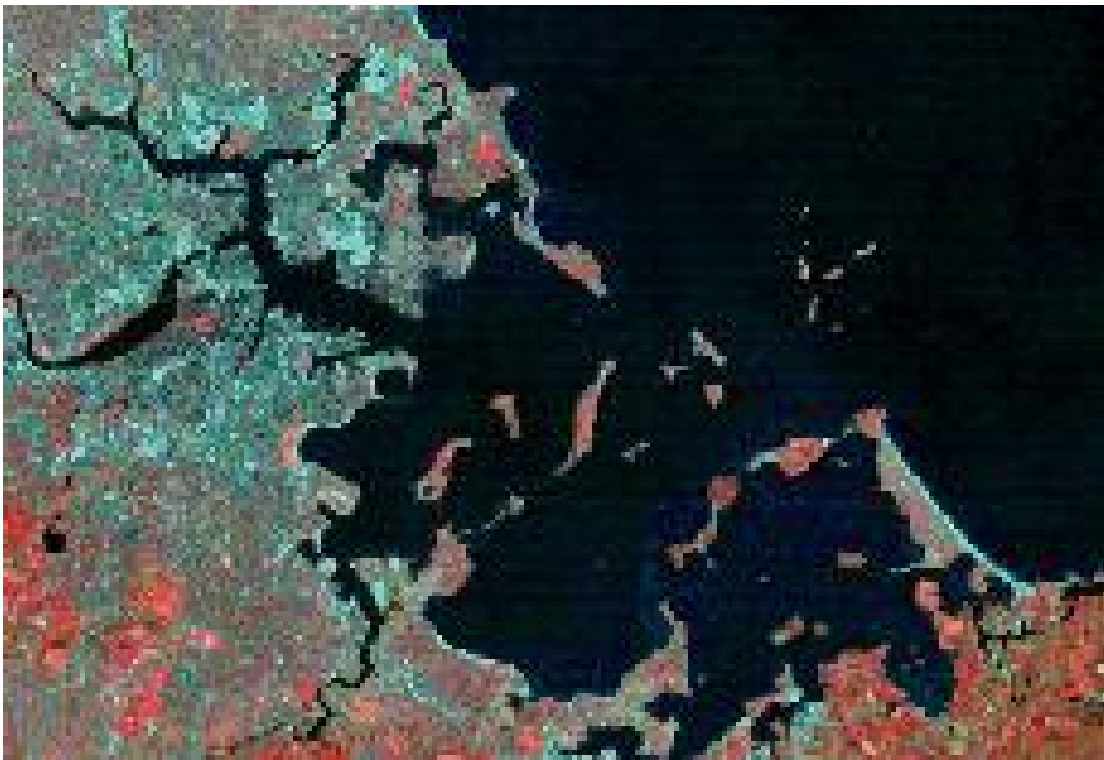
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Annex (Deer Island Diagram)



I.- Introduction

I.A.- How the problem came to be

It was not until the 19th Century, like in most America cities, following the path of the hygienization of urban environments, that Boston engaged in the construction of a modern sewage system. Prior to that, both Boston and its neighbouring communities used the geographical advantage of their lay-out. The “natural drainage” flow towards the beds of the watersheds of the Neponset River to the south, the Charles River to the west, and the Mystic River to the north, and both the southern and northern areas allowed the landowners to channel their waste out of their towns and city by building lanes to the shortest distance, which ultimately resulted in an anarchic grid of combined sewers.

The backed-up pressure created by high tides prevented the flow of the sewage to the sea, thus creating constantly a stagnant cesspool-like mass of water that continuously deposited sewage material in the harbor and nearby wetlands and beaches.

Typhus (documented as early as 1796) and constant cholera outbreaks during the mid 1860s became common. No swimming warnings (risk of getting skin boils) were also common during the mid 1800s.

The city of Boston had started to implement some mitigation measures not too long after captain Squeb, of the “Mary & John”, left the first settlers in Nantasket Point, and only nine years after the Anglican clergyman William Baxton moved to what is today known as Beacon Hill (1625), and 4 years after a group of Puritans moved to the same area (the called “Blaxton Peninsula”) from Charlestown, renaming the settlement “Boston” (1630). In 1656 the dumping of offal in Mill Creek (currently North End) was prohibited and submitted to penalties.

Boston Harbor, with its natural harbors with numerous channels, and its islands had been documented as early as John Smith’s expedition in 1614 which led Prince Charles to rename them with English names (Charles River, Cape Ann...) what Smith had mapped with native Indian names. Its natural beauty, plentiful resources, and ideal refuge conditions were flagged out by the Plymouth settlers whose Governor Bradford 1621 exploration concluded with the wish “we had been sited here”. Early descriptions of the harbor was certainly appealing: codfish larger than Newfoundland’s, lobsters in some cases weighting 20 pounds, oysters as long as a foot long.... (1634 William Wood account).

After the city took control of the grid in 1823 sewers continued to be built. During the 19th Century and well into the 20th the harbor was in great part the center of activity of the city. The islands (Castle Island in particular) were dedicated to military defenses, hosting civil war prisoners of the Confederacy. Shipbuilding (including the 1789 built USS Constitution, “Old Ironsides”, still saluting the visitors of the Harbor) went well into 1986 when the General Dynamics Shipyard at Fore River (Quincy, 5 miles south) were closed. Regional travellers (to New York, Philadelphia, Savannah, Charleston...) and broader city dwellers (from the nearby shore communities) clogged the piers. But,

the most relevant of all, Boston became one of the most important trade centers of the world with merchant fleets in and out of its harbors in frenzy.

It was during the late 1800s that the city consolidated, through a set of tunnels, interceptors and pumping stations, the combined sewer grid into three main systems: 1) the Boston Main Drainage System, completed in 1884 which discharged wastewater via Moon Island; 2) the North Metropolitan Sewage System, completed in 1894, discharging from Deer Island (with its world-famous steam driven pump station built in 1899; and 3) the South Metropolitan Sewage System, completed in 1904, which discharged from Nut Island.



The old pump

The Sewage, though, did not have any treatment, being discharged during the out-going tides. The establishment of the Metropolitan District Commission (MDC hereinafter) in 1919 consolidated the institutional base for the management of the system. Ironically, the result was mismanagement, the system being neglected during the following 60 years, well into the 20th Century. In 1939 the Massachusetts legislature concluded that the conditions of the harbour were “revolting”.

Only in 1952, in Nut Island, and 1968, in Deer Island, was primary treatment introduced as part of the system. In any case, primary treatment did not improve much the situation. The sludge resulting from the primary treatment was directly discharged into the Harbor (50Tns/day from the Deer Island facility only); Deer Island had an ordinary capacity to treat 343mgd (million gallons day, hereinafter mgd) and a peak flow capacity of 848 mgd, which implied that the system would be overflowed an average of 60 days per year, amounting to 10 billion gallons per year of untreated wastewater. The label “filthiest harbor of the US” was still well deserved.

The situation was getting ready for litigation due to the incompetence of the MDC and the rest of the local, State and even Federal agencies.

Some federal statutes had been enacted during the second half of the 20th Century: in 1948 Federal Water Pollution Control Act, 1965 Massachusetts Water Quality Act,

1966 Massachusetts Clear Water Act),...which led to the improvements in Nut (1952) and Deer (1968) Islands.

But it was not until the environmental revolution of the early seventies that the legal system got serious enough.

The enactment in 1972 of the Clean Water Act at the Federal level required by 1977 secondary treatment plants as well as “fishable, swimmable water” as a quality standard, with the mandatory removal of 85% of suspended solids and establishment of minimum BOD¹ concentrations for all publicly owned waste water treatment plants.

The MDC, which had already been forced to improve the system in the 50s and 60s, instead of taking advantage of this fact (including the federal funding attached to the Act), it kept on dragging its feet. . On the one side it continuously produced hypothetical proposals such as the planning and re-planning, since 1967, of a 7 mile out-fall tunnel that would discharge the waters into the Bay or the proposal of 51 dispersed projects worth \$ 855 million in 1976; on the other side, in 1979 it applied for a waiver of the implementation of the Clean Water Act. As we will see , the EPA (the federal Environmental Protection Agency) denied the waiver in 1983, which simply triggered a reapplication on 1984, which was once again rejected in 1985.

I.B.- The litigation. The “nationalization” of the problem through Presidential politics.

The litigation started in the town of Quincy and included three main procedures:

1.- In 1982 the City of Quincy filed a law suit in the Massachusetts Superior Court (within the State Court System). Its citizens blamed the MDC and the Boston Water and Sewage Commission (BWSC) for the unhealthy conditions of their shoreline. The Boston Water and Sewer Commission (BWSC) was established in 1977 pursuant to a "home rule" petition enacted by the Massachusetts State Legislature as “the Boston Water and Sewer Reorganization Act of 1977”. Since then, it owns and operates a system for the distribution of potable water to customers throughout the City of Boston. The BWSC purchased treated water from MDC (later the Massachusetts Water Resources Authority, MWRA). The MDC, now the MWRA, was the wholesale provider of water to communities in the metropolitan Boston area. William Golden, City Solicitor for Quincy, was the first public official to focus on the degradation of Boston Harbor. His reaction was triggered by his experience while jogging at the beach in Quincy: although he was stepping over algae, he thought that he was running on raw sewage !! So he was the one who persuaded the City to sue the MDC for the violation of the Massachusetts Clean Water Act. The Massachusetts Superior Court took the case and Judge Paul Garrity appointed Harvard Law School professor Charles M. Haar as a special master to determine the facts and propose remedies. Within 30 days, Professor Haar produced a 500-page report summarizing the entire network of Boston Harbor

¹ Microorganisms such as bacteria are responsible for decomposing organic waste. When organic matter such as dead plants, leaves, grass, clippings, manure, sewage, or even food waste is present in a water supply, the bacteria will begin the process of breaking down this waste. When this happens, much of the available dissolved oxygen is consumed by aerobic bacteria, robbing other aquatic organisms of the oxygen they need to live. Biological Oxygen Demand (BOD) is a measure of the oxygen used by microorganisms to decompose this waste.

problems, outlining steps for eventual clean up. The case was ripe for litigation. The press (the Boston Herald) had by then picked up the issue.



2.- Within months, in 1983, an NGO, the Conservation Law Foundation (hereinafter CLF) also filed a second lawsuit but this time before the federal courts. It was a class action brought against both the MDC and the EPA for lack of enforcement of the federal Clean Water Act.

