

UNDERSTANDING THE RHETORICAL NATURE OF SCIENCE IN THE IMPLEMENTATION OF AGENDA 21

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Oh, but the authorities of the temple of Zeus at Dodona, my friend, said that the first prophetic utterances came from an oak tree. In fact the people of those days, lacking the wisdom of you young people, were content in their simplicity to listen to trees or rocks, provided these told the truth. For you apparently it makes a difference who the speaker is, and what country he comes from; you don't merely ask whether what he says is true or false.

—Plato, *Phaedrus*, 275b-c

INTRODUCTION

Broadly stated, programs implementing the notion of sustainable development seek to balance economic interests with environmental interests. One would assume from the focus that one finds in sustainable development literature on how economics needs to account for the environment that sustainable development adherents are satisfied with the ways in which environmental studies account for economics. Specifically, it appears that sustainable development adherents are satisfied with the content of science as it is currently practiced and wish only to apply that content of science practice more democratically to social problems. This essay questions that assumption by taking a concrete look at the environmental policy document known as Agenda 21. (All quotations from Agenda 21 in this essay are from the text version cited in UN [1992].) Can the extant practices of science, which to varying degrees created the need for the Earth Summit in Rio de Janeiro in 1992, remain untouched while economics are restructured, if we are to obtain sustainable development? Simply put, what is a sustainable science?

Agenda 21 is a major contribution to the body of literature concerning sustainable development. Most importantly, it operates as a bridge between the abstract notion of sustain-

able development and the practical application of that notion. When the summit in Rio concluded, those who had worked so hard to draft Agenda 21 agreed that its historical measure would not be the document alone, but rather what could be accomplished based upon the document. Agenda 21 takes strides in enabling such action. For example, Section 31 explicitly "focuses on how to enable the scientific and technological community, which includes, among others, engineers, architects, industrial engineers, urban planners and other professionals and policy makers to make a more open and effective contribution to the decision-making processes concerning environment and development." Here it states that the "scientific and technological community" includes planners and policymakers, thereby removing the false distinction in a community between those dealing with "facts" (scientists and technicians) and those dealing with "values" (policymakers and planners). (For more discussion of this questionable dichotomy, see Brown [1987].)

But Agenda 21 also disables such action by its use of language that contains implicit ethical positions inconsistent with sustainable science. For example, in the same paragraph Section 31.1 of Agenda 21, after policymakers and scientists are identified together as the community of sustainable development decisionmakers, they are then separated: "Improved communication and cooperation between the scientific and technological community and decision makers will facilitate greater use of scientific and technical information and knowledge in policies and programme implementation." Yet policy is indeed set by scientists when a scientist determines which problems will be addressed based upon which ones lend themselves to scientific method, and policy is set by technologists when they determine which problems will be addressed based upon those for which technology has answers. This edifice dictates that the problems whose solutions are not testable by scientific method or technological experiment will not be addressed.

Agenda 21 characterizes the practice of science as a social practice. The Preamble to Section 3 of Agenda 21, a section entitled "Strengthening the Role of Major Groups," begins by stating: "Critical to the effective implementation of the objec-

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tives, policies and mechanisms agreed to by Governments in all programme areas of Agenda 21 will be the commitment and genuine involvement of all *social* groups" (emphasis added). One of the social groups prefaced by this preamble, the "science and technology community," is later featured in Section 3, at Chapter 31. Then in Section 4, which is entitled "Means of Implementation," science (Chapter 35) and technology (Chapter 34) are again discussed.

In all of these sections where science and technology are featured, Agenda 21 makes a point of establishing better communication as a norm and as an ethical principle, necessary to sustainable development and the implementation of Agenda 21. For example, when policymakers call upon consultants for "more" or "better" science, as in Section 31.1, what is this thing they have in mind called "science," which by increases in volume or quality will make the world a better place? Also, does any quality exist that can actually make science "better," or does better also just mean more? I suggest that better may in fact be less, if the goal is sustainability. In this context, I wish to look more closely at the issues of communication for science and technology in Agenda 21. In this context, each person must ask himself or herself what he or she knows about the science and technology that Agenda 21 identifies as being necessary to its implementation, and we must also ask what prevents us from knowing more.

