

**DRAFT—FOR COMMENT
NOT FOR CIRCULATION**

**From the Tower to the Arena:
Institutional Context for Wastewater Regulation
(A tribute to the late Douglas M. Johnston,
distinguished scholar and MASC colleague)**

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Introduction

I would like to make three points about the overall institutional and social context surrounding the specific local decisions we will be describing tonight and dissecting tomorrow.

First, governments and citizens are pondering these questions of municipal wastewater effluent within a very dense mesh of global covenants and federal and provincial laws, regulations and guidelines, as well as general conventions and norms.

Second, we all have to make decisions on these questions in the face of unlimited needs but limited social, economic and budgetary resources, as well as constraints on time and attention. Public decisions—official decisions—on these matters are bound by strict norms of accountability and answerability for responsible, evidence-based, outcomes-oriented use of those resources. They are taken within rigid institutional structures; in the face of profound uncertainty and constant change, official decisions must reflect the priorities inherent in the formal, usually hierarchical, structures and procedures of democratically-driven institutions.

Third, in the end, realization of the intent of all such decisions comes down from the tower of principle, in which all these things are elegantly (or not so elegantly) phrased in abstract and general terms, to the arena of practice and action, where individual discretion is shaped by personal perceptions and norms, and individual agency has to be exercised in the particular circumstances of particular places.

So we move from the principle-driven abstractions of global norms and conventions, through a very different procedural setting where formal laws, codes and regulations are written, and policies are established to guide official decisions taken to try to implement those international agreements and realize the intent of global covenants. But in the end, compliance with these regulations and conformity with policies comes down to individual and personal conclusions about what is the right thing to do. Dramatically different institutional cultures drive these successive stages of discretion and decision.

This tour thus takes us in something of a circle, but may help to explain a bit why dedicated people of unquestioned goodwill can see the issues so differently, perceive and interpret the evidence so differently, and reason so differently to arrive at such different conclusions about what we should or ought to do in something as local and seemingly straightforward as managing wastewater effluent.

I. Let's first sketch briefly a bit of the legal and regulatory structure within which we work, across many scales.

International covenants and agreements

Canada has made many international commitments, but not done so well on compliance (the 1998 Report of the Commissioner of Environment and Sustainable Development, a body within the office of the federal Auditor-General, noted that we don't even do very well in tracking how well we are doing in implementing these agreements and coming into compliance with the commitments).

Concern for environmental responsibility of course goes back many decades, even centuries, but began to be expressed more formally in international instruments a couple of generations ago. For example, we have the Stockholm Conference on the Human Environment, 1972, and the associated Stockholm Declaration, as one of the first general statements of need to protect the Earth's environment. In many ways this event launched the international environmental movement, although of course path-breaking books such as Rachel Carson's *Silent Spring* (and also *The Sea Around Us*) had earlier raised awareness of the depth of concern.

The London Convention 1972 has been described as the first major international agreement aimed at effective control of all sources of marine pollution.

MARPOL (73/78) aimed specifically at pollution from ships.

1982 UN Convention on the Law of the Sea; entered into force 1994; Canada ratified in 2003, US not yet. Introduction of the concept of the 'Common heritage of humankind' was for many a landmark feature of the decade-long negotiations leading to this agreement.

1992 UNCED Rio (The Earth Summit)

Agenda 21. Chapter 17 on Oceans outlined the pressing need for protection of the world's oceans. It urged upon governments the obligation to take anticipatory action in line with the precautionary principle that had become much more widely debated over the prior decade.

1992 Convention on Biodiversity also opened for signature at Rio

1992 UNFCCC These days we should probably also mention the UN Framework Convention on Climate Change, which was supposed to lead to an effective tail of protocols for dramatic reductions in greenhouse gas emissions. Commitments under the first (Kyoto) protocol, and subsequent monitoring of climate impacts showing how far short we are of realizing even its modest commitments, make the issue of greenhouse gas emissions an important new consideration in examining alternative approaches to waste disposal. The UNFCCC entered into force 1994; it has not yet been ratified by the US, so far as I am aware.