3.- The EPA, on its side, besides denying the applications for waivers, also filed, although much later, in 1985, a lawsuit against the MDC, its successor the Massachusetts Water Resource Authority (MWRA, the agency which, as we will see, substituted the MDC), and the BWSC.

How did the situation evolve under the light of these three lawsuits ?

The Quincy litigation led in 1984 to a shocking court order which awoke the dormant business community of the Greater Boston Area, or rather, which made it confront a potential nightmare. Judge Paul Garrity banned any additional hook-up to any of the pipes of the MDC sewage grid system. It implied *de facto* the freezing of all construction or development which coincided precisely with the middle of a building boom cycle. Of course it was immediately appealed and in December 5th 1984 the order was overturned by the Massachusetts Supreme Court. But the grounds on which it was overturned (lack of sufficient factual evidence) allowed Judge Garrity simply to re-decide a more lengthy procedure, with judicial hearings in which the board members of the MDC and local managers, politicians, and citizens ... and, of course, the media, would have to show up!! The building industry “forced” the Legislature and Government of Massachusetts to create a new agency (that became later the MWRA) instead of having the MDC playing games with proposals of advanced primary treatment, requests for waivers...etc. It was clear that the MDC would not provide a real solution (traditional water fees amounted to \$ 90 per year, so with this approach it would be impossible to finance the needed project; MDC was not entitled to use rates, neither to issue bonds based on those rates, so it was clear that it could not accomplish

the task. Besides that, MDC would never raise them for political reasons, and even if it was able to get an initial boost, it had to go back every year to the State budget for the funding. The fact was that due to the geography, the grid system was a gravity based self-functioning system, so it could “function forever” almost without investment. The way in which the MDC had also rooted itself in the governmental system was somehow rooted also in nepotism or even corruption. It was widely spread that, if rates increased, it would not go to the improvement of the system but, instead, to higher payroll of new staff. When the MWRA was created judge Garrity retired. It was also clear that Harvard’s Professor Haar who had been appointed as a mediator to attempt to reach a negotiated solution would lead nowhere. In any case, there was no resistance against that Court Order. The Legislature of the Commonwealth, recognizing that the MDC had had its day, created the Massachusetts Water Resource Authority (MWRA), an agency that was to manage both the upstream (supply) and downstream (waste water treatment and discharge) of the waters of the Greater Boston Area.

The federal lawsuit brought by the CLF had been stayed by the federal judge, David A. Mazzone, while the Quincy suit proceeded before the State Courts. But as soon as the Court Order was overturned, the federal judge decided to go along with it. The EPA’s lawsuit triggered the acceptance by the CLF of a motion to dismiss the EPA as defendant. The EPA went side by side with the CLF in principle (although many battles were to be fought regarding the agenda and technicalities of the final solution). Certainly siding by the EPA helped the lawsuit, pretty much as the appointment of Mike Delano as new EPA administrator of the First Region made a big influence. It helped CLF with much needed evidence. In May 1984 a liability ruling was issued by Judge Mazzone against the new MWRA since it was denying the right to be sued (it was not MDC). The CLF disputed that fact and decided to pursue a different line of action asking the federal judge to have the MWRA declared liable. It won. Judge Mazzone went straight after the new MWRA.



The second act was the discussion of the final solution and its timetable. Judge Mazzone forced the speeding-up of the MWRA’s environmental impact statement needed to decide on the basic facility for compliance with the Clean Water Act: the Deer Island secondary waste water treatment plant. It was completed by the end of 1985 and both the EPA and the CLF concurred that this was to be the masterpiece around which the planning of the rest of the activities and facilities had to be built. The Section on Guiding Students’ Discussion question the validity of such a centralized scheme.

Due to its size, the timetable became a question of essence. Everybody knew by then that the public work needed would imply thousands of jobs and contracts/subcontracts under public procurement. So the New England based sewage and water treatment industry did not want to cooperate. Nobody really wanted to confront the MWRA on its planning. The litigation reached a point where only the CLF was willing to keep the pressure. Fortunately an engineering company based in New York and specialized in space constraint NY buildings was happy to provide (pro bono) expert testimony and very detailed affidavit about the realities of having to conduct in Manhattan construction operations under stressful conditions of spatial size and deadlines. So the CLF fought against the very extended deadlines that the MWRA authority wanted the federal judge to consider. A major breakthrough happened when the MWRA offered a substantial reduction of its original timetable. It implied having the new system in place in 13 years, a much shorter period of time compared with what it had offered previously as completely unavoidable (20 years), although it was far away from what the CLF was asking for, taking the affidavit of its expert testimony as the base for its petition (6 or 7 years), and what the EPA was also originally considering (7/8 years). The judge finally agreed to it and took the MWRA decision (11 years instead of 20)

The original 13 years timetable (1986-1999) approved by Judge Mazzone's Court Order of May 1986, suffered some delays because of various circumstances that will be later explained. The Box compares the original timeline with the real one as it materialized.



In the dispute over the Boston Harbor wastewater treatment facility, some argued that then-Superior Court Judge Paul G. Garrity (left) and U.S. District Court Judge A. David Mazzone (right) were acting as quasi-legislators usurping the policy and funding role of the executive and legislative branches.

Boston Harbor Project Court Order Timeline

1988

Planning of the new primary and secondary treatment plants completed. Construction management and design firms were hired. Improvements to Deer Island treatment plant ended daily discharge of more than 10,000 gallons of floatable pollution -grease, oil and plastics- known as scum.

1989

Improvements made to the Nut Island treatment plants ended daily scum discharges. World War II bunker demolition and substantial earth moving activities prepared Deer Island for construction. Repairs to existing Deer Island treatment plant ensured reliable treatment .

1990

Water transportation system were operational with completion of onshore piers and staging areas. Construction began on new primary treatment plant. A 70-megawatt cross-harbor power cable was installed, bringing electrical power to Deer Island. Construction began on effluent outfall tunnel.

1991

Construction began on 5-mile inter-island tunnel to link Nut Island flows to new Deer Island plant. Sludge processing facilities became operational at former Fore River Shipyard, ending daily discharge of 50 tons of sludge into Boston Harbor.

1992

Primary plant construction continued, construction of Nut Island headworks began.

1993

Construction of secondary plant began.

1994

Final Conceptual Plant for the capture and treatment of combined sewer overflows completed.

1995

Primary plant and Nut Island headworks completed.

1996

First phase of secondary treatment plant and Inter-island tunnel completed.

1997

Outfall tunnel completed.

1998

Second phase of secondary plant completed.

1999

Final phase of secondary plant completed.

Boston Harbor Project Real Timeline

1990

MWRA initiates the construction of new wastewater treatment plant at Deer Island.

1991

In December this year the MWRA ends discharges of sewage sludge into Boston Harbor from the old Deer and Nut Island treatment plants. Sludge-to-fertilizer pelletizing begins at the Fore River plant

1995

MWRA's new improved primary treatment facilities at Deer Island begin operation.

1997

MWRA opens the first battery of secondary treatment facilities at Deer Island

1998

MWRA opens the second battery of secondary treatment facilities at Deer Island, providing secondary treatment for almost all flows.

1998

The Nut Island-to-Deer Island sewage transport tunnel is completed, allowing the Nut Island treatment plant to be closed. Wastewater from MWRA's South Shore communities is now transported to Deer Island for treatment.

2000

Opening of the outfall tunnel that allows MWRA to stop discharging treated wastewater into shallow areas of Boston Harbor and discharge them, instead, 9,5 miles deep into Massachusetts Bay.

2001

Last battery of secondary treatment placed in operation at Deer Island Treatment Plant

The main delays had to do with outfall tunnel; the first one with the discharge permit for the outfall tunnel which was appealed and forced both the EPA and the Massachusetts Department of Environmental Protection to settle for a modified discharge permit; the second one with the almost one year that took OSHA (Occupational Health and Safety Administration) to investigate the causes of the accident that resulted in the death of two scuba diver workers.

Even before the construction started, the issue still was a major one in national politics. It is well known how the uncontested fact that Boston had the “filthiest waters” of the Nation became one of the factors that might have triggered Governor Dukakis’ credibility as an environmentalist *vis a vis* the future President Bush (father) in the presidential campaign. It was in September 25, 1988 when, Candidate Bush answered to a question of a journalist enquiring about what he thought of Candidate Dukakis’ comment on a Social Security reform: “*That answer was about as clear as Boston Harbor*” (followed by laughter from the audience). Vice President George H.W. Bush knew what he was talking about. He had taken as Ronald Reagan’s Vice President and already the Republican Party candidate a tour, accompanied by the press, of what he dubbed the “Harbor of Shame”, a piece of political theater aimed at embarrassing his opponent, Gov. Michael Dukakis, in his own back yard. This visit also gave national exposure to a harbor so foul for so long that locals developed a grim humor about it. Floating tires were referred to as “Boston Harbor seals.” The condoms that bobbed amid human waste were “Boston Harbor white fish” (Associated Press, Tuesday April 27, 2004).

The Republican candidate to the Vice Presidency, Dan Quayle, noticed that the audience present in December 25th at the presidential debate had captured the critique, so in the Vice Presidential debate of October 5, 1988 he spelled out to candidate Bentsen, the candidate of the Democrats: “*Let me tell you about his environmental policy. The Boston Harbor - the Boston Harbor, which is the dirtiest waterway in America, tons of raw sewage go in there each and every day. What has the governor of Massachusetts done about that? Virtually nothing. And then he has the audacity to go down to New Jersey and tell the people of New Jersey that he's against ocean dumping. This is the same governor that applied for a license to dump Massachusetts sewage waste off the coast of New Jersey. Who has the environmental record? Who has the environmental interest? George Bush and I do*”.

The debate went on, forcing Bentsen to reply: “*This late conversion is interesting to me. (Laughter and applause) I must say, when they talk about Boston Harbor and he says he hasn't done anything, the facts are he has a \$6-billion program under way on waste treatment. And it was this administration, their administration, that cut out the money early on to be able to clean up water, and made it impossible to move ahead at that time on Boston Harbor. We are the authors, the Democratic Party, of Clean Air, of Clean Water, of the superfund. I am one who played a very major role in passing the superfund legislation. And every environmental organization that I know, every major one, has now endorsed the Dukakis-Bentsen ticket. And I am one who has just received the environmental award in Texas for the work I've done to clean up the bays, to clean up the water, off the coast of Texas. No, I think we know well who's going to help clean up this environment. The record is there, the history is there. And Dukakis and Bentsen will be committed to that*”. (Applause).

