Can the Wild Discourses of Sustainability be Tamed?

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Most people will never encounter "evidence" relevant to sustainable development in the form of scientific publications, such as refereed journal articles. They are much more likely to read about related topics through news articles, interest group websites, blog postings, internet comments, or social media messages. Through these various channels, an average citizen may easily encounter a wild profusion of mutually contradictory claims and discourses; they may be told, without equivocation, that "climate science" is "settled," or that it is "a hoax," and may encounter a mind-boggling array of related disputes, great and small. Many of the claims that they encounter are advanced or framed as assertions that communicate scientific findings.

But while scientific articles may be written with care and subjected to peer review, once they are released the information and concepts they contain can take on new lives of their own, influencing "downstream" texts and discourses, through reformulations written by public relations officers, journalists, advocacy group CEOs, interns, or others. The downstream texts that result will have varying degrees of fidelity to the original findings, but most will not refer back to the initial articles or reports, and the authors of second- or third-hand formulations may be unaware of what "the science" originally, in a precise sense, "said."

Sustainable development related issues are often characterized by a lack of agreement among stakeholders regarding their salience, degree of certainty, and even the most basic "facts of the matter" (as may be seen with the polarized views in the United States regarding anthropogenic climate change). While this may be due to factors such as psychological biases, ideological lenses, narrative framings, and efforts to promote "misinformation" or "disinformation," the lack of agreement is complicated by the fact that related knowledge and claims are not always transmitted in an accurate manner. Moreover, the communication style of many increasingly popular communication formats, such as blogs or social media, generally do not place a high value on the citation of supporting material.

With respect to climate change, as with most complex scientific issues, each of us as individuals is incapable of having first-hand knowledge of all of the relevant original data and inputs (whether instrumental readings, the code of computer models, or the content of the thousands of related scientific papers) or even awareness of the many chains of evidence and argumentation that must come together to support key scientific claims. What we have, instead, are the "testimonies" of others – perhaps scientists themselves, or individuals or organizations that see their role as "boundary organizations," "science communicators," or "knowledge brokers."

But how do we know that what they communicate to us is true and accurate? Texts and claims can be instantly rephrased or reformulated, and thus altered – intentionally or not – in a wide variety of ways, or can even be fabricated from thin air, having no relationship to actual evidence. Thus, while we may tend to trust certain sources (or, alternatively, dismiss any claims from sources we deem

untrustworthy), there is always the possibility that even those sources that we believe to be reliable may mischaracterize scientific findings. It could be due to an innocent typographical error, or as a result of subtly altering facts or leaving out explanatory steps of logic in an attempt to make a point more comprehensible to non-expert audiences.

The types of transformations that information may undergo tend to not be random. Jeanne Fahnestock, in "Accommodating Science: The Rhetorical Life of Scientific Facts," found that when scientific findings are communicated outside of specialized scientific journals, the results tend to be presented as having greater certitude, as a result of undergoing a shift in rhetorical styles used by authors and through the removal of qualifications.[1] She attributed this (p. 278) to the passage of information from one "rhetorical" realm to another and the need for authors communicating to less expert audiences to shift among Aristotle's "three types of persuasive speech," specifically from the "forensic" to the "epideictic" style, the latter of which Aristotle said "ultimately aims at solidifying the values of its audience."

Additionally, interest groups or individuals may also selectively focus on, and consciously or unconsciously transmit, only a biased subset of "cherry-picked" information that they believe provides support for their positions and goals, thus often further altering the supposed certainty of the scientific findings that are communicated.

Intentionally or not, information and claims can thus subtly shift from being one thing to another, silently slipping from being accurate to being inaccurate, tipping from truth to untruth. In the process of translation and retelling, a hedged scientific finding about shifting probabilities for the occurrence of certain events under scenarios envisioned decades in the future might easily be transformed into an assertion about what is definitely happening, here and now. (Texts can also be intended by their authors to be assertions of fact or as intentional exaggerations or understatements crafted for dramatic effect, or even attempts at irony, sarcasm, parody, or self-parody; it may not be possible to determine which is which, and authors and readers may have different views regarding which category a particular text should be consigned to.)