1992 Basel Convention on the Control of Transboundary Movements of Hazardous Waste. It is relevant to mention this agreement for two reasons. First, Article 4 encourages countries to keep waste within their boundaries and as close as possible to its source of generation, in order to create

internal pressures and incentives for waste reduction and pollution prevention. (Remember this thought when we come later to talk about source controls in dealing with CRD wastewater.) Secondly, debate about the application of the convention has focused the tension between letting willing transactors pursue their economic interests, and preventing mutually advantageous deals in the service of some higher moral imperative, such as taking personal responsibility for one's own waste. (Some of you may remember the famous World Bank memo written by Larry Summers, then Chief Economist, later President of Harvard, arguing that low-income countries should be allowed to pursue livelihoods based on accepting the wastes and polluting industries of countries that could thus enjoy high material standards without having to deal with the resulting wastes. Of course the memo was much more nuanced and sensible analytically than that caricature, but my memory is that the incident still cost him his World Bank job.) My memory also is that in the mid-1990s the NDP government in Ontario went through a similar controversy when it prohibited the shipment of solid waste from Greater Toronto to willing recipients for disposal in abandoned mines at Kirkland Lake or Adams Lake (mine) or somewhere North of Toronto.)

In 1994 the North American Agreement on Environmental Cooperation, a parallel accord to NAFTA, came into force. It includes an important (though arguably not very influential, and not taken very seriously by the parties) provision in establishing a citizen complaint process: the failure of a party to enforce its own environmental rules can be the basis for a complaint by citizens or citizen groups in the other two countries. The point of principle is that non-compliance with environmental laws and regulations as written is not an option open to a responsible party.

1995 Canada signed on to UNEP Global Program of Action for Protection of the Ocean from Land-based Activities (GPA), with a commitment to develop a National Program of Action. (See, for general information, <http://www.gpa.unep.org/index.html?ln=6> and <http://www.gpa.unep.org/content.html?id=190&ln=6> for the international program and general links to national programs, and http://www.npa-pan.ca/en/publications/oceans/oceans_e.pdf for reference to Canada's National Program of Action, to be discussed briefly later.)

1997 Oceans Act: mandated integrated, ecosystem-based, precautionary oceans management in order to assure that Canada's stewardship of Canada's (the world's) oceans meets the highest standards.

1999 Canadian Environmental Protection Act is one of the major documents shaping decisions around environmental protection and management of wastewater in Canada. A five-year review of the original legislation is, I believe, still underway. The review website has extensive documentation.

2001 Canada hosted first Ministerial Intergovernmental Review Meeting on Implementation of the UNEP GPA, in Montreal—unveiled Canada's National Program of Action, with priority to sewage problem. As noted above, Canada's National Program of Action for the Protection of the Marine Environment from Land-based Activities identifies sewage as a concern of first priority. Extensive background on implementation of this program, and related legislation, can be found on the NPA website at <http://www.npa-pan.ca/en/publications/implementing/annex.cfm>. "Under the NPA, Canada has

assigned sewage, persistent organic pollutants, and habitat alteration/destruction as high priorities for action.”

National Legislation

Long predating all this activity, Canada’s Fisheries Act is, I think, the oldest piece of legislation on Canada’s books, and contains the most fundamental provisions with respect to discharges into waters. What are now sections 35 and 36 simply prohibit discharge of any deleterious substance into fish-bearing waters. The Act has been amended, of course, but in the past couple of decades further amendment has proved very hard. New Bills keep dying on the order paper. Another set of proposed amendments is in the House, but may die again. Nevertheless it is important to comment because the proposed new federal regulatory framework for municipal wastewater is being prepared by Environment Canada under authority of Fisheries Act; amendments to Act are pending (but not affecting provisions with respect to discharges into marine environment?)

2002 saw announcement of Canada’s Oceans Strategy to pursue implementation of the Oceans Act (and in 2005 the Oceans Action Plan was announced to give content to the strategy). Although the Act was pushed through Cabinet on the heels of Rio (5 years later), we still face the challenge that now, ten years after the Act came into force, it seems that resources, which have never been adequate, remain very limited, as does any sense of urgency around fulfillment of the goals of the Act.