The damage was done nevertheless. Candidate Dukakis, though, tried to clean his record in the next Presidential Debate of October 13, 1988 by referring to the media campaign of the Republican party that had been hammering the electorate with this issue: *“But let me say this, because he [George Bush] spent millions and millions of dollars of advertising on the subject of Boston Harbor. George, Boston Harbor was polluted for 100 years. I'm the first governor to clean it up. No thanks to you. No thanks to you. We've been cleaning it up for four years. We passed landmark legislation in '84. No thanks to you. You did everything you could to kill the Clean Water Act”*.



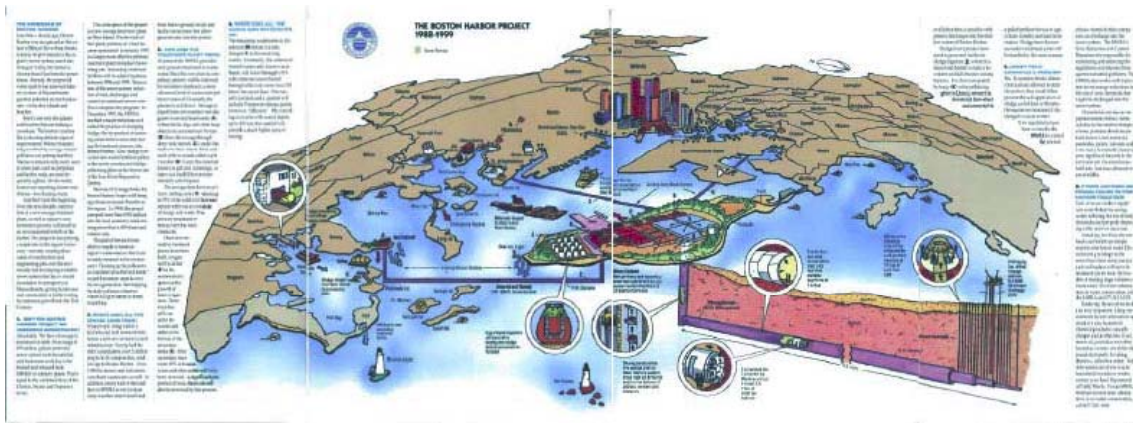
I.C.- The project: state of the art technology.

Learning as it went on, the Boston Harbor restoration project undertaken by the MWRA under continuous pressure from the judge was indeed a public work of a massive scale:

- 1700 contractors and subcontractors continuously operating at the same time in such a reduced space as Deer Island.
- 3000 to 4000 workers, under a single collective labor agreement bargained with the Unions, also operating at the same time (with the logistics of transportation via South Boston in order to prevent massive traffic jams through Winthrop, the local community that connects the Island with the mainland). Memorial black benches and plaques have been dedicated to the 5 men who perished during the works (only in the outfall the statistical estimates were 9 to 10 deaths -1 per mile), so the casualties were much lower than what statistically had been projected.
- Building of a concrete plant in order to avoid transportation from the mainland.
- Building of the long pipelines that would bring all the sewage to Deer Island (closing Nut Island's primary treatment plant)
- Building of the huge secondary wastewater treatment plant in Deer Island itself. The jewel of the system that is becoming a model for many big cities around the world. It went through 3 stages: 1) increasing the capacity of its primary treatment; 2) putting to work the secondary treatment system; 3) building of the outfall for the discharge of its cleaned water (See Box, Picture and Annex).
- Additional recycling facilities such as the preparation of the sludge (through digestion) for its shipment as raw material for a fertilizer plant which made

possible the use of methane as an energy source for electricity production; and the construction of a mini-hydroelectric plant making the final water circulate through a turbine before been sent to the sea via the outfall.

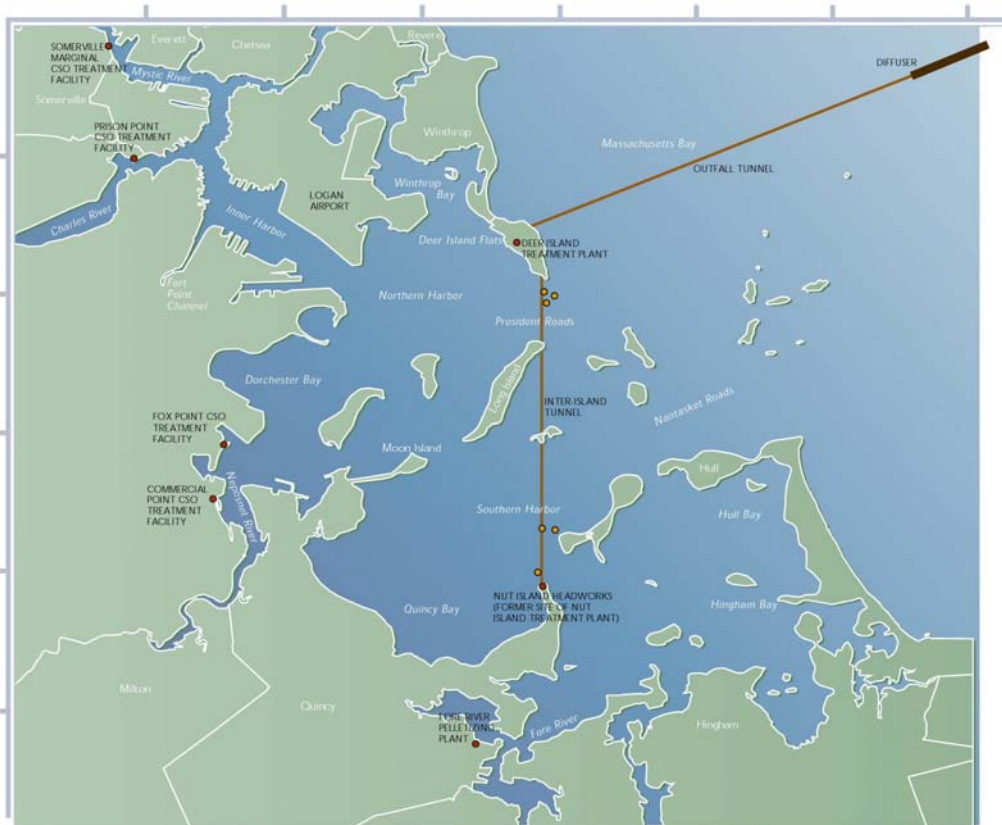
- Additional accessory installations for the treatment of removed solids and of the sludge which could not be discharged into the harbor. Off-island landfill space was needed for the grit removed in the first phase of the treatment. A fertilizer manufacturing plant was needed for the pelletizing of the treated sludge, and of course the marketing of the product (“Bay State Fertilizer”, with a very high quality standard) . The fertilizer plant was located in Fore River. There is an additional off-island landfill site, needed as an alternative back-up in case commercial landfills were not enough to take care of the byproducts of secondary and palletizing sludge operations. Some land was bought and the cities of Walpole and Norfolk agreed to build a landfill if needed. The pelletizing program to dispose of sludge byproduct has worked so well that the Norfolk/Walpole land has not been used. As of 2004 MWRA intends to work with Walpole, Norfolk and the court parties to revisit the need for this backup site since it currently pays \$870,000 for a Utah landfill and 40 rail cars.



This picture, courtesy of MWRA, can be seen in detail in the Annex



Deer Island



Scum being removed from the secondary treatment



The Quincy Bay Terminal Company runs for the MWRA the trains to commercialise the fertilizers off Fore River pelletizing plant.

Deer Island Wastewater Treatment Plant

- Ordinary 370 mgd capacity; 3 miles of trails; 16 ? State Park
- The main building (1896) is a landmark site
- It has received more than 20 awards
- It has become a model for other cities. In 2004, for example, while doing this Case Study, it received the official visits of water authorities from Mexico City and Shanghai
- 5000 visitors/year
- Water takes 18 hours (8 plant + 10 outfall) to circulate from entrance to outfall. In emergency can be speeded up to 6 hours [1/3 reduction]
- Capacity: daily 500 M Gallons (325 N; 100 S; 25 Revere & Winthrop) Can handle up to 1270 M
- Remote Headworks Facility providing pretreatment of up to 400 mgd of wastewater from the Boston South System connected to a 5-mile Inter-Island Tunnel that ties together two separate sewer systems (North and South) into one, cut through rock, that transports these flows beneath Boston Harbor to the Deer Island Treatment Plant. Grit is removed to the off-island landfill
- Transportation of wastewater through 5,400 miles of pipes and community-owned sewer lines and approximately 230 miles of MWRA owned interceptors and tunnels
- Primary Treatment Facilities consisting of three batteries of primary clarifiers (they remove ½ of pollutants; 50% of suspended solids; 50% of pathogens and toxic contaminants. Gravitation separates primary sludge and scum from waste water), an on-island headworks, pump stations, and disinfection facilities. In dry weather, the primary plant handles about 350 mgd and can handle peak wet weather flows of 1,270 mgd
- Secondary Treatment Facilities consisting of three (originally four were planned) batteries of activated sludge secondary reactors and clarifiers, supported by a cryogenic oxygen plant, capable of treating up to 780 mgd, with mixers, reactors and clarifiers solids are removed using gravity and biology. Aerobic microorganisms consume organics (3 batteries are used, originally 4 were planned). Oxygen is manufactured in Deer Island for this process
- Sludge thickening and digestion. Sludge from primary treatment is thickened in gravity thickeners; sludge from secondary treatment is thickened in centrifuges. Anaerobic bacteria break down sludge and scum in 3 million gallons 12 egg-shaped digesters (originally 16 were planned). Methane gas + carbon dioxide + biosolids + water are produced. CH₄ is used to produce electricity
- An odor control facility with scrubbers and activated carbon absorption systems
- A thermal power plant capable of generating electricity
- Wastewater is disinfected to prevent damage to ocean organisms with sodium hypochlorite to kill bacteria. Sodium sodium bisulfite is added to dechlorinate the water
- The water flows through a turbine to produce additional electricity (minihydro)
- It is discharged into the ocean via a 9½ Mile Deep Effluent Outfall Tunnel to discharge treated wastewater away from shallow Boston Harbor waters and into the deeper waters and stronger currents of Massachusetts Bay. 55 diffusers were planned spaced along the last 1½ miles of the tunnel (ultimately 53 diffusers, with 8 ports each were built – two diffusers have been saved out of the 55 planned because with the higher number the velocity of outflow was slower thus favoring the attachment of barnacles to the port, something certainly that should be avoided to downsize maintenance costs-). It goes deep into the ocean bed (250 feet, equivalent to a 42 story building)
- An off-island sludge pelletizing plant that converts sludge into 33,000 dry tons of fertilizer annually
- It has enhanced safety features. Redundant systems for by-passing the flows if something goes wrong ensure reliability. A contingency Plan is constantly in place.