On September 11, 2012, a number of Twitter users shared the following message: "If you're sneezing right now, it is climate change's fault." They were re-tweeting the headline of an article by the popular U.S. environmental blog Grist,[2] which had stated "More climate change = more hay fever, according to the *Guardian*." The referenced article in the *Guardian*[3] apparently did not assert when in fact hay fever might increase, but it presumably was sometime in the future; the article mentioned dates of 2050 or 2080 for some other changes that may occur in the United Kingdom due to climate change. Although it did not specify the title of the report, the *Guardian* article appears to have been largely based on a report released by the U.K. Health Protection Agency.[4] That report did address hay fever

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[1] Fahnestock, Jeanne. 1986. "Accommodating Science: The Rhetorical Life of Scientific Facts." Written Communication, Vol. 3, No. 3. p. 283.

[2] Laskow, Sarah. 11 September 2012. "If you're sneezing right now, it is climate change's fault." Available at http://grist.org/list/if-youre-sneezing-right-now-it-is-climate-changes-fault/, accessed 11 September 2012.

[3] Carrington, Damian. 10 September 2012. "Climate change will extend hay fever season by six weeks, report warns," The Guardian. Available at http://www.guardian.co.uk/environment/2012/sep/11/climate-change-hayfever, accessed 11 September 2012.

[4] Health Protection Agency. 2012. "Health Effects of Climate Change in the UK 2012: Current evidence, recommendations and research gaps." Available at http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317135969235.

(allergic rhinitis), but in a manner that was multiply hedged, and presented as complex and indefinite, including with the admission (p. 84) that "a great deal of uncertainty exists in predicting the effects of climate change on pollen or fungal spore related allergies." But here we evidently see one example in which climate change related "evidence" appears to have undergone subtle but ultimately significant transformations as it has been passed from governmental publication to press release to news article to blog post to tweet, shifting in the process from an expert judgment regarding a potential future scenario for the United Kingdom to a statement about what is happening currently, presumably in the United States. As it has been communicated through various downstream incarnations, precision has been lost, logic has been short-circuited, and what remains is only a vague, shape-shifting notion of a connection between hay fever and climate change, one which has become unmoored from its scientific anchoring.

There are many cases we could find of similar distortions along the chain of communication, where interpretations and restatements invest claims with new meanings, allowing them to take on new relationships to their underlying truth. But which ones? It would be useful to be able to tell when knowledge claims have undergone what Fahnestock (p. 285) called a "slight legerdemain in phrasing, changing qualified claims into certainties, omitting contradictory evidence and giving space to unsupportable claims."

Claims related to climate change are particularly complex, involving imperfect estimations of changes in probabilities of future events and cascading chains of cause and effect and feedback loops; they may thus be especially susceptible to potential overstatements of certainty about relationships that may in fact only be known approximately and in probabilistic terms, and which are characterized by inherent uncertainties.

An illustration of the wide range of claims that have been made in relation to climate change, and that the public has been exposed to, can be found in what is known as the "Warmlist," a website maintained by a retired British engineering professor that is occasionally referenced by those who are often referred to as climate "skeptics" or "contrarians;" it purports to offer "[a] complete list of things caused by global warming." Most of the concisely worded items in this one-page list (said to total 883 items) provide a hyperlink to another website where – or so it is implied, and a reader may be led to believe – such a claim has been made. It begins:

> A complete list of things caused by global warming
> ….
> AIDS, Afghan poppies destroyed, African holocaust, aged deaths, poppies more potent, Africa devastated, Africa in conflict, African aid threatened, aggressive weeds, Air France crash, air pockets, air pressure changes, airport farewells virtual, airport malaria, Agulhas current, Alaskan towns slowly destroyed, Al Qaeda and Taliban Being Helped, allergy increase, allergy season longer, alligators in the Thames…[5]

Those familiar with ongoing debates related to climate change will recognize that this list mixes together more serious with less serious claims, as well as well-supported and poorly supported ones, things that might be occurring presently, and those only possible in some distant future (and other, even wilder, claims could also be found in internet discussion forums). It may contain claim that have been rendered less credible through their rewording, or mischaracterized into something

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[5] Brignell. John. "A complete list of things caused by global warming." Available at www.numberwatch.co.uk/warmlist.htm. Accessed 15 September 2012.

unrecognizable. But upon exploration, most of the links in the Warmlist do in fact lead to articles offering each of these claims – more or less. The veracity of each of these claims is contestable to a greater or lesser degree, and many may be the topic of rich scholarship and dispute, while others may be hoaxes or jokes.