- *Canadian Council of Ministers of Environment (CCME, at www.ccme.ca)*

The CCME is the central vehicle for pursuing coordinated initiatives involving federal, provincial and territorial governments in the challenging fields of environmental policy and environmental protection. In these fields constitutional jurisdiction is hopelessly murky and joint action is the only responsible course. With an independent secretariat, CCME is in a stronger position to provide staff support for intergovernmental negotiations and harmonized initiatives.

CCME work on harmonization of standards for municipal wastewater effluent began around 2002 and an extensive consultation process has followed since then. Much material can be found on the CCME website.

Following these several years of negotiations, the CCME Draft Strategy on Municipal Wastewater Effluent (MWWEE) was released for further consultation Oct 2007; consultation ended Jan 31, 2008; report on results from consultations? A meeting of Ministers is planned for Spring 2008 to agree on final draft of strategy on Canada-wide harmonized approach to wastewater regulation and standards. The proposed Strategy identifies National Performance Standards that require a minimum standard of secondary treatment prior to discharge of sewage effluent to any of Canada’s surface water environments. (For the current version of the consultation document, one can see http://www.ccme.ca/assets/pdf/mwwe_cda_wide_strategy_consultation_e.pdf.)

A draft Federal Proposed Regulatory Framework was also released October 2007 (see <http://www.ec.gc.ca/ETAD/1C8FFC56-FE84-4C31-BCF6-88F5401F1EFB/>)

[EC Proposed Regulatory Framework En.pdf](#)); a final regulatory framework to implement the approved CCME strategy is targeted to appear in the Canada Gazette (Part I) for comment in December 2008. Environment Canada has indicated that these proposed regulations will include the National Performance Standards for secondary treatment and implementation timelines. At the moment the draft strategy places Victoria's raw sewage in the high-risk category ("because of the large volume of sewage discharged daily and because of the poor effluent quality, with preliminary screening only"). With this rating, the Strategy would demand a 10-year implementation timeline. [Will this comment period see renewed debate around standards? Could BC argue that placement in the 'high-risk' category is inappropriate given the specific features of the particular receiving environment?]

Georgia Basin Initiative, GBEI; GBAP; Georgia Basin Puget Sound BC-Washington Environmental Cooperation Agreement; GB-PS International Task Force; Marine Water Quality Science Panel (very impressive Report 1994 identified risks and priorities for response). It is perhaps important to note that this bi-national science panel—chaired by Andrea Copping, our lead-off speaker tomorrow—concluded that Victoria sewage disposal is not the highest priority threat to marine habitat or marine ecosystems (habitat degradation and loss from shoreline development and industrial activity were much greater concerns, for example).

Provincial

The Municipal Sewage Regulation (1999) outlines provincial standards for treatment and discharge of sewage to the environment.—includes a minimum standard of secondary treatment for all large discharges of sewage to surface waters.

The Provincial Environmental Management Act gives the Minister authority to regulate waste discharge to the environment and requires that CRD operate under an approved Liquid Waste Management Plan (LWMP). The BC government has taken the view that "secondary treatment best meets regulatory standards and the goals of the LWMP in that secondary treatment is effective in reducing toxic contaminants and enables nutrients and water to be economically removed and residuals to be beneficially managed".

Contaminated Sites Regulations (CSR) were established in 1997 under the EMA. The CSR includes legal standards that must be used to determine whether a site is a contaminated site. In July 2004 sediment standards were added to the CSR, providing legally enforceable sediment limits for sediments in British Columbia.

The current LWMP was approved in 2003; based on strategy of source control, constant monitoring, and triggers to determine when further action is required. Extensive monitoring work and extensive scientific analysis and modeling have been undertaken to try to understand the very complex oceans dynamics, marine ecosystem dynamics that determine the impact of the effluent flow through the existing outfalls. ...

However, as you will hear at some length in the following discussion, the SETAC report commissioned by the CRD and the MESL report commissioned by the Ministry of Environment question whether the current activities under the existing LWMP comply with existing BC legislation and regulations, or federal guidelines and commitments.