I am concerned with the same facets of science and technology with which Agenda 21 is in Chapters 31, 34, and 35, but I will give these facets slightly different names so as to enable a focus. I will focus on "the players" and "the practices," because science and technology are practices of human beings, not products of an "objective world out there."

RHETORIC AND COMMUNICATION

Let me explain my use of the word *rhetoric*. In its seminal work on sustainable development called *The Brundtland Report* and published as *Our Common Future*, the World Commission on Environment and Development (WCED) defined "sustainable development" as "development that meets the needs of the present without compromising the needs of future generations to meet their own needs" (WCED, 1987). (For a brief history of sustainable development, see Slocombe and Van Bers [1991]. For a longer history, see McCormick [1989].) As sustainable development practices, science and technology require communication. In Section 31.1, Agenda 21 calls for "[i]mproved communication and cooperation." Behind this apparently simple statement is, however, a fundamental issue concerning the nature of communication: the use of language, also known as rhetoric. One must ask, as has been the tradition of the practice of rhetoric, whether Agenda 21 is indeed a rhetorical situation—"a complex of persons, events, objects, and relations presenting an actual or potential exigence" that can be modified by the "creation of discourse which changes reality through the mediation of thought and action" (Bitzer, 1968, 1980). That

is, will talk change anything here? In most situations, one assumes away this question and just begins talking. Here too, as evidenced by the simple fact that Agenda 21 is a text, silence has already tacitly been determined not to be an acceptable behavior in achieving the goal of sustainable development. Moreover, Agenda 21 itself explicitly calls for speech-related action throughout its pages.

Thus the question is not whether talk, or rhetoric, can address the exigencies identified in the Agenda 21 blueprint, but how. Framing the question in these terms compels me to define rhetoric because I realize that outside of the 2,000-year-old academic discipline of rhetoric, the word *rhetoric* carries a pejorative spin placed on it for the political and social gains to be made by those who historically have benefited by elitist knowledge production rather than many-voiced democratic knowledge production. Addressing all of those who are not in the small room of academia where the inhabitants are called rhetoricians, I offer positive connotations for the word *rhetoric*. If rhetoric did not have this positive potential, I would be rather absurdly suggesting that one apply an unethical practice to consider the ethical issues that must be faced in implementing Agenda 21.

As is the case in all defining, one must note what is not meant by the term under consideration. By the word *rhetoric*, I do not mean stylized language that functions as a sort of handmaiden to truth. Rhetoric is not the decoration to an unassailable objective core of recalcitrant reality. Rhetoric is thus not properly predicated with "mere," "just," or "only." For instance, in the opening abstract for their essay on sustainable development, Slocombe and Van Bers (1991) state, "In this article, the authors discuss approaches for turning sustainable development rhetoric into individually recognizable alternatives that may contribute to achieving sustainable societies." I am without explanation as to how these authors believe they can "discuss approaches" without language. In effect, what they want to do is substitute one text for another, and they attempt to justify doing so by calling that which they wish to delete "rhetoric." Other such publications include "Earth Summit '92: Rhetoric and Reality in Rio" (Hecht and Cockburn, 1992), "Reconsidering Ocean Incineration as Part of a U.S. Hazardous Waste Management Program: Separating the Rhetoric from the Reality" (Reitze and Davis, 1990), and "Environmental Education in Third World Schools: Rhetoric or Realism?" (Vulliamy, 1987), and such books as *Acid Rain: Rhetoric and Reality* (Park, 1987). The meaning of rhetoric I use in this essay is the constitution of knowledge by language, which is exactly what these antirhetoric book and essay titles are achieving. Stating that a text is nonrhetorical is tantamount to saying that it is written without words. Stating that one's practices are nonrhetorical is itself a rhetorical position.

I have identified two different, but related, ways in which employing the positive notion of rhetoric serves the Agenda 21 program. First, a rhetorical analysis may provide insight

into the very nature of the practice of science and Agenda 21, by helping to examine the ways in which knowledge of science, technology, and economics is constituted. For example, stating that science and technology are nonrhetorical is itself a rhetorical position. Treating science and technology as mute, noble truth, constituted by nonlinguistic ideas but communicated by the regrettable nonconstitutive vehicle of language is a rhetorical position, a position constituted by language.