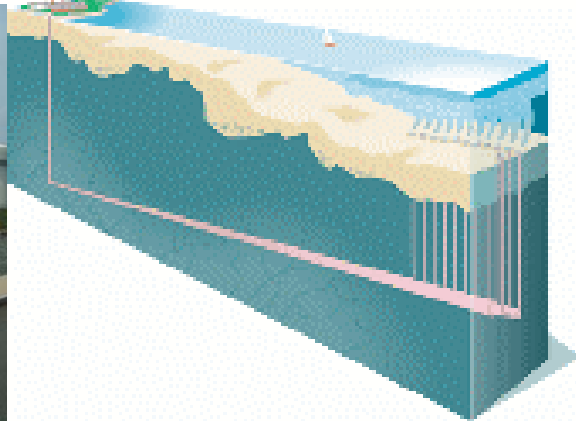
Interior pipes indicate the flows in different colors



Batteries



**The head of one of the spared diffuser
(Nadia Thomas & Patrick Costigan from MWRA)**



The Outfall



**Clean water on its way to the minihydro before
being sent to the outfall**



Recreational trails around the plant

I.D.- Some economics.

Although the total costs were \$ 450 million below the initial estimates (\$6.1billion) the funding of the whole operation was always the major concern.

The major project costs include a \$159 million, 5-mile inter-island rock tunnel; a \$482 million primary treatment facility capable of handling more than 1.3 billion gpd; a \$506 million secondary treatment facility capable of handling 1,000 mgd; an \$85 million power plant; \$312 million sludge thickening and anaerobic digestion facilities; and a \$260 million, 9.5-mile ocean outfall tunnel.

Notwithstanding the availability of \$10million subsidies, around \$ 40 million (39.6) of yearly total operation costs add to the problem notwithstanding the savings (formerly 44 or 43 million) achieved through improvements of management, such as the close joint work of both operations and maintenance (\$11 million) which not only save money but also contribute to the full reliability of the system; the automatization of the plant (with 30.000 points of control; the maintenance management software used by the Authority is Maximo version 4i. whose software includes safety features that allow users to document hazardous materials in real time, automate lockout/tag-out/lineup activities, and “push” proper procedures out to the field. Maximo provides document management capabilities to streamline maintenance and regulatory functions, and workflow capabilities for synchronizing operations); and a strict policy of public procurement in supplies (a threat to build its own sodium hypochlorite plant in Deer Island if prices offered continued to skyrocket, for example, contributed to maintain the costs low) and services (the maintenance program is supplemented by a series of service contracts which are intended to provide specialized services beyond the resources of the MWRA maintenance staff). The plant is regularly operated by day by 175 workers. The night and weekend shifts are extremely low in numbers (6 at night and weekends).



Deposits of sodium hypochlorite

FY04 Approved Maintenance Annual Budget

Budget Line Item	Wastewater Transport
Wages and Salaries	\$7,682,268
Overtime	\$267,303
Fringe Benefits	\$5,500
Chemicals	\$20,000
Utilities	\$116,099
Maintenance (Parts & Supplies)	\$2,395,009
Other Materials	\$355,115
Other Services	\$108,925
TOTAL	\$10,950,219

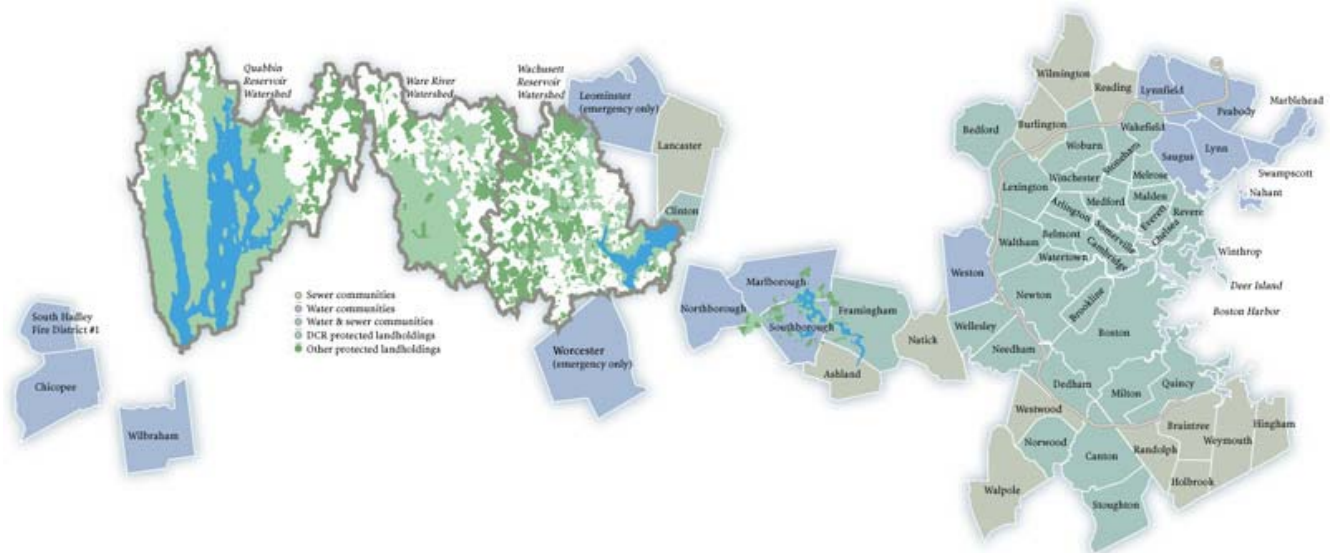
Early in the game, the federal money had vanished because of the lack of diligence of the MDC to apply for the funds attached to the Clean Water Act 1977 deadline. The 1987 Water Quality Act contributed to relieve this pressure by allowing for State revolving funds and a grant of 100 million to MWRA. All the projects funded in the 1989 federal legislation were ones that had been authorized in provisions of the Water Quality Act of 1987 (WQA, P.L. 100-4). Boston was not the only one to receive cash: the designated projects were in Boston (authorized in section 513 of the WQA, to fund the Boston Harbor wastewater treatment project), San Diego/Tijuana (section 510, to fund an international sewage treatment project needed because of the flow of raw sewage from Tijuana, Mexico, across the border), Des Moines, IA (section 515, for sewage treatment plant construction), and Oakwood Beach/Redhook, NY (section 512 of the WQA, to relocate natural gas distribution facilities near wastewater treatment works in New York City).

The selling of pellets from the Quincy plant is managed via a concession to a private company, contributing to reduce the operation costs. The sales of fertilizer amount to half a million dollars per year. Marketing is done by New England Fertilizer Co. (NEFCO), a private contractor. A small amount is managed directly by the MWRA, for gardening and golf courses, as “Bay State Fertilizer”. The operating agreement calls for 6-month, 12-month, and subsequent annual reviews to make sure that NEFCO operates the plant as agreed. The current agreement requires NEFCO to provide a letter of credit in the amount of \$1,000,000 from which MWRA may draw in the event that there is a material breach of the said agreement, which includes maintenance.

The production of electricity for its own consumption, through the methane production of the eggs digesters –it contributes to an equivalent of 28% of the total energy bill- and through the mini-hydro plant before the discharge of the clean water through the outfall, is also of relevance. Systems are in place for self sustenance in case of a blackout from Boston Edison [happened twice and ready in 3 seconds] but they do not meet the Clean Air standards (low quality, needs to be mixed with the diesel to have enough btu power)and need to be reported to the EPA so there is no possibility to sell electricity mainly because the combination of diesel and methane needed for that eventual purpose would imply problems with the clean air regulations (the system, though, is prepared to contribute to the energy supply for the city in case of emergency). The energy production from the hydroelectric plant takes place at the end of the process (after chlorination and pathogen killing) as well as from the methane. In all 2 MW are produced from hydro, 5 MW from the thermal methane based plant.

The pilot plant, a mini-scale model that allowed during 10 months, in 1991, for the testing of the treatment (until the sludge obtained would meet the standards) instead of being dismantled is now leased to scientists and industrial companies for research and testing.

The most important problem, though, was the contribution that the consumers had to make and keep on making through water rates. Judge Mazzone's was from the very beginning very strict in binding 43 communities of the Greater Boston Area (2/3 North of Boston) to the operations (and financing) of the whole venture.



All the communities served by the sewer system can also be seen in the Annex.

In order to prevent social revolt, a very complex financial plan was arranged for those communities. Customers were appeased via honest proactive communication strategies, with neighborhood meetings in each of the communities. There were moments in which the reaction of consumers threatened to halt the project. For example, in 1991, the rising sewer rates, threatened to kill the project, forcing MWRA to propose to "pause" it. Only half of the required Deer Island secondary treatment plant was by then in place. Judge Mazzone held special hearings and, despite rate protests, the project continued. Two years afterwards, public demonstrations against the project included a postmodern "Boston Tea Party" with sewer bills thrown into Boston Harbor. Once more, the MWRA proposed to study proposals to downsize the project, and once more Judge Mazzone allowed the project to proceed forward.

In any case it seems that the massive scale of the funding -the biggest public work ever in New England at the time- has got the city used to similar ventures. The Big Dig (see The section on Guiding Students' Discussion) started just when the Deer Island works were ending.

The everlasting pressure to maintain the costs low may be starting to produce a policy of scaling down additionally needed investments, such as the channelling of stormwater runoff into Dorchester Beach (see the Section on Scholars' Debate).

