
Chapter 1: Introduction

“Without an operational definition of sustainability with which to work, we shall not make any progress in this project.”

Such remains the common refrain, more than twenty years on from 1987, the year we now generally mark as the beginning of the global movement towards sustainable development.

People speak of an “industry” of indicator-generation that has since sprung up. There is convincing evidence of this. “Assessment Frameworks, Indicators, and Metrics”, merits a two-volume special issue of the journal of *Engineering Sustainability* of the UK Institution of Civil Engineers (Fenner, 2008). Even alternative procedures (Cobiac, 2006) have arisen — amongst which we must choose — for choosing the indicators, which will subsequently be applied for the purpose of evaluating policies and progress towards sustainability. Or should we be thinking in terms of “unsustainability”, defining it instead, and reaching for indicators for gauging movement away from it? It is as though we have been driven back, through lack of success in defining what was originally the object of interest, to defining a lengthening succession of increasingly subsidiary objects, with which then to remount our attack on the original matter of concern.

The absence of a sufficiently satisfying definition or indicator set is surely not for want of trying. A host of definitions of sustainability and sustainable development has become available to us in these past twenty years and more: definitions in respect of development around the globe; for the world community and economy, in general; as much as for the water sector, in particular (for example, Loucks and Gladwell, 1998). Sustainability fully deserves such attention. It is undeniably a BIG idea. It should not be anything less, given the scale of the problems to which it is addressed.

It is also frustratingly vague and imprecise, remarkably resistant to any better definition than that first coined (to paraphrase):

Doing well now by the biosphere and the stock of natural capital and flow of services

therefrom entails doing at least as well generations hence.

It is unquestionably about the long view into our future. And when we “do”, what we do must be judged — by those who will bear the brunt of the doing — to be socially acceptable, economically feasible, and environmentally benign (Elkington, 1998).

The primary purpose of this *Sustainability Concepts Paper* is not to contribute to yet another operational definition or indicator set, for what it might mean to have sustainability in the water sector, or more precisely, sustainability in the pursuit of Integrated Urban Water Management (IUWM) nested within Integrated Water Resources Management (IWRM). Rather, this is a *Concepts* paper: a discussion resonant with the notion of sustainability as a big *idea*, written from the perspective of Engineering and the Engineer.

In setting out thus some concepts of what “IUWM within IWRM” could be, and how we can move from where we are now to where these aspirations might lead, part of our purpose initially is to act as a counterpoint to the copious attempts at definition, precision, reproducibility, standardization, codification, procedural systematization, and so forth. This does not mean any tightness of logic is to be sacrificed. On the contrary, it will become especially vital in charting the changes in the way we assess sustainability in Chapters 5 and 6.

If, however, the contrarian stance provokes debate and protest, that indeed will be a measure of its success. So let us start by seeking to be contentious, and on two accounts.

Wrong-headed Convergence Towards Conformity and Singularity

In the midst of discomfiting imprecision, vagueness, and uncertainty — when *surely* there should instead be clarity in what the problem is, specificity in what our aspiration is, and prescription in the path to the solution — the urge to converge on

**“Getting it right; finding *the* unique solution;
hence moving measurably forward”**

can become almost overwhelming. It should be resisted, of course! William Rees, co-author of the ecological footprint, has berated the successful LEED program for promoting green buildings with the following words (Rees, 2009):

Consistent with Heidegger’s lament, the LEED programme has been accepted uncritically (i.e., almost thoughtlessly) as a sustainability solution with little consideration to whether it is actually addressing the fundamental problem of global overshoot and rarely any adjustment to vastly differing local conditions and requirements.

LEED is a reform at the margin that would deliver a more energy- and material-efficient version of the otherwise status quo.

Once was the time when we could indeed have imagined there was just *one* way of becoming less unsustainable in the water sector, a seeming singularity. This was more apparent than real, however. For it depended upon listening to but one of the several players on the global water scene, each of whom tended to assert that it — and it alone — possessed *the* “answer” to becoming sustainable. Given the crowded field of many such players, what one was actually witnessing was more the advocacy of a plurality, if not plethora, of seeming certitudes, even mutually contradictory certitudes (Thompson, 1985).¹

Engineering education perhaps unwittingly aids and abets the urge towards the singularities of conformity, with all its protocols, procedures, standards, codes of practice, and the like. This we fully appreciate and respect. It has to do with minimizing the risk of failure. But what might constitute “failure” in the context of engineering for sustainable development? Should students of Engineering, like those of History or Philosophy, be taught that there is more than one school of thought; more than one basic style of building a water purification plant, for example; more than a single set of fundamental principles — to be

very provocative — for that particular branch of engineering design?