Second, one may examine how that knowledge may be employed to give voice to the broad range of individuals, governments, and nongovernmental organizations necessary for making policies and decisions to support the program of sustainable development announced in the Agenda 21 blueprint. A close examination of knowledge production in this light provides for a sort of "social epistemology," which recognizes the essentially rhetorical character of normative action: "A necessary (though not sufficient) condition for the appropriateness of a norm is that the people to whom the norm would apply find it in their interest to abide by the norm" (Fuller, 1993: 32). (For a thorough explanation of the term "social epistemology," see Fuller [1988, 1993] and Medhurst et al. [1990].)

Once one has recognized the rhetorical nature of knowledge production, one can begin to approach knowledge production differently, as is echoed in the many "shoulds" of Agenda 21. For example, another sort of contradiction in Chapter 31 begins in Section 31.1 by stating that "the independence of the scientific and technological community to investigate and publish without restriction and to exchange their ideas freely must be assured." This use of "independence" suggests that one could determine before the fact what type of interference is to be avoided and what type is to be embraced, because interference by "policy and programme formulation" is explicitly invited in Section 31.2: "[T]his dialogue [between scientific and technical knowledge and strategic policy and programme formulation] would assist the scientific and technological community in developing priorities for research and proposing actions for constructive solutions." I limit my focus in this essay to sustainable development as it relates to and depends upon science, although rhetoric certainly offers possibilities for economics as well.

RHETORIC APPLIED—THREE USES OF THE WORD

Rhetoric at its simplest and most basic is the practice of rhetoric, what I call "Rhetoric I"—an act of persuasion. (Trevor Melia of the University of Pittsburgh has devised this schema of Rhetoric I, II, and III based on the connotation distinction made by Burke [1945: 405 and other works].) This essay is one such act of persuasion; Agenda 21 is another; the practice of science is another. Engaging in the practice of rhetoric is what Agenda 21 calls for.

Having said this, I am, however, at the same time engaging in what I call "Rhetoric II"—the analysis of the Rhetoric I-type acts of persuasion. Rhetoric II may range anywhere from banal trope-counting to an interventionist social agenda. It is toward the social intervention end of this spectrum where I wish to suggest the positive intervention of rhetoric into the science practice that underlies sustainable development as called for by Agenda 21. As stated by chemist and rhetor Melia, "[E]ven those who believe that science qua science is immune to rhetorical critique would nonetheless grant that situated acts of scientific discovery, science policy, science popularization, priority claims in science and so forth are susceptible to rhetorical scrutiny of the first varieties" (Melia, 1992).

At the level of Rhetoric III, rhetoricians are concerned with how language enables and disables certain forms of action and ways of viewing the world. From the rhetorical worldview, one seeks not to analyze how facts or values are stylized or delivered (as when one says "cut through the rhetoric and get to the facts"), a position of analysis which assumes that behind the language is an ontological truth, but rather one seeks how the facts and values are constituted by rhetoric assuming no ontological extra-linguistic kernel to remain once language is removed. For instance, one may inquire how Agenda 21 is constituted by language, as follows.

A program of "sustainable development" is not a fact-finding mission. Moreover, one does not understand it as a positive term, but rather dialectically. Thus, the notion of sustainability is only understood in context with its opposite—the unsustainable. It gets its meaning in this oppositional context. Not having the force of a law or binding effect of a treaty, one may well ask what power Agenda 21 has. To ask such a question is to inquire into the nature of Agenda 21. As a written text of legal-political style and scope, Agenda 21 is analogous to a constitution (cf. Junker, 1992). It is, in effect, a world constitution. As a constitution, Agenda 21 functions to synthesize environmental concerns with economic concerns. The word *constitution* itself indicates this method of obtaining meaning from opposites: *con* ("against") and *statuere* ("to place") (Burke, 1945: 323).