Water rates have certainly increased since the MDC times. In 1993 the news offered this gloomy picture: “In 1985, if you were a Boston-area resident, you may have paid somewhere around \$140 annually for combined water and sewer service. Four years later, in 1989, that amount probably doubled to something like \$292. Today your rates could be almost four times the 1985 rate, at \$545. The Massachusetts Water Resources Authority estimates an average water and sewer rate in 1996 at \$838. By 1999, rates could hover in the \$1,200 range, an increase of 400 percent. Even now there are stories of homeowners paying as much as \$2,000 per year” (On the Issue, May 1993, number 5, Paul Reid, the Beacon Hill Institute). The MWRA charges its rates to the communities. Each MWRA community sets its own water and sewer rates for residential and business customers. Rates vary considerably among communities due a variety of local factors. Even today, notwithstanding the good ratings in Wall Street of MWRA bonds, which allows its borrowing capacity to remain cheap, MWRA is looking forward to 4.7% increase in the combined water and sewer assessments to member communities in FY 2005 (sewer assessment increase is 3.2% and the average water assessment increase is 8.7%). Debt service now accounts for 60% of the MWRA’s budget. Nevertheless, MWRA’s capital program still foresees an additional \$1.9 billion in projects between now and 2014 in order to make major improvements to the systems, 80% of which is for projects mandated through court orders or consent orders, such as the continued construction of the combined sewer overflow program.

Up until last year, MWRA communities received State assistance on debt service from the Sewer Rate Relief Fund. After the elimination of \$47 million in assistance to MWRA for FY2003, the legislature restored a small program that provided about \$4 million in FY2004. However, the Governor’s proposed budget does not include any debt service assistance funding in FY2005.

I.E.- The aftermath.

The success of the restoration of Boston Harbor were saluted with jubilation early on in the process. The community started very early to notice the lack of the traditional brownwater flows in the middle of the Bay to which they were used whenever the sludge was discharged. The harbor seals started to return to the place where they had been seen traditionally in the last centuries. The fisheries (lobster and flounder...) started to recover....

The prompt perception that the expected change was happening allowed to strategize the operation of making the city, and its tourist industry, look again toward the sea. The example of the Golden Gate National Recreation Area of San Francisco was followed under the leadership of Congressman Gary Studds and in November 1996, by an act of Congress (Public Law 104-333), the Boston Harbor Islands became a unit of the National Park System (its legal name is “Boston Harbor Islands National Recreation Area”, a name rejected by the Native Americans who attach sacred value to the burial grounds of their ancestors involved in King Philip's 1675-76 War against the colonists, which convinced its unique 13-member management Partnership, of the National Park Service and other public and private organizations, to refer to it as “Boston Harbor Islands, a national park area”).

It includes 34 islands (ranging in size from less than 1 acre to 274 acres). It is their special **natural and geologic resources** (although there are no island species on the federal list of endangered species, the Massachusetts Natural Heritage Program lists six rare species known to exist within the park, including two species listed as threatened and four of special concern and the 34 islands are part of a "drowned drumlin field"², the only collection of glacial drumlins that intersects a coast in the United States), combined with their **cultural and historic resources** (it has three national historic landmarks: Fort Warren, Boston Light, Long Wharf; and at least 21 islands contain evidence of American Indian use of such archeological significance that, to date, have been designated within a district listed on the National Register of Historic Places), what was perceived as a combined value that could contribute to award them national significance.

Certainly, this decision to establish a National Park reflects the change in perception of what the project ultimately has achieved: from a filthy cesspool to a beauty that has recovered its "sense of place".



² A drumlin is a glacier formation consisting in a low, smoothly rounded, elongate oval hill, mound, or ridge of compact glacial till that form at the base of moving glaciers under the margin of the ice and shaped by its flow. There are four major areas of drumlin fields in North America: in southern New Hampshire and eastern Massachusetts (3000), in New York and Ontario south and north of Lake Ontario (10 000), in Nova Scotia (2300), and in parts of Wisconsin (5000), Iowa, and Minnesota. Drumlin fields are also widespread in Europe, especially in Ireland, Scotland, and England, Germany, Sweden, and Finland.



Boston Light at Little Brewster, seen from Georges Island



Georges Island Harbor



Lovell's Island

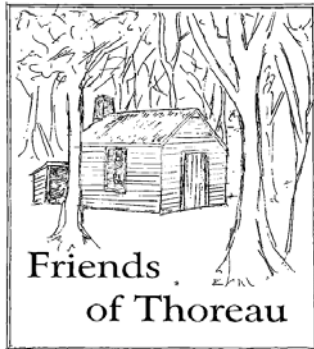
It is true that the monitoring and reporting (through the “Massachusetts Bay Marine Monitoring Program”) was and keeps on being an essential element of the project. A Science Advisory Panel, with the mandate to raise issues and propose recommendations, has been quite effective. There are still quite relevant issues which continue to puzzle scientists, such as the high PCB levels in Tomalley lobsters, or others that continue to show some tendency to quick but not serious management, such as the removal of sediments because of dredging that goes on in the Harbor (the dredging of the main channels was accomplished by discharging the material in the superficial not so used ones), an issue that, after some consideration, the CLF decided finally not to litigate.

Three major issues remain unsolved. All of them are subject to very serious discussion that can be scrutinized in the Section on Scholar’s Debate:

- 1.- The uncertainty about the impact of the outfall in Massachusetts Bay, in particular in Stellwagen Bank National Marine Sanctuary;
- 2.- The problems with the combined sewer overflows (CSO) system
- 3.- The management of the rivers (Mystic, Charles, and Naponset).

In any case, the Boston Harbor project surpassed all expectations and allowed the city to energize itself around a common venture that everybody perceived as totally necessary. The renovation of the life in the city cannot be exclusively attributed to the project, but certainly it was a centerpiece in the policy of recovering its waterfront as the New England common that it had been through history. It is true that most of this spatial planning operation had taken place before the 80s. Quincy Market, one of the most visited places in the US, the new residential zones in the waterfront itself, Boston skyline from the sea, with the combination of historical landmark sites and the power of its financial district, was only waiting for the recovery of the Harbor to enhance its beauty. The waterfront renovation continues (the Federal Courts building being one of its recent successes) and the Big Dig will probably finalize this lengthy process. But the connection of the natural environment with the beauty of its cultural heritage and postmodern planning of public space was at the core of this future success. The Section on Guiding Students’ Discussion analysis this issue in depth.

Future literature, based on the sinister fate toward which the harbor waters and its islands may have been headed, is now much more science fiction than what was easily imaginable in Neal Stephenson’s eco-thriller “Zodiac” (1988), when Spectacle Island and the rivers flowing to the Harbor became the venue for dangerous microorganisms.



The Boston Harbor Project

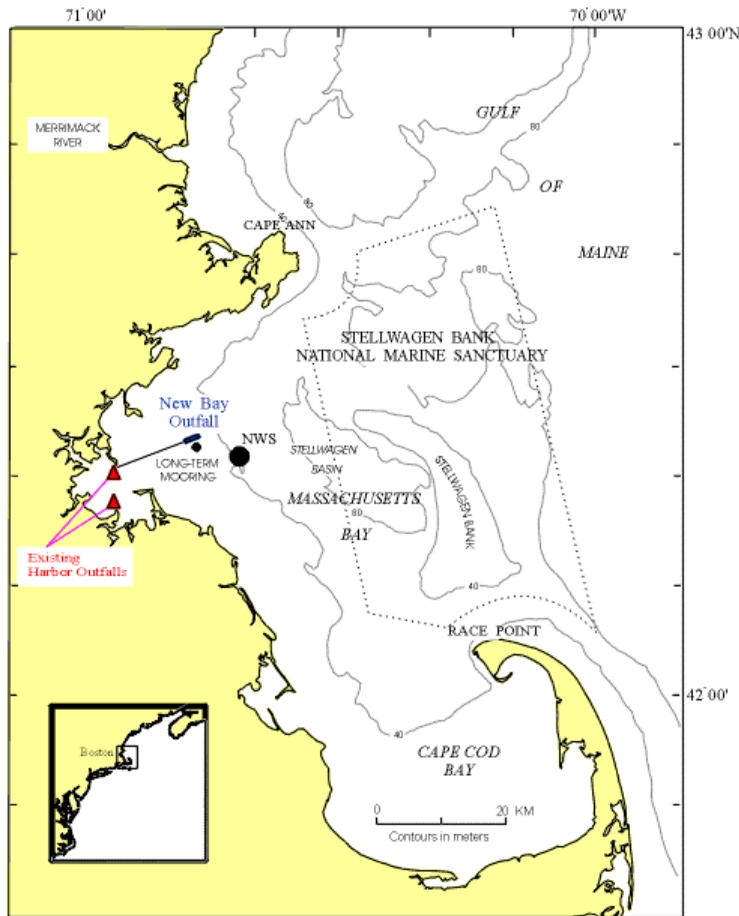
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II.- Scholars' Debate

II.A.- The ecological issue: certainty and precaution in the vicinity of Stellwagen Bank National Marine Sanctuary.

The decision on the outfall still raises very interesting questions on the interrelationship between science and policy. It was mainly based on the US Geological Survey (USGS) modelling, which presented it as the best option since there are no biodiversity hot spots in the area (at least, no resident animals). Just a month before the first discharge there was an episode of dead turtles in the Bay (one could wonder what the reaction might have been if the episode did coincide in time with the first discharges !!). Certainly the proximity of the diffusers to the western limits of Stellwagen National Marine Sanctuary (to a point about 15 miles from its northwestern corner) does not leave everybody happy. About the system, and about Stellwagen Bank see the following Case Study of the Institute of North American Studies at the Universidad de Alcalá: Historical Whaling in New England, by Ana Recarte. April 2002 and The Sea Otter Recovery Plan, by Ana Recarte. April 2004.



Some scientists still think that the final solution may have resulted, only, in the translocation of the pollution from the Boston Harbor to Massachusetts Bay. This is the question raised, for example, by Harvard's School of Public Health professor James Shine. The monitoring will show whether this is ultimately true or not. What is your own opinion?

Would your opinion vary if you knew that the MWRA is ready to make an additional investment in the Deer Island waste water treatment plant consisting on an additional denitrifying plant to prevent excess of nitrates reaching the marine ecosystems?

As we will see in the Section on Students' Discussion, ultimately, the outfall did not pass any environmental impact statement, so was the science out of the picture or should the environmental impact statement as a process be considered useless? The history was that after a four-year long process including oceanographic and engineering studies, regulatory review, and extensive public participation, the 9.5-mile site for the outfall discharge was found to be the best location for the health of nearshore and offshore waters.

Besides that, the MWRA put in place a Contingency Plan to ensure that discharge from the outfall does not adversely impact Massachusetts Bay. The Plan identifies thresholds that can suggest that effluent quality or conditions in the Bay may be changing.

Certainly the Cape Cod community is still complaining about the fact that the whole project simply shifted to them the consequences of the wastewater treatment. The scientists and policy makers insist that still this solution, even in a worst case scenario, would leave the Cape Cod community much better than if many waste water treatment plants would have been built in the coast, because of the Ocean dynamics.