At the very least, this list offers a glimpse into the vastness and complexity of the argumentative "landscape" related to climate change to which the public may be exposed, and would seem to suggest that any contrived attempt to force the entire discussion of climate change into any given simplistic, binary framing will likely not succeed. No one would be justified in unquestioningly accepting, or dismissing, this entire collection of claims, and each person might accept or believe any unique combination of them, depending on what they have heard, witnessed, experienced or read, and how they judge the merits of each case, its framing, presentation and particular wording. How might we prepare for the likelihood that any of these claims might arise in connection with related policymaking processes?

While there can be no doubt that less-than-accurate information and claims exist, possibly influencing the public and policymakers, separating the credible from the spurious is not an automatic or simple matter, but it is one deserving of greater concern and attention. As aptly put by William Ascher, Toddi Steelman and Robert Healy in *Knowledge and Environmental Policy: Re-Imagining the Boundaries of Science and Politics*,[6]

> The skeptical attitude engendered by the range of electronically distributed "knowledge" might lead to a salutary skepticism about all knowledge transmitted to the policy process: What is its origin? Has it been reviewed? What do other sources have to say on the same topic? Just as the awareness that counterfeit currency may be in circulation causes people to examine more carefully the banknotes they are given, the increased likelihood of encountering "bad" electronic information may lead to greater scrutiny of all information. (p. 71)

Unfortunately, statements concerning supposed scientific knowledge, unlike banknotes, do not carry within themselves attributes that can validate their veracity. We cannot hold a statement up to the light to find an authenticating watermark; even by scrutinizing a statement directly, we cannot know that it is valid – even if it does say that it *is*; even if it does say that "*Scientists say….*"

We thus need to find ways to enhance the fidelity of the transmission of scientific information, heightening the abilities of individuals to separate out counterfeit claims. We must endeavor to offer, whenever and however possible, what Fahnestock (p. 283) called "giving a 'regress' of specificity for more inquisitive readers." To do this, we must somehow hitch claims back to their origins and more solidly anchor them what might serve as their foundations.

A useful concept to guide such efforts is that of a "chain of custody." There are a number of fields in which the chain of custody is recognized as a fundamental concern. For example, those presenting physical or electronic evidence in legal proceedings must be expected to be able to prove that such evidence has not been corrupted, substituted or tainted. The fate of entire legal cases, and thus human lives, may hinge on even minor inconsistencies, lapses or questionable steps in the chain of

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[6] Ascher, William, Toddi Steelman, and Robert Healy. 2010. Knowledge and environmental policy: re-imagining the boundaries of science and politics. Massachusetts Institute of Technology Press.

transmission ultimately affecting the trustworthiness and integrity of a piece of evidence. This is why, as Giandomenico Majone has noted, "in jurisprudence we find a highly developed 'law of evidence' for the presentation and testing of information offered as evidence in court cases."[7]

In many commercial supply chains, including commodity sustainability certification programs, elaborate measures, some of which reach into the remotest corners of the globe, are employed to properly distinguish products that are certified as having desired characteristics, such as being sourced through environmentally friendly production methods (although examples could be found of fraud and gaming of such systems). Proper and credible chains of custody in such a realm can result in preferential treatment and a higher value placed on goods that can be shown to have successfully followed the relevant chain-of-custody procedures, while failure to prove what path an item traced before it arrived at its destination should result in market exclusion or an unsalable product. We should have similar expectations for policy-relevant information – and expect similar benefits for evidence which can similarly substantiate its origins and for which successful documentation can be provided in response to challenges to its provenance or pedigree.