July 2006 Letter from Minister requires CRD to prepare proposal for amendment to LWMP

CRD

In response to the instructions in the July 2006 letter, the CRD submits to the Minister a letter in June 2007, containing a proposed amendment #6 to the LWMP. (See materials accessible on the CRD website at <http://www.crd.bc.ca/wastewater/reporttominister.htm?mb> .)

In Dec 2007, the CRD received a response from the Minister, advising of approval of Amendment #6, contingent upon completion of further work on two substantive matters; plans from there will be described by our last speaker this evening. For the wide range of information on liquid waste management now available on the CRD website, including some of the original background documents on which the provincial government's order to the CRD was based, one can see either <http://www.crd.bc.ca/wastewater/sewagetreatment.htm#> for materials on planning for wastewater treatment, or the Wastewater and Marine Environment Assessment site at <http://www.crd.bc.ca/wastewater/marine/index.htm> .

All this is of course only a sketch of a much more elaborate mesh of covenants, agreements, conventions, with their expression in legislation and in regulations created under the authority of that legislation.

There is also an extensive array of case law testing or challenging the interpretation of all this apparatus. You'll no doubt hear more about that tomorrow. Much of this challenge goes to the question as to what the language in the laws really means. What did Parliament or legislatures have in mind? What was the intent of the drafters? What was the intent of Parliament itself? How would they have intended/expected the language of their day, expressed in the context of their day, to be interpreted and performed in the circumstances of current action? (There is a wonderful set of issues here of performance practice, law as a performing art, or public administration as performance of text, and so on. But obviously there is no time to go into any of that at this time.)

But it is important to note that public decisions intended to mandate collective action to realize the intent of all these covenants and legislation have to be taken in a very different institutional context from that in which the marching orders were framed, first as covenants and then as legislation or regulations. Decisions about policies, expenditures, monitoring and enforcement (or, ultimately, compliance) move us away from the tower where drafters build ideas and craft text, toward the places where decisions on implementation are negotiated. One can think of this as moving away from sacred text and legal language toward practical public administration, where fidelity to the text becomes a real concern, but practical constraints and the responsibility to serve a diverse democratic polity bear more heavily.

Involved also in the process are a number of other entities.

Individual municipalities

Within each municipality are located many responsibilities that relate to both protection and distribution of safe drinking water, and responsible management of liquid wastes. Instruments for this purpose include zoning, regulation of property development, management of revenue from property taxation and so on. The incentives surrounding many of these functions will lead to differences of interest among the members of the CRD. (The famous ‘NIMBY’ phenomenon is only the most obvious example.)

Environmental Non-Government Organizations; Civil Society Organizations

In an setting with growing pressure for more inclusive participatory decision-making—or at least more substantial consultation efforts—it is important to note the increasing influence of civil society organizations (as well as the already influential business associations that have been accustomed to operate more in the corridors than in the consultation chambers).

First Nations governments and communities

Even more important is the increasing insistence of the courts on the obligation of governments to consult First Nations and, where possible, accommodate their interests, and the resulting dramatic increase in their influence. Consultation with concerned First Nations is documented on the CRD website and in the 2007 CRD report to the Minister of Environment on amendment to the LWMP.

Individual academic groups and ENGOs—links

<http://www.geog.ubc.ca/~bakker/Projects/index.htm#governance>

<http://www.watergovernance.ca/Institute2/municipal/references.htm>

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

<http://www.rstv.ca>

http://www.ecojustice.ca/clean-water/clean-water/richtopic_view?b_start:int=5&-C=

<http://victoriasewagealliance.org/>

Individual households and people

At the core of the system, of course, is the behaviour of the individuals and households who consume the water and rely on all the systems just enumerated to assure its safety and adequacy, and whose individual decisions on the management of waste determine the stresses and the risks facing the overall hydrological cycle. Again, the incentives bearing on individuals, and the differing perspectives they bring to decisions, may lead to substantial differences of interest and of views amongst the participants in municipal and regional debates. (The famous ‘BANANA’ – Build Absolutely Nothing Anywhere Near Anything—phenomenon is among the better-known examples of strong differences of views among pro and anti-development forces in local politics.)