Who is the audience for whom Agenda 21 is written—with whom is it speaking? As a program for sustainability, Agenda 21 is in dialogue with nonsustainability and addresses its readers and adherents as such (Mikesell, 1992). Built in to all of the normative choices raised in Agenda 21 is of course an additional choice: Do we do this because we care about human use of the environment, that is, the so-called future generations or utilitarian norm, or do we do it to protect the nonhuman environment per se, by assigning to it the human cultural construct called rights? The popular definition of sustainable development from *Our Common Future* answers this for us: Sustainable development is "development that meets the needs of the present without compromising the

needs of future generations to meet their own needs" (WCED, 1987: 8; also, Mikesell, 1992: 6). Yet this notion is explicitly expanded in the discussion of science in Agenda 21, at Chapter 31. Section 31.8 of Agenda 21 states, "Increased ethical awareness in environmental and developmental decision-making should help to place appropriate priorities for the maintenance and enhancement of life-support systems *for their own sake*, and in so doing, ensure that the functioning of viable natural processes is properly valued by present and future societies" (emphasis added). This colors the several parts of Chapter 31 where the adoption and implementation of scientific principles and codes of practice for the science and technological community are called for, because in these very instances the codes are "aimed at sustainable development." (See, for example, Sections 31.10 and 31.12.) Having stated the above as sort of a rhetorical worldview analysis (Rhetoric III), I will now shift back to a Rhetoric II type of analysis of implicit ethical persuasions.

THE PLAYERS

If one takes a look at Chapter 31 of Agenda 21, entitled "Scientific and Technological Community," one will note that science and technology are identified and defined together as "[m]embers of disciplines devoted to the search for knowledge" (Section 31.7). This seemingly harmless statement is, however, loaded with the attributes of a traditional notion of science and technology. First, they are called "members of disciplines." To call them "members," they must first be reified and then, as reifications, they must be communicated by the trope of personification. One must keep these linguistic processes in mind when discussing science and technology because they themselves are not people; they are not even organizations of people in any universal sense. Science and technology as "members of disciplines" are reified personifications. One cannot compose a list of those people who are scientists or technologists without knowing beforehand why such a list would be needed. And that is an issue—different people are scientists for some purposes and not for others. There is no such thing as someone who is definitively a scientist for all times and places. For example, although Section 31.1 includes architects, urban planners, and policymakers as members of the scientific community, a theoretical physicist would not be included, nor would elected politicians or government lawyers who make public policy consider themselves part of the scientific or technological community. Conversely, is the experimental physicist a scientist when she is writing grant applications or making telephone calls to get laboratory equipment repaired? Is the theoretical physicist who studies cosmology a scientist or a philosopher?

Moreover, insofar as science and technology can be reified and personified as "members of disciplines," one must keep in mind that disciplines are established institutions; members thereof must abide by the rules of entry and maintenance for those institutions. I am thus suggesting that the rules for entry into and maintenance of membership in these institutions or

disciplines is itself a barrier to the people involved to better communication and to better address the needs of Agenda 21.

If one looks at Agenda 21's Chapter 31 interpretation of science practice, a linear progression of events is suggested wherein science thinks of an environmental innovation, technology takes it and makes it usable, government and business make policy decisions about it, and then it is delivered to the public. Yet if one looks at the institutions of science and technology, one notices that policy is occurring long before scientific solutions to environmental problems are delivered to government and business. For instance, choices as to which research proposal to fund and therefore which experiments to conduct are policy choices. When those choices are made, they are not scientific choices determined by the objective reality of the natural world, and therefore they should not be entrusted to science to make the choices. The practice of science itself is policy, and the practice of science is determined at least in part by government policy. Our wish to keep science norm-free and policy-free is a discourse that refuses to acknowledge the policymaking nature inherent in the practice of science. Such an attitude promotes placing as many decisions into the scientific realm as possible in order to avoid overt political and cultural choices—as if the rationality of scientific method purges the questions placed before science of economic, social, or political practices.