So the situation, notwithstanding the intense monitoring, is still of keeping the fingers crossed. Do you think that this is an adequate environmental policy? Does this fact tell you anything about the polycentric nature of environmental law? It is said that environmental law does not solve linear conflicts -one right holder v. another person's interests or rights- but complex conflicts in which many third parties may become seriously affected by the decision. If this is the case, the appropriate solution should look more like a spider web, stretching the rope toward a legal solution only to the extent that it does not break in another point thus seriously damaging or lacking to properly acknowledge the interests of other persons. Do you think that this is the case in this situation?

II.B.- Combined sewer overflows (CSO). Environmental justice in Dorchester?

The most important remaining question to be solved is how to deal with the CSOs. Old systems like Boston's have "combined" sewers that carry both rainwater and sewage together instead of using different pipes. During normal conditions the flows are delivered to Deer Island Treatment Plant. During heavy rains, when flows sometimes double and even triple, these systems become overloaded. Built-in overflows (called combined sewer overflows or CSOs) relief excess flows upstream of sewage treatment plants, by leading the water to points from which it can be discharged into the nearest body of water. This prevents sewage backups into homes and onto area streets, but it does so at considerable cost to local water quality. As a result, Boston Harbor, the Charles, the Mystic and the Neponset Rivers are subject to occasional overflows of combined rainwater and sewage. It is obvious that the capacity of the Deer Island plant cannot take care of exceptional wastewater flow due to storms. It is also obvious that the discharge of untreated run-off water that has flown through a metropolis is dangerous for marine ecosystems. The question of the lack of sufficient capacity of the Deer Island plant was addressed originally and continues to be addressed by the MWRA.

Originally there were 84 points of discharge along the shore disconnected from the pipeline system that channelled the run-off waste water to Nut and Deer Islands. Out of these 84 CSO flows, four communities (Boston, Cambridge, Somerville and Chelsea) took care of the treatment and sanitation of the water. After additional investments of the MWRA (which also contributed to the increase in rates that nearly derailed the project twice in 1991 and 1993) has allowed for proper channelling and treatment (mainly via chlorination) of most of them. In 1994, running parallel to the Boston Harbor project, a \$650 million "3 Phase CSO Plan" was approved by the MWRA. Works and investment is still needed for approximately 30 to 35 of them. 4/5 of them present serious problems of water quality. The total input of CSO water is

approximately 1,270 bgd (325 mgd from the North and the rest from the South of the City).

In March 2004 the CSO improvement in Dorchester became a very serious issue: the MWRA had been using a lot of state of the art and over-engineered technology when investing in the backup sludge treatment in Walpole and in other several CSOs (Walpole investment is almost never used). When it had to decide on the system to be employed to solve the runoff water pollution in Dorchester Bay, the MWRA started considering that eventual close of beaches was not really important. Precisely in Dorchester? What a coincidence! Since Dorchester is mostly an African American community, and Dorchester Beach one of the main recreational sites used in summer by this community, is there evidence that there might be an environmental justice issue? (see Farming in the Elkhorn Slough Watershed, Environmental Justice & the Hispanic Community, by Jason Benford, supervised by Enrique Alonso García & Ana Recarte, April 2004, at the web page of the Institute of North American Studies of the Universidad de Alcalá)

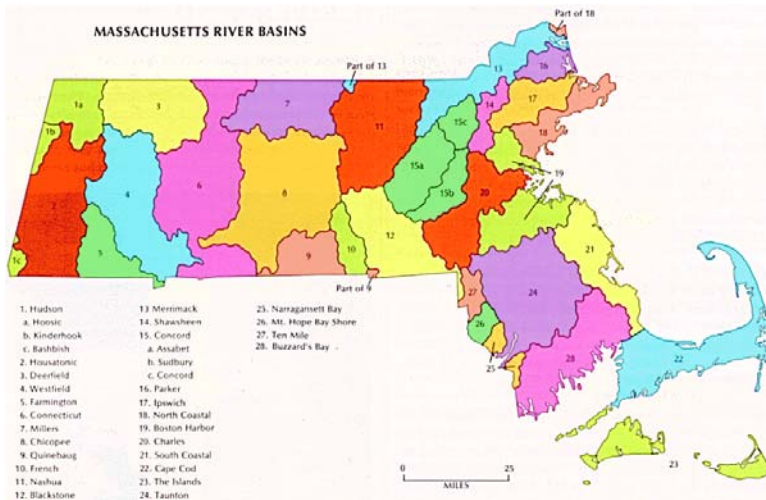
There is still CSO litigation. CLF's position is that there are techniques to reduce and store stormwater. They should be put in place in Dorchester Bay.



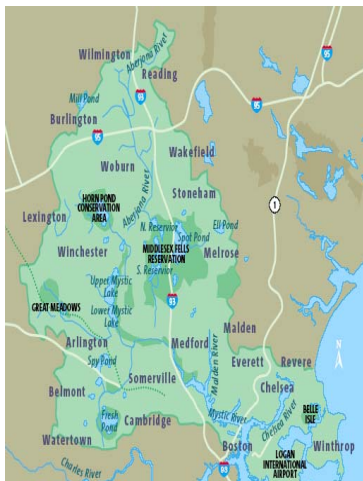
Map of beaches close to Boston

II.C.- Focusing on the rivers. MWRA: visiting integrated management of water resources

The project, based on secondary treatment, needed to ensure that toxic discharges did not take place in the rivers in order to prevent the killing of the bacteria. A “Toxic Reduction and Control Plan” was put in place very early in the game, forcing all the industries to install on site pretreatment plants. Nevertheless, it is clear that the Mystic, Charles, and Neponset rivers, which are the major freshwater sources to Boston Harbor carry pollutants, beyond what CSOs should normally produce.



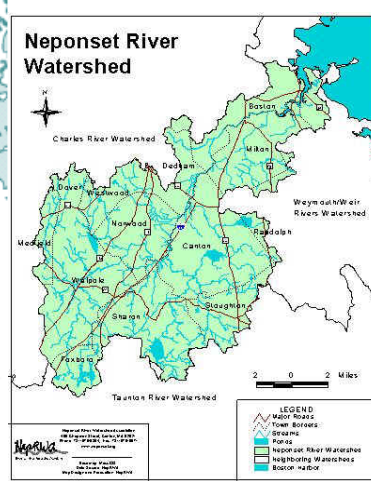
River Basins of Massachusetts



Mystic (N)



Charles (W-SW)



Neponset (S)

The control of the three watersheds still require new approaches. The problem is that there are many Authorities having control of water quality in the region. The MWRA, which has limited control over them may be facing the typical problems that worldwide are raised when integrated watershed management is approached by government in general. Coordinated efforts by local, state, and federal agencies, businesses, and residents. Have in mind that the MWRA is nevertheless used to multijurisdiction management. From the point of view of the supply it manages water from far in the west of Massachusetts (Quabbin Reservoir –See Map of Communities).

But from the point of view of the wastewater treatment it is limited to the 43 communities listed in Judge Mazzone’s Order. The monitoring plan routinely measures the contaminants (see map), but that does not mean that the MWRA is in control of permit for discharges nor of inspections. Besides that, contamination of underground aquifers faces in Massachusetts and Federal law the same problems as in most of the world when it comes to determine which authorities should be in charge and what statutes and regulations should be applied: whether the Clean Water Act or the

CERCLA (see Box below) the federal statute that strictly controls soil pollution in the US

How would an integrated watershed management system be efficiently put in place?



Pollution in the 3 basins

The Comprehensive Environmental Response, Compensation, and Liability Act –CERCLA–, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. Over five years, \$1.6 billion was collected and the tax went to a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. This federal statute has its parallel in Massachusetts Law. At sites that have been impacted by a spill, a leaking tank, or other source of oil or hazardous material, the soil excavated during construction must be strictly managed in accordance with regulations known as the Massachusetts Contingency Plan or "MCP" (310 CMR 40.0000) which started operating in October 1993. These regulations, define the extensive process for testing contaminated soil to determine the appropriate disposal site and for creating the “paper trail” for tracking the soil. A person who is licensed as a Licensed Site Professional (LSP) by the Commonwealth of Massachusetts must oversee the process for managing soil at a contaminated site. The procedure is clearly different than the one regulated by CERCLA at the federal level.

How do you think that decisions to intervene are taken when it seems clear that both the Federal and State Government have full concurrent jurisdiction?

An additional issue is the lack of recharging of the used water. The MWRA does not need it because the supply of water is fully ensured for the 43 communities since the MWRA controls Quabbin reservoir. But the surrounding communities have a serious problem of access to water (this is also CLF’s opinion). The option for the single plant in Deer Island made impossible the recycling of clean water and the recharging of some of the aquifers. In energy costs (repumping against gravity) would also make the MWRA pay for water that goes for non MWRA communities and farther complicate the economy of the whole venture. But shouldn’t these alternatives been considered before deciding on the project? The Guiding Students Discussion Section will analyze the

issue of the option for a decentralized system versus the one that was chosen: a single high tech project.

II.D.- Some alternatives to a complex waste water treatment integrated system: Title V septic tanks policy?

Although the 43 communities which were forced to be served by the MWRA under the Court Order did complain during the process about the rates, the question remains if they did not ultimately have a better situation than those other communities whose sewage system is under the control of each municipality.

This is due to the fact that in 1995, the Massachusetts Department of Environmental Protection (DEP) revised Title 5 of the State Environmental Code, which regulates on-site subsurface sewage systems, including residential septic systems to prevent the contamination of drinking water by identifying failed, substandard or poorly sited septic systems. These regulations provide more environmental protection for certain sensitive resources (such as areas contributing to drinking water supplies), than the previous version of the regulations, the 1978 Code. The purpose of Title 5 (Title V CMR 15.000, of the Massachusetts Environmental Code) is to provide for the protection of public health, safety, welfare, and the environment by requiring the proper siting, construction upgrade, and maintenance of on-site sewage disposal systems and appropriate means for the transport and disposal of septage.