We should not be surprised by there being disagreement over the essential matter of this *Paper*. The plurality of schools of thought on the nature of that essence, moreover, can surely be held to be valid at one and the same time. The approaches of both Ashley *et al* (200) and Starkl *et al* (2009) have been lauded: as recipients of the Award for Excellence in achieving theoretical progress in Sustainability in the Water Sector (inaugurated by the International Water Association (IWA) in 2008). The one (Ashley *et al*, 2008) acknowledges (but largely dismisses) the other’s refutation of generic criteria for assessing sustainability, for they (Starkl *et al*, 2009) argue thus:

In implementing such ambitious policies, one needs to distinguish case sensitive objectives (they are to be defined for each problem, depending upon the applicable regulations) from generic ones (they are prescribed for all cases). The solidification of case sensitive objectives gives the local decision-makers (developers, planners, authorities) a certain amount of autonomy. However, it may introduce uncertainty (court appeals, project delays, cost excesses), where different persons think about the same issue in different ways. ... This form of case sensitivity barely matters for the objectives of class A (cost minimization) [subject to the constraints of environmental regulations], it may matter for B1 [seek an environmentally best alternative in the case of similar costs of the alternatives], and it is highly relevant to B2 (optimization of ecological efficiency) and C (maximization of overall benefits) [in the context of sustainability].

The deeper one delves into what it may mean to become less unsustainable, the more the disagreement matters. Counter-intuitively, disagreement and conflict might matter in ways that (up to a point) are to be constructively harnessed.

Plurality of perspective reigns supreme. There is no simplicity to be wrung from an irreducible complexity.

How then should we proceed in the absence of a shared, consensual, singular, complete definition of a “sustainable IUWM within IWRM”, especially when achieving such singularity and conformity runs against

¹ This jostling for position may yet apply. In their recent theoretical exploration of global governance for water, Pahl-Wostl *et al* (2008), contend that “[t]he various global initiatives developed to date appear to compete for influence rather than move toward coordination”.

the deep grain of the mind-boggling cultural diversity so evident around the world?

The Essential Long View: Conspicuous By Its Absence

Sustainability is nothing, if it is not about taking the long view and being mindful of what will, what might, and what must, change from one generation to the next. We have to look up from our day-to-day routine — each day — to recall and re-shape the vision of sustainability. And there can be no question: the world in so many places needs now, not tomorrow, the engineered infrastructures for providing life-giving potable water and health-preserving sanitation. Yet those infrastructures must just as much be conceived of as a first step along a path evolving towards greater sustainability a generation hence.

All too often, the long view is conspicuous by its absence from many discussions with “Sustainability” prominent in their titles. Either that, or the sheer urgency arising from looking back at an enduring, unmet historic need — provision of safe water and sanitation for all — may induce myopia when looking in the other direction, towards the distant future.

How too then should we proceed when adoption of the very long view is the one *distinguishing* — if not *defining!* — feature of being less unsustainable, not least when Society’s views on what constitutes a “good thing” are bound to change, and change substantially? For all their current command of the global attention, sustainability and sustainable development will themselves just as surely be swept away in due course by the next yet better “solution”.

We acknowledge then that we are proceeding in the spirit of “Always Learning; Never Getting it Right”. Change is the only constant in life.

Forward in the Face of Vagueness

This *Concepts Paper* is therefore about setting out a framework for thoughtful guidance of actions today in respect of achieving less unsustainable forms of IUWM within IWRM, without our losing sight of the inter-generational consequences of these actions. And it is just as much about preparing this philosophical framework itself for change and evolution — a few years from now — as we continue to learn from our everyday actions.