II. Public administration

Decisions are being taken every moment by elected and unelected officials on behalf of other people, who usually don't know the action is being considered, rarely have a voice in the definition of the problem, or formulation of the dilemma, but are definitely affected by the decision, often deeply. They feel the consequences directly, but are rarely part of the process underlying the action.

Decisions are also being taken by corporate officials, responsible to shareholders, bound to some extent by legal and regulatory constraints designed to protect the interests of those who don't have any voice in those decisions, but without any formal direct responsibility to those who are not owners. (I leave aside all the interesting questions about whether the owners actually have any voice at all relative to the managers--and the financial fund managers to whom the enterprise managers must offer amazing quarterly results.)

(Interestingly, it may also be relevant to note that decisions are being taken all the time by environmental non-government organizations and other civil society organizations, also constrained by resource limitations, but serving yet a different constituency or clientele, whose perceptions and interests shape decisions on what issues deserve priority or command attention at all.)

Just a couple of quick observations about the nature of all this decision-making—a vast field of interesting issues about which we have no time to talk here.

Governments (and, as noted, corporations and civil society organizations) at all levels face essentially unlimited needs and demands, with strictly limited resources and capacities to meet them. Responsible public service (indeed, responsible service to whichever clienteles) requires that the resources available to meet those perceived needs be used in the most effective manner, to realize the greatest good for the greatest number (or to serve the relevant clientele most effectively).

This is not just textbook oratory. Within government, failure to use the available resources in an appropriate manner means that people will starve who did not need to do so, people will die who did not need to do so, human potential will go unrealized, quality of life will suffer. The challenges are real, and truly great. The choices are tragic, in the words of the title of the seminal book by Calabrese and Bobbitt (ref).

A tremendous amount of work has been done to try to establish ways in which responsible decisions can be made in large scale bureaucracies to meet collective needs in large and diverse communities of people with different perspectives and preferences, different needs and interests.

In particular, wave after wave of effort has been expended to find ways to establish priorities sensibly and allocate resources effectively. In the government setting, PPBS, ZBB, PEMS, all aimed at budgetary systems where community preferences could be communicated through parliamentary democracy to realize an appropriate balance in the allocation of resources. (Dobell, 2003, offers some references.)

But, to cut a long and fascinating story short, the outcome is that we are imprisoned in a mesh of custom and procedure just as we are in a mesh of covenanted ideals....And we are imprisoned in a mesh of language just as we are in a mesh of laws. The cultures in which global covenants are built by epistemic communities are very different indeed from the cultures underlying the hierarchical structures in which official rather than personal responsibility is exercised to develop collective decisions taken in order to serve a defined and limited constituency. Concerns for legitimacy and accountability dominate, and commitments to ongoing programs for established clienteles cannot easily be repudiated.

The result is that government budgets have very little discretionary money in them. Things grind inexorably on, with only little discretionary incremental change.

And standards have to be phrased in standard terms, uniformly, homogeneously—even though we live in a world of wondrous variety. (I can't resist reference to a great book titled *Seeing Like A State: How Certain Schemes to Improve the Human Condition Have Failed* (Scott, 1998). Somewhat similar problems around the negotiations attending policy implementation were set out a generation earlier in a classic book titled *Implementation: How Great Expectations in Washington are Dashed in Oakland* (Pressman and Wildavsky, 1973).

Not only are our standards designed uniformly for no place, rather than fitting any one place. But also we know precious little about the real consequences of many of the actions flowing from our collective decisions, and much less than that about how to weigh and appraise those consequences. When it comes to assessing the consequences of human intervention in marine ecosystems, despite an immense body of wonderful science, we face degrees of uncertainty that might as well be called ignorance.

Despite that, we try to guide the incremental change that is open to us at any one time by attempting to examine and weigh consequences of alternative actions. We try to use apparatus such as cost-effectiveness analysis, cost-benefit analysis, risk-benefit analysis, risk-risk analysis, all as ways to improve intuitions about the best ways to use limited resources, limited means to achieve essentially unlimited ends and conflicting objectives. The culture of responsible public service rests on the obligation and the ability to set priorities for the allocation of resources.