But perhaps most alarming about this notion of scientists and technologists from Section 31.7 is that they are putatively "devoted to the search for knowledge." This very sentence structure suggests that knowledge is some sort of reified, tangible thing for which these disciplines are searching, like pigs looking for truffles. If that were the case, one must ask how the "knowledge" got to its hiding spot to begin with and by what is it hidden—political pressures, cultural bias, gender bias, racial bias, or lack of funding, for example? I would rather suggest that those particular women and men whom we call scientists for a particular purpose in a particular place at a particular time create their particular knowledge in response to particular questions being asked by other particular men and women and for which particular technologists are receiving particular funds with which to test experimentally particular hypotheses.

It is also important to separate scientists from technologists in at least one additional respect: Scientific research, whether of the experimental or theoretical variety, does not have any particular technological implication until a number of other people—businesspeople (see Agenda 21, 34.11), engineers, government officials, and so on—get involved in the process. A tremendous network of interests is needed to extend a scientific idea into a technological system that is quite specific to particular locales. A good example is the extension of Edison's original light bulb to the electrical systems of New York and London, two advanced First World cities. The implementation processes for the two cities were radically different from one another, reflecting the different interests

involved. In the end, the original scientific idea counted for little more than an inspiration for the businesspeople and engineers to think that the job could be done (Hughes, 1983).

This is an important point because, contrary to some of the literature on sustainability, science is not a magic bullet to solve the environmental crisis. Too often people think that the answer lies in some yet-to-be-discovered brilliant idea such as inhibiting birthrates safely or creating safe energy cheaply, when in fact we may have all the science we need, but rather lack the appropriate social structures for putting that science to work. (For a discussion of the difficulties of accommodating technological and social change within existing institutions, see Dyer [1985: 253].) In other words, the longing for some innovative scientific discovery may mask an inability to challenge current political and economic orders that prevent the mobilization of existing scientific knowledge—or, for that matter, even so-called local knowledges. One could interpret this as the wish to scientize policymaking or as adding the ingredient of a reified body of knowledge—science—to a stew in which it is not currently present.

This practice of science is a western construct and northern practice. Historically placed, this science since the “Scientific Revolution” of the seventeenth century has required increasing amounts of capital for increasingly limited and specialized scientific projects (Fuller, 1993: 281-90). This science and technology practice has relied on the natural resources of the entire planet, especially for energy production, to fuel the North, and on the cheap labor of the Third World and Southern Hemisphere to mine and harvest these energy resources, and on those same areas as dumps for the by-products of these practices. These science and technology practices are not sustainable—the North will not produce cheap labor and natural resources for the South to engage as an economic “development” practice, and the North will not act as a dump for the South the way that the South has done for the North. It is naive to suggest that in economically “developing” the South, one can pare away those parts of science and technology as practiced for 300 years in the North that inherently exploit the South and use only those that do not. Science and technology practice is a package deal, as the economist would say, and is holistic, as the environmentalist would say.

THE PRACTICES

Logic and ethics are fundamentally the same; they are no more than duty to oneself.

—Otto Weininger, *Sex and Character*

The traditional view of the practice of science and of technology, insofar as they are related to policymaking, is one whereby independently working research and experimental scientists, when free to pursue their own research agenda, produce brilliant discoveries which technologists then take and turn into applications which the public and policymakers

then observe and either choose or reject. This story neglects to identify some of the necessary people involved, as we saw in the discussion of Chapter 31, and also fails to recognize some of the practices involved, as we shall now see.

What are not identified in this narrative are the sources for labor and materials to carry on these practices, nor the places that can be wasted in the practices. This traditional view reflects science and technology practice in the Northern Hemisphere, which has used the people of the South and the minority peoples of the North for cheap labor and has exploited the Southern Hemisphere as a resource mine and a waste product dump. In transferring technology from the so-called “developed” countries, which are primarily of the Northern Hemisphere, to the so-called “undeveloped” countries of the South, one must recognize that the South will not have the North to rely upon for the cheap labor resources and dumping grounds that are intrinsic to the historically placed tradition of science and technology.