The process of providing references and citations for claims and assertions has become established as a norm to differing degrees within academic contexts, but this norm developed prior to the advent of computers and the internet. The prevailing approach to references and citations therefore leaves much that remains vague and inconclusive. While authors may provide a citation to a given publication, tracking down the particular information within the given reference that supposedly supports a claim or argument may be time consuming or often fruitless.

Links can and should be made to the specific data that would corroborate a claim. There would seem to be no valid reason in the future – especially when an issue rises to a certain level of importance – to not specify the exact passages, words or data that purportedly support a claim, along with a link to (or appended copies of) the original "justificatory" source material. Providing direct and immediate "click-through" access to supporting documentation in its original context, and the exact supporting passages or data, could allow readers to begin to make meaningful judgments as to whether the purported "evidence" does indeed provide suitable support for an assertion.

Outside of academia, the process of providing references is generally lacking, and the chain of custody for information is often broken in fundamental ways. News articles typically do not name the journal articles where scientific findings are published. The content of journal articles usually cannot be accessed without payment. The underlying data used in studies and experiments usually cannot be accessed. Poorly transcribed or dead-end and outdated links on the internet may essentially lead nowhere. Links may lead to pages that do not logically provide support for the claims being made. Webpages may offer hyperlinks appearing to lead to corroborating source material, but which merely refer to other webpages produced by the same advocacy group, sometimes in a self-referential loop that does not provide access to more credible – or any – outside sources. Even statements produced by scientific bodies may lack citations. In too many cases we are thus expected to merely accept claims that we read at face value.

Yet in most fields of human endeavor where money, reputations, or even lives are at stake (and does this not also include what we mean by "sustainable development"?), it is normally taken for granted that no one should accept assertions or claims at face value; there is usually some independent

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[7] Majone, Giandomenico. 1989. Evidence, Argument & Persuasion in the Policy Process. Yale University Press. p. 49

corroboration required: there must be paper trails, audit records, signed receipts, sworn testimonies, notarized deeds and abstracts of title. How can the process of policymaking for sustainable development hope to operate in a successful and effective manner if it has any lesser degree of rigor or standards of proof and procedural care?

It would therefore be useful to determine what would constitute minimal attributes and conditions for an acceptable chain of custody for information and evidence important for sustainable development policies, and to fully explore how "good" or "excellent" chains of custody could be constructed using the tools of the 21st century, now that we have technologies that make it practical to link to exact sources and archive essentially unlimited reference material. Here are some of what could be considered key attributes for a chain of custody of knowledge and evidence serving as the basis for policymaking:

- It should be essentially seamless and without gaps; thus, if it is claimed that "science" or "scientists" "say" something, a reader should be provided with the ability to actually follow the chain of information back to the original claim that is being invoked, in its original phrasing and full context;

- It should be transparent and traceable; we should be able to access the support for a claim with only a few clicks of a computer mouse, rather than having to go searching for it;

- The structure of arguments should be explained and clarified, such as through diagramming techniques and knowledge representation schemes that indicate where evidence and arguments are strong, or where they are weak;

- Access should be provided to "metadata" or explanatory information about a claim which clarifies the kinds of evidence and argumentation it is based upon, such as the degree of certainty of each link in a chain of argumentation; when restated, the conditional, contingent and probabilistic nature of findings should not be allowed to be stripped away, leaving artificial certainty.

We could also benefit from improved rules and guidelines that would help us to determine when an error or new information should invalidate a given conclusion or claim. With the indexing of webpages and the ability to find them through web searches, old and outdated claims may remain easily accessible long after they should have been dismissed as a result of new information; how can we create systems to alert us when an outdated claim has been invalidated by new findings, and to be directed to the more credible information? Also, when would certain types of errors invalidate the credibility of an individual or organization serving as a source of information or as a "knowledge broker" or scientific "boundary organization"?