Governments everywhere have embraced and embedded notions of evidence-based decision embodying outcomes-oriented evaluation, all within a framework of risk management in a world of profound uncertainty.

But still we usually finish up with standards-based regulation (which is what we think we can measure—and which therefore becomes what matters) rather than outcomes-based, adaptive and flexible policies (in which we try to address what really matters). These standards are set in a culture of legal text and tests of compliance, not of performance-based assessment of the achievement of underlying ends.

We have established a very elaborate system of audit, monitoring, control, scrutiny of procedures and decisions to ensure that proper effectiveness analysis is done and guides decisions and actions, on the one hand. On the other, we have very little capacity to identify ultimate outcomes related to achievement of the ends we are attempting to achieve, and less capacity yet to attribute the achievement of those ends to particular actions.

Very serious consequences attend governments or officials who are unable to demonstrate that the decisions they have taken and the actions they have mandated meet tests of probity and prudence and precaution and reason and rationality and rightness—as tested by the sorts of analytical apparatus and methods just mentioned. (Or even the much less fundamental or rational tests imposed by auditors-general and their minions, relying on uniform application of generally accepted standard principles, usually of paperwork and reporting.)

In the social context for decisions, we have, for example, the formulation of the precautionary principle as an expression of a global commitment. But then we have a highly contested and not terribly satisfactory federal document flowing from extensive interdepartmental negotiation on how to understand and apply the precautionary principle. And a whole chain of further guidebooks flowing down towards the folks in the forest and on the ships on the sea, for whom very little of all this seems to make any sense in relation to the practical challenges that each day brings.

(Even now as we speak there are working groups trying hard to formulate an understanding of what we might mean by mandating ecosystem-based management and how we might recognize it if we saw it. This question matters deeply, for example, because the whole of the recent agreement on saving the Great Bear Rainforest and finding a degree of peace and reasonable stewardship of resources on the Central and North Coast of BC rests on being able to find such an understanding (before March 2009—that is, before the coming Olympics), compatible also with First Nations traditions and cultures.)

As I mentioned earlier, this isn't a glass-bead game, for its own sake. It is to ensure that fewer people die than otherwise would; greater health is achieved than otherwise would be; human potential realized to a greater extent than otherwise possible. On a national or hemispheric or global scale. Not just here.

So let me turn to the next step in this process of moving down from global abstraction to practical living. In this we further onward, away from the official world to a living world where personal values come into play and individual action is shaped. And yet again a different cultural context, with different language.

III. Compliance: Realization of intent, in place-based decisions

So we come back to the CRD and the challenge faced by the CRD in managing wastewater effluent within this amazing mesh of social and institutional context, bureaucratic cultures and democratic governance.

To recap:

Global covenants exist, expressing values and wishes and attempting some guidance as to principles by which these commitments might be realized, through anticipatory, precautionary action, for example.

International agreements exist, codifying some of those values.

Federal legislation exists, intended to be obeyed; so do regulations, with equal authority.

Attempts to harmonize some of this guidance to embody national goals across provinces and territories are coming to a head, and agreement may become entrenched in more federal regulations (yet to be put into final form).

Provincial legislation exists, with uniform regulations and standards and guidelines.

The British Columbia government interprets the current state of the world—present CRD wastewater disposal activities and practices—as being in violation of those guidelines; understands our current actions as being out of compliance with established regulations.

But notice now: with that last claim we have left (at least to some extent) the world of language and moved into the world of observation, of empirical evidence linked through a chain of analysis and reasoning to some conclusions about the world actually out there. One might say we have moved into a world of science, with claims and inferences tested against observations, looking to consistency with what we can measure of the world ‘out there’.

My understanding is that the BC government position on this matter rests on a range of observations, including two reports in particular about which there will be discussion just a bit later in this meeting, I expect: the SETAC report commissioned by the CRD and the MESL report commissioned by the Ministry of Environment.

The challenge then is to try to relate the interpretation of the partial and preliminary evidence we can obtain about the state and dynamics of the marine ecosystems out there with the interpretation of the intent of legislation that is not very good—and standards-based regulations that are not at all good—in recognizing the complexity and uncertainty and variability of that world out there.