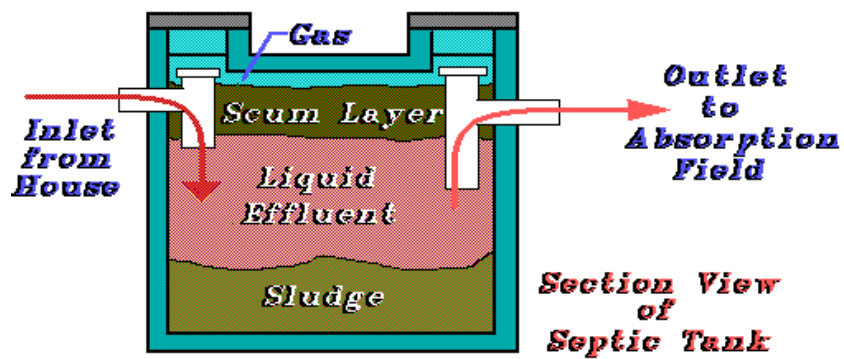
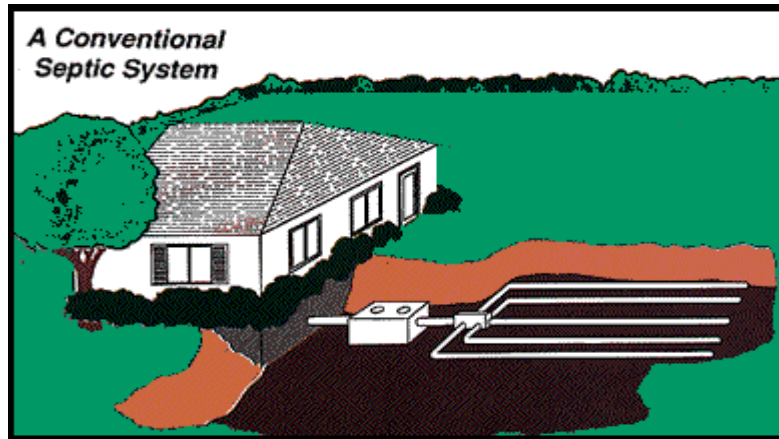
The 1995 Code changes contain more stringent protection for lots in nitrogen sensitive areas (NSAs) than the previous 1978 Code.

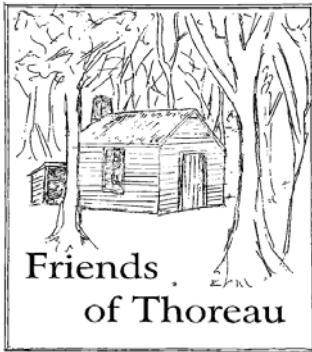
While it is true that some transition rules were part of the scheme, whenever a property is sold a Title V inspection takes place. If you are selling your house or changing the usage of (i.e. putting an addition on) your Massachusetts home and you don't have city sewer service then you need a Title Five (Title V) Certification for your septic system. This certification comes from a Title Five inspector after a septic inspection deems that the system doesn't meet failure criteria as outlined in Title Five CMR 310 15.000. Title V regulations require that on-site systems comply with state-mandated design and performance standards.

Residents from some communities may be also under a Wastewater Management Plan that may require a system check every time any septic system is pumped. If the pumper sees something suspicious with the system, he or she will report that information to the Board of Health, which will require the owner to have the system inspected (or if the owner concedes that the system would fail an inspection, he/she can voluntarily accept a failure) and then start the process of upgrading the system to bring in into Title V compliance.

The average cost of a new septic system in MA is \$15,000. It is quite a surprise for landowners wanting to cash their residence value whenever they decide to move. So,...is this system cheaper than hooking the sewage to a broader grid governed by rates?

Should a septic tank policy be put in place independently of whether the city has or not sewage systems in place?





The Boston Harbor Project

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III.- Guiding Students' Discussion

III.A.- The actors: CLF, Health, City Council, State & Feds, the different communities: Winthrop, Quincy, Provincetown, Dorchester. The intricacies of litigation. The exact mandates of the CWA. Settlements, how do they function; EPA, from defendant to plaintiff; CLF, citizens suits; judges: injunctions and other extraordinary powers.

As we saw in the introduction of the Case Study, the CLF used the citizen clause of the Clean Water Act, under which the EPA needs a 60 day notice if it wants to entertain it. The notice was filed in Fall 1983, and the formal complaint in November 83. Are citizens lawsuits "normal" in the US. What is the normal standing for citizens before the courts?



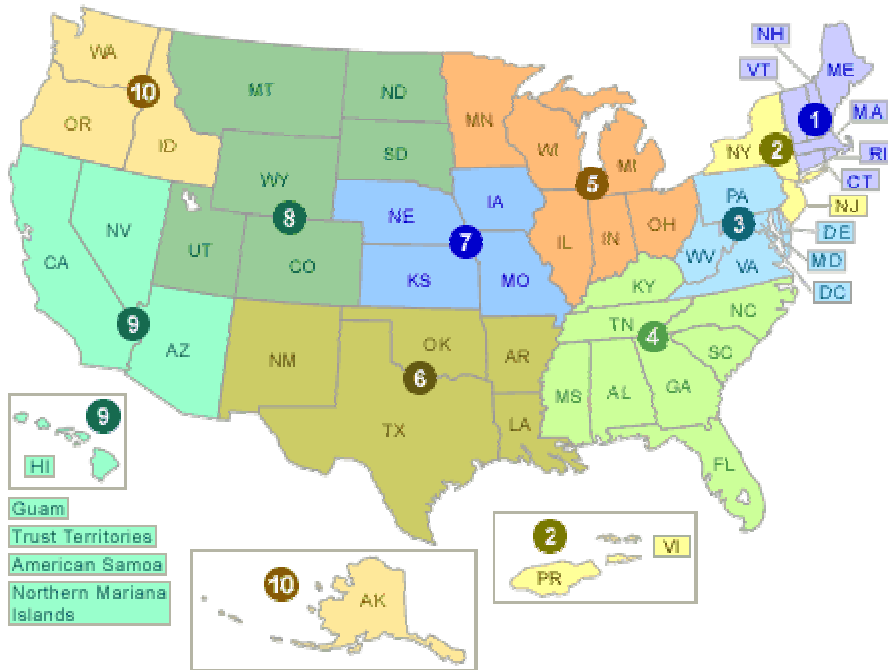
CLF Attorney Peter Shelley with one of the authors of this case study

It seems that the Boston Harbor project ultimately happened because of the action undertaken by citizens themselves. It all started very tiny. Jogging solicitor of Quincy against the city of Quincy. The Boston Globe did an extensive article in December 1982. Do you think that the media are essential in environmental activism? Is the agenda of the environmental agencies really governed by what the media considers important?

The CLF did not recover litigation fees but for the liability judgement holding MWRA liable as a successor of the MDC. It was the only substantial success that allowed the CLF to recover some fees since regarding the project itself, the CLF could not get any fees for the remedy approved since Judge Mazzone, as we will see, picked the MWRA proposal of the Deer Island plant with its own timetable. When the Quincy litigation was known, the Dough Foy, its president at the moment, thought it should be also taken by CLF. Attorney Peter Shelley, then in Pennsylvania, was called. Many environmental sceptics argue that NGOs further their own interests based on the generous share of contingent fees that the US legal system awards to environmental plaintiffs. Is that true? Do you think that this is what the CLF was looking for in this case? What is the real role of US NGOs in environmental litigation? Why is it that NGO litigation is not used that much in Europe?

Originally (1965-1975) the CLF focused on land easements. It had also been active in Georges Banks moratoria against oils shore gas exploitation. Around 30/40 % of its activities were funded through foundations.

The change of the EPA administrator in Boston helped the original lawsuit brought by the CLF. Do you know how the EPA is organized. How many EPA Regions are there in the US? Do the Regions have enough autonomy to decide its own policies?



Map of the EPA Regions

Even at its central level in Washington. Is the EPA independent from the President? What is really meant when the US system establishes “independent” agencies? Should not the administration of the public interest be on the hands of the Executive Branch of Government? Where are the independent agencies mentioned in the US Constitution?

The whole Boston Harbor litigation implied a remedy which ultimately amounted to have a Federal Judge in charge of massive scale public works operations under very strict and daily scrutiny. Is such a remedy common at all? Should judges engage in such administrative ventures? Does it not imply a role which the Constitution attributes to the Executive Branch of Government? What are, if any, the limits to what judges can do in the US?

Ultimately, the outfall did not pass any environmental impact statement because the whole project was in the hands of the judiciary. Can the Judicial Branch simply skip obvious environmental law requirements such as the need of an environmental impact assessment? Can a judge, when activating a remedy, skip essential elements of environmental law such as the requirements of the National Environmental Policy Act to conduct an environmental impact assessment? What is the role of EIAs? Why is the judiciary so strong on agencies requiring them to apply seriously EIA methodologies and so lenient when the project is on its hands? Can the four-year long process including oceanographic and engineering studies, regulatory review, and extensive public participation that took place substitute a regular environmental impact assessment procedure?

In the Scholars’ Debate section it was seen that the Cape Cod community is now complaining because they think that the project simply sent them the pollution. The issue was raised whether the appropriate solution should look more like a spider web,

stretching the rope toward a legal solution only to the extent that it does not break in another point thus seriously damaging or lacking to properly acknowledge the interests of other persons (the Cape Cod community in this case). Do you think that this is the case in this situation? Shouldn't social interaction and negotiation become a better forum for the solution of environmental conflicts than judicial unilateral mandate notwithstanding the virtues of a contradictory (versus inquisitive) judicial system? What are the institutions that the US legal system provides to ensure public participation in environmental litigation?

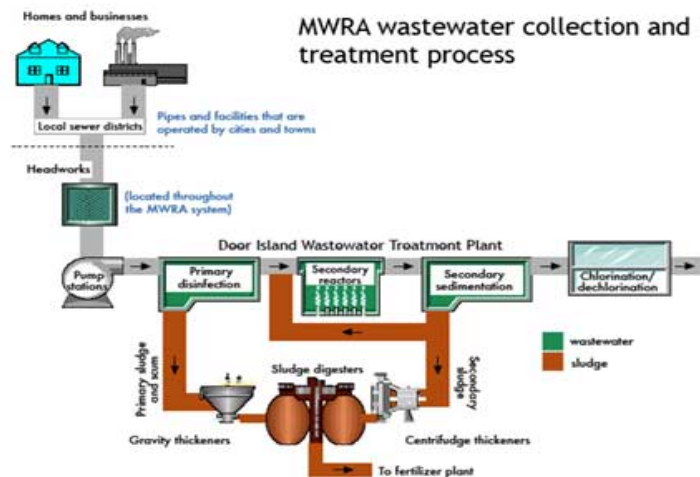
Another community that had to be offered compensation was Winthrop, the nearest to the isthmus that connects Deer Island with the mainland. Besides making sure that most of the material and personnel was moved during construction in barges from Central and South Boston, so that the town avoided heavy traffic for years, it ultimately received additional "compensations" as the siting place. Looking at the pictures of Deer Island, ...can the students sort out what improvements did the huge plant provide to the town?