In addition, this traditional view romanticizes independent research by scientists to the point where one might actually believe that a reflective Isaac Newton reposing under a tree “discovered” gravity when a falling apple found its way to his head. According to Section 31.1, “Decision makers should create more favorable conditions for improving training and independent research in sustainable development. [T]he independence of the scientific and technological community to investigate and publish without restriction... must be assured.” In *Our Common Future*, Brundtland makes much of identifying and fulfilling our needs (WCED, 1987). In fact, needs are thematic in the definition of sustainable development. Yet there is a “general tendency to neglect the material consequences of satisfying *intellectual* needs... [T]he maintenance of ‘free inquiry’ normally entails the ability to pursue false leads with impunity, which materially involves the freedom to waste resources; which, in an age of increasingly expensive science, means channeling more funds away from other public and private interests” (emphasis added) (Fuller, 1993: 228). Given the numerous pronouncements in Agenda 21 that communication between policymakers and scientists is a two-way street (Sections 31.1, 31.2, 31.4, 31.10, 34.5, 34.7, 34.14, 35.1, 35.3, 35.5, 35.17, 35.21), one must also ask from what, whom, and where is scientific research to be independent? Absolutely independent research is a romantic fiction. After all, research depends on funding. Research depends on technologists who are capable of carrying out experiments. Research depends on libraries and laboratories. Which funds, which technologists, and which libraries and laboratories together determine which research will occur. The same holds true for publication. One could respond, “Of course, all of these things are necessary; we only want to be independent from the ‘wrong’ type of restriction,” meaning the ideologically “wrong” universities, governments, and nongovernmental organizations. That, very clearly, is a normative decision.

In a newspaper editorial entitled "Why Wait for 'Proof' of Environmental Danger?" after reviewing the hazards of an electric power line project, the editor notes:

Industrialists counter that no one has yet proven the energy from such power lines to be dangerous—just as they remind us that no causal link can be proven between many pollutants and cancer. But at one time corporate spokesmen also denied any link between smoking and cancer, and denied that DDT remained in the food chain. Shouldn't the burden of proof be upon those wishing to impact the public? Must we *prove* something to be *unhealthy*, rather than they having to prove it safe? (Kruth, 1992)

My first reaction to this question is to answer that this person just does not understand the nature of scientific method as it is generally currently practiced. I am speaking of what philosophers of science call the "deductive-nomological" model of scientific explanation. "Stated very simply, an explanation of this type explains by subsuming its explanandum-fact under a general law" (W.C. Salmon, 1992: 15). In the case of Agenda 21, this means that "sustainable development" is used thematically and axiomatically as a hypothesis, as the *nomos* from which all of the 27 "Principles" of Agenda 21 are then deduced, in the traditional method of science (M.H. Salmon et al., 1992). No one principle is devoted only to announcing or stating that sustainable development is a proper or achievable goal. The Principles instead assume the propriety and value of sustainable development and go on to couple it with a checklist of applications of sustainable development to form the Principles. In the case of the power line project, it is the industrialists who are privileged to posit tacitly the general law of the status quo, something like "electric power lines do not harm human health," under which the explanandum facts are all of those people who have ever lived near power lines and not become ill. Furthermore, it is then up to those who posit a contrary law, such as that power lines do cause health problems, to develop sufficient explanandum facts to support such a claim. These explanandum facts would take the form of people who did live near power lines and were ill because of that fact. This then serves as a consistent counterfactual to the industrialist's explanatory law and discredits the industrialist's explanatory law and discredits it as an explanation. As one can see, such methodology hides the issue of who gets to state the law first or loudest or with the most investment capital, all of which contribute to this "norm-free" scientific model of explanation.

But I am not content with giving this newspaper editor such a systematic answer, for it would belie the underlying sympathy which the Earth Summit had for his question. By contrast, Principle 15 of the Rio Declaration on Environment and Development addresses his ethical question with an ethical wish—the precautionary approach—whereby "lack of full scientific certainty shall not be used as a reason for postpon-

ing cost-effective measures to prevent environmental degradation." Yet we see little evidence of this precautionary principle in practice. To be able to use it, we must know why it is not already in use. Why indeed? As the editorial asks, "Shouldn't the burden of proof be upon those wishing to impact the public?" This seems to suggest an obvious and reasonable answer: "Yes, it should." Why then is the burden of proof not assigned to those wishing to impact the public? Because although we ask this question in the form of ethics, we answer it in the forum of science. We have unconsciously given this question of norms over to a part of culture that often is called "nonnormative"—science.