The conclusions to which the Ministry has come are questions about the strength of beliefs about the world out there—to some (possibly great) extent, they have to be tested as questions of evidence and what we would like to call fact.

So, to conclude, see what a big challenge the institutional and social context leaves us with, all by itself.

IV Conclusion: Communication and conversation

We have to bring our own perceptions and beliefs to an interpretation of the partial evidence we have about the dynamics of a complex ecosystem, recognizing that some amongst us have tuned their intuitions about these matters through lifetimes of study. The science is hugely significant, but not at all easy to interpret.

And then we have to bring our own personal perceptions and interpretations to understanding how those who framed rules for action in a democratic community intended those simple general rules to be applied in particular circumstances. There is now a vast body of literature making it clear that people do not—and perhaps should not—perceive personal risks the way decision theorists perceive statistical risks (Dobell, 1979; Kahneman and Tversky, 2000). They do not—and perhaps should not—reason the way economists reason (Gigerenzer et al, 1999; Gintis et al, 2008; Engel, 2007). Nevertheless, we have to recognize that consequences do matter. And priorities should be somehow reasonably based. (And in the absence of more understanding of ecosystems, uniform standards may be all we have on which to base decisions and make progress from day to day.)

And then we have to try to link our interpretation of the meaning of the science in our particular concrete circumstances to our interpretation of the general rules of conduct for moral agents in such circumstances.

To try to meet this challenge, it seems to me we are seeing a new wave of thinking about governance. Unfortunately it seems to be a way of thinking that condemns us to never-ending dialogue and deliberation, to a situation where our thinking about the world and our conduct is never settled.

In this new setting, we are looking to civic science, what has been called Mode II science, interactive procedures for risk management in a democracy (Nowotny, 2003; refs, refs). We are seeing new ways of approaching the science that take advantage of local traditional knowledge, other ways of seeing, other ways of knowing, other ways of communicating my frame of reference, and reflecting on yours.

More generally, it is common now to advocate seeking better ways of speaking among ourselves, of moving from adversarial debate to shared dialogue, to deliberation, to what some have called generative dialogue. Adam Kahane talks about changing the world by changing the way we talk and listen. He contrasts downloading, debate, reflective dialogue and generative dialogue, and suggests that “if we want to change the world, we have to develop our capacity to recognize and navigate through all four of these models” (Kahane, Adam. “Changing the world by changing the way we talk and listen”, accessible on line at http://www.c2d2.ca/adx/asp/adxGetMedia.asp?DocID=699,32,Documents&MediaID=1590&Filename=Kahane_on_talking_and_listening.pdf . See also Kahane, 2004.).

The one thing we can be sure of is that the simple questions we pose about the simple and mundane task of managing municipal wastewater has no simple answers. People of genuine good faith and deep commitment may differ in their interpretation either of the nature of the world or the guidelines for our conduct within it.

We have seen that some will be coming at this discussion as a principled discussion, based on agreed text and an expression in homogeneous standards to be applied uniformly. Others, equally conscientious and committed to serving the communities to whom they feel responsible, approach the challenge as one of interpreting general guidance to establish priorities and allocate resources to realize agreed purposes most effectively, in the particular circumstances of particular places.

We see a continuing tension between the local, concrete, personal concerns of particular people in particular places, and the global, abstract, statistical concerns of the general public interest. Public officials are charged to serve the latter interest, seeking priority rankings dictating where resources should best be expended. Politicians hear more directly from the former interests. Decision theory, risk analysis and cost-benefit calculations serve the latter; the law and civil society organizations more often seek to protect the former. The people to be served in a democratic process blending all these efforts bring to it their own puzzling personal mix of all the cultures and approaches I have mentioned. The challenge obviously is to see how we might work to bring it all closer together, and deal responsibly with all the resulting distributional challenges.

In the face of this tremendous diversity in interpretations, perceptions and cultural context, I hope that our discussions here can move as much as possible toward reasoned deliberation about future decisions. I hope we can explore respectfully how we might in the future exercise responsibly the discretion that is—and must be—built into legislation and regulations and can stay away from dispute about the past.

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