Nor can what is to be said be confined and packaged merely as succinctly expressed insights, although it can in the end be tabulated cryptically, as a set of line items within the context of Triple Bottom Line (TBL) accounting (Elkington, 1998). Instead, the reader will be confronted with a lengthy discourse, in which insights and messages are intricately interwoven, if not densely entangled, at several levels of interpretation.² What is to be said, moreover, must necessarily be written from one perspective, i.e., one particular disciplinary perspective, given which this *Paper* is bound to be biased, inadequate, and quite incomplete in the face of the massively multi-disciplinary nature of sustainability and its framing around the Triple Bottom Line.

We shall set out in Chapter 2, therefore, a challenge and a vision. These are motivated by a metaphor, of the city as a “large animal grazing in its pasture” (Rees and Wackernagel, 1996). They are conditioned upon some of the relevant history of the past century, especially the two decades since the 1980s. Above all, they are perhaps uncommon, even preposterous, in their intent: of re-engineering urban water infrastructure so as to make the city a force for good in its watershed (Beck *et al.*, 2010a). This challenge and vision could even come to be viewed as yet another contrarian element of this *Paper*. They are essential, however, in keeping our discussion focused, as it threads its way through the labyrinth of the three bottom lines in Chapter 3: first, of {social legitimacy}, wherein plurality of perspective is everywhere to be found (and faced); second, of {economic feasibility}, with its high-minded principles unmistakably cast within the long view; and third, of {environmental benignity}, throughout which our

² In defense of this, and in spite of one’s best endeavors, over several years and through several drafts, the present lengthy text is not entirely out of line with other similar documents, such as the highly influential report of the Global Water Partnership on Integrated Water Resources Management (GWP, 2000a) and the SIWI-IWMI (2004) policy-position paper *More Nutrition Per Drop*. Here too, in this footnote, I — the author; the “one” cited in the previous sentence — should address an issue of style. I shall occasionally resort to such use of the first-person singular (I), when I want to make a personal attribution especially clear. “The author” sounds stiff, impersonal, and perhaps out of keeping with the contemporary idiom. Otherwise, I tend to write as “we”, a form I like because of its hint of gathering the reader with me into some joint endeavor.

metaphor may be pushed to its limit in constructing a response to the challenge and vision.³

That biological metaphor, of the city as a large animal interpreted as a bull, which then elides into the image of an athlete, is not some silly play on words. It is a powerful means of conceiving of what sustainable forms of IUWM within IWRM could be, without jettisoning the companion metaphor of the clockwork mechanism as the epitome of engineering design and innovation.

When all is said and done, our predicament remains: of how to move forward under vagueness. This is the subject of Chapter 4. Yet vagueness is not necessarily a bar on discerning how, specifically, to proceed. History encourages us in the view that the original Brundtland expression of sustainability, for all its vagueness (indeed perhaps precisely because of it), may have the power to inspire, motivate, and innovate *in practice* — just as did Aldo Leopold’s land ethic of six and more decades ago (Leopold, 1949). Leopold’s inspiration was expressed thus: “a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community”. No matter how vague this may be, almost tautological, the evidence shows it has motivated many over the years to restore and treasure landscapes and environments in palpable ways (Meine and Knight, 1999), including expressly the IUWM within IWRM now before us (Rosenblum, 2005).

Preparing for Change

Change is indeed the only constant in life and wrestling with it still is how we shall close this *Concepts Paper*. Chapter 5 charts the eternal change and flux, from how we have conceived currently of the Triple Bottom Line, i.e., the *TBL_{now}*, to how we might imagine concepts for assessing sustainability in the future (a *TBL_{future}*). Chapter 6 calibrates this *TBL_{future}* against what is presently being achieved in the forward-most reaches of practice, at the *TBL_{frontier}*.

Cheryl Davis of the San Francisco Public Utilities Commission has quoted an insight of Aldo Leopold towards the close of her essay on “Ethical Dilemmas in Water Recycling” (Davis, 2008):

Let no man jump to the conclusion that

[the ordinary man] must take his Ph.D. in ecology before he can ‘see’ his country. On the contrary, the Ph.D. may be as callous as an undertaker to the mysteries at which he officiates.

A *Concepts Paper* should be mindful of this Leopoldian “Ph.D.” In the *practice* of the *TBL_{frontier}*, hence in Chapter 6 also, resides the engine of yet further change to our concepts of sustainability and its assessment. And so the saga will continue:

Always Learning; Never Getting It Right.

³ Wherever emphasis is to be placed on any of the triple bottom lines, so the device of placing the phrase within parentheses {•} will be employed.