We saw in the Scholars' Debate section that the integrated watershed management will be a difficult task for the MWRAS to complete. Responsible and concerned Greater Boston neighborhoods have a long tradition of getting organized to activate environmental programs. The three watersheds (Charles, Neponset, and Mystic) have their own Watershed Associations. What s the role of such associations? Are they really useful for the purpose on integrated watershed management?

III.B.- Alternatives: big infrastructure vs decentralization? The technology: the works themselves; the eggs; the outfall tunnel; the pelletizing facility.

The first alternative, that kept the MDC -and, later, even the MWRA because of the rates- busy making other proposals consisted in the enhancement of the primary system.

Water treatment may involve primary, secondary and tertiary systems. The students should be introduced to the basics of the different technologies and costs implied in the choices among the three different systems.



As we have seen, the Main Page has a box with the planned and real timelines of the project. The students should analyze the environmental consequences of the different milestones of the real timeline so that by the end of the process they should be able to identify which improvements should have been noted in the quality of the Boston Harbor waters just after the initiation of each of them. Through this method, the different technologies and their costs can be directly related to specific measurable environmental improvements, thus allowing for a conscientious evaluation of the cost/benefits involved in expensive water quality management schemes.

Was it the only available remedy? Initial evidence started to show that everything was a disaster (for example, the pipe from the second reservoir to Boston, essential for its supply, was wooden and 150 years old, and leaking in the Back Bay area, exposure to air of the basement created palafites when the leak was fixed: so the drinking and normal wetland groundwaters were mixed in the supply system; the system was really treating much more water than the wastewater). Could one rely in the full renovation of such a system instead of building a straightforward pipeline system toward the 4 pipes leading to Deer Island?

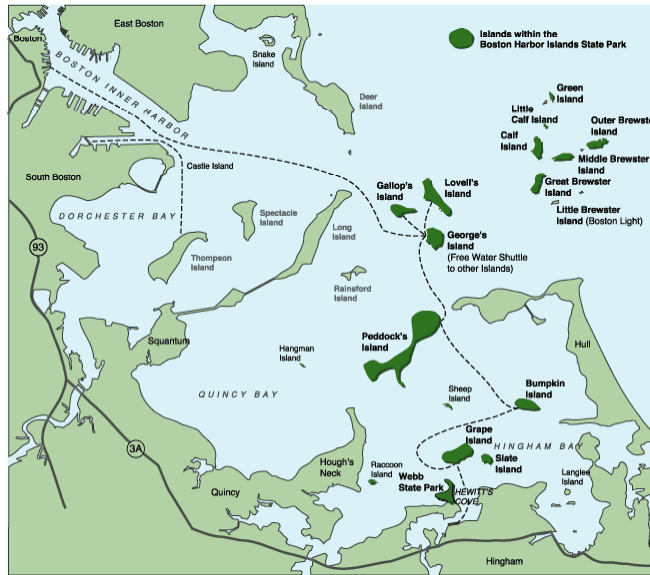
In terms of policy and technology it would have been ideal if several plants would have been built along the sea shore. But all the parties considered it almost impossible because of the economic costs entailed in renovating the grid after 100 years of distributed infrastructure plus the consideration given to the risk of controlling several plants in case of failure. The system as it was set allows for lots of redundancy that allows for bypasses, but, for example, it has foreclosed forever the possibility of recycling water or recharging the aquifers that would allow the communities outside the MWRA system to increase their access to water, which is an increasingly serious problem.

Do you think that these are the real reasons for the decision to concentrate in a single project? Doesn't the decision reflect, rather, the unrestrained trust of American society in technology and big projects?

III.C.- National Parks: "politicking" or tradition?

As we saw in the introduction of the Case Study, a lot of value has been added to the Harbor by the establishment in 1996 of the Boston Harbor Islands National Park. The speed of the process through which the Park went in Washington surprised everybody. It takes a very lengthy procedure to establish new national Parks notwithstanding the fact that almost every US President has been faithful to the tradition of adding new acreage to the list. Do the Islands really deserve to have been declared National Park? Wasn't it really simply a tribute to Gary Studds when he retired as Congress representative? What does the process tell you about the complexity of Washingtonian politics?

Most of the islands are also part of a State Park, What is the difference between both Park systems, federal and state?



The State Park system, with the possible visits that can be made by public boating

As the introduction made clear, the Boston Harbor Islands National Park has a larger component of historical heritage than of natural beauty. In many countries around the world, National Historical Heritage is protected under very different institutions from those in charge of the protection of National Parks. The student should be guided through the National Park system of the US to understand the close connection that both natural and cultural heritage have in the US cultural identity.

This tendency to treat equally, as common heritage, both natural and cultural sites is not only a US trend. It happens also at the global level. For example the UNESCO World Heritage Convention of 1982 allows for the designation of both historical and natural sites. In many cases both features combine, as it happens, at the national US level, with the Boston Harbor Islands National Park. The students could be guided to try to find World Heritage Sites that do also combine both elements: natural and historical.

I



Fort Warren, a National Historic Landmark in Georges Island, the center of transportation to the rest of the islands

III.D.- New England's option for "pharaonic" projects? What about the Big Dig?

The Boston Harbor project was of such a large scale that, as we have seen, it nearly raised popular revolt. While other such big operations that changed the face of the City (and everything that happens in Boston has a regional New England pride) were planned and implemented by calling for the private sector to get involved, as it happened with the development of Quincy Market and the Waterfront –or the recent translocation of the Boston Celtics arena to the Fleet Center-, or by finding added value for other institutions (the Trade Center or the Federal Courts Building), the Deer Island Project was an exclusively public sector venture.



Boston's celebrated Quincy Market

The surprising anecdote is that notwithstanding the opposition raised against such type of projects, the city got involved in the immediate aftermath in even a larger scale project: the so-called Big Dig -the official name is the Central Artery/Tunnel Project (CA/T)-, which removed the old interstate system that cut the waterfront from the rest of the city for decades. The impact of the works themselves, while the building went on, has probably changed forever the mood of the city. Now that the Big Dig is almost over the students can be guided to analyse the intricacies and complexity of the planning of big infrastructures, to the difficulties of proper budgeting and the social reactions that mismanagement can create, and to the benefits that in the long term they can produce. These projects, though, have promoted many others that will reshape the economy of the city and the whole region (Save the Harbor/Save the Bay 2004). This analysis of the Big Dig can offer to the students another opportunity to learn about complex policies of urban and spatial planning when compared with the difficulties that the Boston Harbor

project entailed and to which they should be well exposed by now. Long term planning versus short term investment needs to be scrutinized in terms of the cost/benefit that they may produce and not only in public sector budgetary terms.

The project's two major components are the removal of the six-lane elevated highway with an eight-to-ten-lane underground expressway directly beneath the existing road; and the extension of I-90 (the Massachusetts Turnpike) from its former terminus south of downtown Boston through a tunnel beneath South Boston and Boston Harbor to Logan Airport.



Ongoing Big Dig works and a poster showing how it will look like once they works are finalized and the reclaimed surface is landscaped.

To put these highway improvements in the ground in a city like Boston has amounted to one of the largest, most technically difficult and environmentally challenging infrastructure projects ever undertaken in the United States. The larger of the two Charles River bridges, a ten-lane cable-stayed hybrid bridge, is the widest ever built and the first to use an asymmetrical design.

The project also includes four major highway interchanges to connect the new roadways with the existing regional highway system.

The Central Artery/Tunnel Project is public works on a scale that has been compared to such landmark engineering projects as the Panama Canal or the English Channel Tunnel (the "Chunnel")



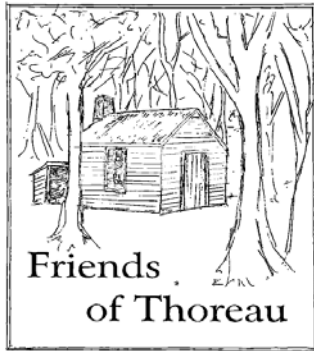
Boston's skyline from the Harbor Islands



Boston Inner Harbor waterfront



The New England Aquarium, at the waterfront



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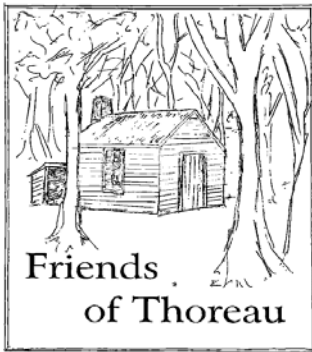
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V.- Links to Online Resources

Judge A.David Mazzone's Chamber Papers on the Boston Harbor Clean Up Case. The University of Massachusetts has a web site with the papers and some videotapes of the case:

<http://www.lib.umb.edu/archives/mazzone.html>

Web Page of the Boston Water and Sewer Commission (BWSC)

<http://www.bwsc.org/mainpage.html>

Web Page for the Big Dig:

<http://www.bigdig.com>

Web page of the Massachusetts Water Resource Authority (MWRA)

<http://www.mwra.state.ma.us/>

About the CSO management and Plan:

<http://www.mwra.state.ma.us/03sewer/html/sewco.htm>

About the Deer Island Plant:

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About the outfall (including the 2002 monitoring review)l:

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The State of the waters. Monitoring Report:

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State of the beaches around Boston:

<http://www.boston.com/travel/newengland/beaches/summer/livereport/>

Some citizens' NGOs:

Conservation Law Foundation:

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About Boston Harbor (pictures et al):

<http://www.bostonharbor.com/>

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Save the Harbor/Save the Beaches:

<http://www.savetheharbor.org/>

The Boston Harbor Association:

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Charles: <http://www.crwa.org/>

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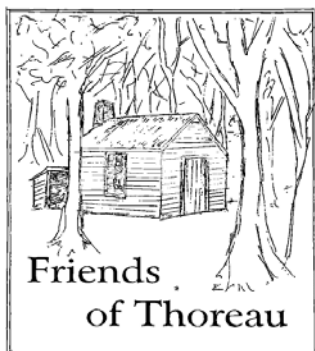
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About EPA's funding of water related projects until 2000:

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About the disappearance of Boston groundwaters:

<http://www.bostongroundwater.org/snow.html>



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VI.- Acknowledgements and illustration credits

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