Some existing tools can provide hints of how to proceed. Wikis, such as Wikipedia, have the benefits of allowing users not only to update and correct texts, but to allow all changes to be traceable. In addition, the users of Wikipedia have developed and adopted norms, which are implemented quite unevenly in practice, of seeking to indicate when information needs further explanation, clarification or citation. And yet we know that information appearing in Wikipedia, the most utilized reference source, may be completely inaccurate. Such a system can allow a large community of participants to correct and update information, but how might it be made more reliable? At the same time, the many climate change related blogs provide a useful role, conducting an extended and added layer of review for scientific studies and reports by governmental and non-governmental sources, supplementing them with further analysis and annotation, and placing them in fuller context. How could the analytical skills of the followers of such blogs be mobilized to improve the fidelity of communication of

information useful for the policymaking process? These are important questions that deserve future attention, research and experimentation.

A variety of additional approaches, methods and tools to enhance the fidelity of transmission of scientific information and evidence could also be tried. These could include:

1) Promoting codes of conduct for ethical communication of evidence and for responsible argumentation, through which organizations could commit to fundamental principles and practices, such as:

- To provide sufficient and accurate sources and citations for their claims, including direct hyperlinks to archived supporting material;

- To conduct due diligence in verifying the accuracy of their claims;

- To strive to transmit information in a manner that is faithful to the original, including ensuring to convey any uncertainties, risks and ranges of results that may be inherent to scientific findings;

- To not distort or mischaracterize the claims or positions of others;

- To reveal potentially contrary information when it may be relevant to the policymaking process;

- To publicly correct errors that may be found in their claims and publications.

The adoption of such ethical standards and practices could go a long way toward improving the debate on key issues of importance to sustainable development, including climate change.

2) Developing a repository or "knowledge base" of fundamental core data, information, arguments and claims relevant to key policy areas, such as climate change. This could allow for a more rationalized discussion and provide a useful supplement to the current reality in which many thousands of websites and publications advance claims. Such a repository would ideally allow for free access to essential supporting information (which would be facilitated through the archiving of copies of all data and publications cited, thus helping to prevent the problem of "link rot" and dead end links), and could provide explanatory text linking together the information sources in a user-friendly way.

3) Creating new, structured "argumentation spaces" or systems which would require that claims advanced or added would need to meet certain key criteria, such as clear rules for logically linking claims to the other elements within the system and minimum levels of specificity for key parameters regarding claims (such as time frames, rates, ranges of uncertainty, ranges of measurement error, etc.). It is common to encounter claims such as "sea level rise is accelerating" (or the opposite) which do not have sufficient specificity in terms of time frames, for example, as to provide a meaningful claim that could be measurable or falsifiable. Creating a system within which such minimum attributes of claims could be documented and ensured before their addition to the argumentation structure could result in the development of a valuable reference useful for clarifying issues and helping to settle disputes.

4) The development of computerized tools and algorithms that could assist with the "harvesting," collation and analysis of claims, such as by tracing their genealogies and evolution, that is, the path that they may have traveled, and at which points they may have been transformed into what should be recognized as new claims.

The ability of the public to sort through information and claims appears to be growing less manageable. We can allow ourselves to remain at the mercy of wild discourses and unmoored claims, or we can adopt a new attitude toward proper custodianship of potentially important knowledge and information. The norms that evolved in previous eras to guide when and how information should be referenced can be updated for the era of hyperlinks and virtually unlimited electronic storage.

Whether improved chain-of-custody systems for knowledge could be developed fast enough to assist us in meeting the challenges we face, only time will tell. And while it would be impractical to expect adoption of such enhanced practices and approaches by a wide range of participants in the discussions related to climate change or other key issues, the emergence of a subset of participants adhering to higher standards of proof and stricter chain-of-custody norms for the information that they utilize could help to improve the credibility of debates and their outcomes. Erroneous and outdated claims and texts would continue to live on, and distorted or baseless claims would continue to be made, but a more credible and constructive set of claims and spaces for discussion could emerge to assist in taming the internet's wild discourses, providing arenas for progress in resolving debates and moving toward shared solutions.

Extra time and effort will be required to develop credible and reliable technologies and practices, and to actively put into practice systems to help tame the discourses of sustainability, but doing so may be essential if we are to craft, and achieve public support for, effective policies based on sound evidence.