Allowing this question regarding the burden of proof to be answered by science, and in fact advocating that it be answered by science, is to take an ethical position assuming that, because the practice of the human cultural construct that we call science has as its subject matter a putatively objective and natural reality "out there," everything done in the name of science may wear the cloak of objectivity as well. Yet this cloak of objectivity covers a wearer—the human scientist. Thinking of *science* as the word that represents the objective natural world is like thinking of the word *economics* as representing a pile of cash. Just as cash is only called economics when it is communicated through culture, so too is the objective natural world only scientific when it is communicated through culture. Consider as another example the cost-benefit analysis. It is formulaic and quantitative and (presumably) everyone can accept it, regardless of ideological orientation. After all, if numbers are not neutral, what is? There is a tendency for people to assume that precision of expression (mathematical and verbal) implies the objectivity of what is expressed. And this tendency lies behind the tendency to answer ethics with science.

Insofar as sustainable development is concerned, this dumping of ethical questions on science counts for the natural sciences or "hard sciences" as well as the social sciences, including economics. Both the Rio Declaration on Environment and Development and Agenda 21 are filled with normative statements—statements concerning what we should do. For example, Principle 9 of the Rio Declaration says, "States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific and technological knowledge." In Chapter 35 of Agenda 21 ("Science for Sustainable Development"), Section 3 begins, "Scientific knowledge should be applied to articulate and support the goals of sustainable development, through scientific assessments [that] should be used in the decision-making processes between the sciences and policy-making." In Chapter 31 ("Scientific and Technological Community"), the "Basis for Action" section, Section 2, begins with the words, "The scientific and technological community and policymakers should increase their interaction in order to implement strategies for sustainable development on the basis of the best available knowledge." Just as the editor in my newspaper clipping asked a "should" question that can be

answered by science, so too does Agenda 21. In both instances, the question can be answered by entrusting ethical questions to the scientific forum, a maneuver that gives one the comfort of not having to answer difficult ethical questions explicitly, because they will be answered implicitly by what is believed to be a norm-free and therefore better arbiter, the scientist. Science by its nature masks its rhetorical character, because it makes its points not in words but in effects that it can produce in the words. Yet the very statement that one's practices are not rhetorical is itself a rhetorical position. The highly respected Royal Society of London has had as its motto since the time of Isaac Newton, "*Nullius in verba*" ("Nothing in words"), but of course, the motto itself is words—and as a motto, it does attempt to characterize what the practice of science is.

CONCLUSION

One might say that environmental ethics begins by each person asking himself or herself whether what he or she does is "right." Then it branches to a sort of categorical imperative, whereby one asks whether what each person's family, local community, and nation does is sustainable, if every other family, community, and nation did the same. But in addition we must ask whether what we call science and technology can be a sustainable development practice. The answer is that science and technology as developed and practiced in the Northern Hemisphere for the past 300 years are not sustainable practices. Because science and technology have had the history that they have had, whereby a few people use tremendous amounts of resources while exploiting labor and resources from the South and producing waste to be dumped in the South, it is impossible to think of this kind of history being universalized. Thus, whatever "development" may mean for the Third World, it cannot mean what it meant for the First World—if we want a sustainable world.

A sustainable science must take this insight to be axiomatic. In other words, we need a science that has a global orientation without being universal in the traditional sense of applying the same way everywhere. Who should do what, when, and where are open questions which apply no less to science than to any other political issue. In contradistinction to the traditional notion of science, ethics are culturally dependent and often unique to one culture. Thus, when we search for that which is universal in ethics in an effort to have a consistent answer for all, we find ourselves looking to science as providing the same answer for everyone, assuming it does so because it is driven by objective reality. But just as different individual humans in a common culture can live under one ethic (e.g., Islam, capitalism), it is possible for different individual cultures in a common world culture to live under one ethic. If that ethic turns out to be science, which is an entirely different issue, fine, but admit that and live with all the consequences of calling the science institution an ethic, including the incapacity for change and the impossibility of

appeal to the so-called metaphysical. Until we would make such a move, we cannot treat science as above or beyond ethics just because the subject of its mediation happens to be what we call "objective reality."

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