

MINI-SYMPOSIUM ON "CITIES AND RIVERS"

Introduction:
New Directions/Cities and Rivers: Interdisciplinary
Studies in Knowledge Production

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Introduction

Over the course of the last six years, *New Directions: Science, Humanities, Policy* has taken a case-study approach to questions concerning the nature of knowledge production. Launched in 2001, *New Directions* promotes interdisciplinary collaborations where physical scientists, social scientists, and humanists work together with public science agencies, the private sector, and communities to deepen our understanding of and develop effective responses to societal problems. Two key elements characterize all *New Directions* projects. First, by involving the sciences, engineering, and the humanities, in dialogue with the public and private sectors, *New Directions* unites the two axes of interdisciplinary—the wide and the deep. Second, these experiments in interdisciplinary problem solving function as a means for thematizing the problem of the breakdown between knowledge production and use.¹

Admittedly, the first element—revealing and integrating the humanistic element within interdisciplinary deliberations—has its greatest relevance within the United States, where the bonds of positivism and pragmatism (in both its naive and philosophical variants) retain their greatest strength. The situation is different in Europe and South America (to speak briefly of only these two regions). In both, the humanities retain a more substantial place within culture. Nevertheless, in all of these contexts the dynamic is similar: technoscientific culture, predicated on the belief that





traditional philosophical questions are obsolete, today raises questions that are fundamentally metaphysical and ontological in nature. Out of a myriad of examples, consider how our relation to ourselves is being changed through genetic manipulation.

The second element—the relation between the supply and demand of knowledge—is still largely absent as a theme of intellectual reflection. It is still assumed that knowledge (especially, but not only, scientific knowledge) is by its very nature relevant, and inherently good. Knowledge could be turned to malign purposes; but this did not seriously raise the question of whether knowledge production could or should be slowed or even stopped. In contrast, New Directions emphasizes the question: In a given context, for a given audience, what is pertinent knowledge?

First Steps

In the spring of 2001, the concerns outlined above brought together a small group of scholars from the environmental sciences and the humanities and stimulated them to launch an interdisciplinary research group titled “New Directions in the Earth Sciences and the Humanities.” Using environmental issues as its initial focus, the group sought better ways to complete the cycle of knowledge production by bringing the humanities to bear on the same issues often addressed by science and technology. Although interdisciplinarity in the form of collaborations among different kinds of science, between science and engineering, and between the physical and the social sciences has become increasingly (if still insufficiently) common, the humanities have too often remained marginal. The working hypothesis of New Directions has been that the humanities and humanities-oriented social sciences can make significant contributions to public policy discussions that heretofore have relied heavily on the sciences and engineering.

New Directions has explored its hypothesis by means of case studies and a series of workshops. The inaugural workshop, held at Biosphere 2 in March 2002, formed several case study teams, each of which focused on some aspect of society-water interaction. The workshop also considered the looming failure of Biosphere 2—a particularly ambitious effort to model biocomplexity, which arguably failed because of what might be described as weaknesses in its humanities interface.



Moving from west to east across North America and then jumping to Europe, the initial six case studies focused on:

- The Georgia Basin (in British Columbia, Canada) futures project
- Salmon restoration in the lower Columbia River Basin
- Environmental decision making and hydrological modeling in the Utah Department of Transportation
- Humanizing environmental research of the South Carolina coast
- Visualizing a Gulf of Maine digital library
- Ecology and cultural history of the Neva River, St. Petersburg, Russia.

A second workshop, held at the Colorado School of Mines in September 2002, shared initial case study results. It also explored as its own case study the cleanup then in progress at the Department of Energy Rocky Flats Plant, the former manufacturing site for the plutonium “pits,” or triggers for thermonuclear weapons, located just outside Denver. At its completion in September 2006, Rocky Flats became the most successful cleanup of any major nuclear waste contamination site in the United States. A key contributor to this success was the independent Citizens Advisory Board, which was able to interact effectively with the corporate contractor as well as federal, state, and local agencies. This effectiveness, in turn, rested at least in part on the humanities-based skills of its staff and membership, and raised communication studies as an interdisciplinary field of the humanities.

A proceeding volume from these two workshops was prepared by Frodeман and Mitcham. The initial proceedings volume emphasized the contributions of the humanities, actual or potential, to the interdisciplinary dimensions of environmental science and engineering projects. Examples included case studies of salmon restoration, which tried to bridge scientific studies of and religious respect for nature; relations between science and culture in the management of the Neva River in St. Petersburg, Russia; interdisciplinary collaboration between philosophers and ecologists on the South Carolina coast; and the construction of a geospatial information system for the Gulf of Maine drawing on hermeneutic principles adapted from art and literature.²

A third workshop took place at Pennsylvania State University in October 2003, and again undertook an interdisciplinary case



study, this time in the form of a field trip exploring the Human-Environmental Regional Observatory (HERO) network. With sites in Arizona, Kansas, Pennsylvania, and Massachusetts, HERO research attempts to develop protocols for studying the long-term implications of human dimensions of global environmental change at regional and local levels. In the Penn State case, the emphasis is on collaboration with the U.S. Geological Survey to create tools for geographic visualization that can draw context- and task-sensitive data from large data warehouses and facilitate multi-site communications. Such a project is inherently interdisciplinary insofar as it incorporates not just scientific but also social science and humanities information.

As Julie Thompson Klein observed, apropos of the initial New Directions activities, “For all the talk about interdisciplinarity, not a lot has been written on how to actually do it and even the abundant reports on research and teaching examples are case-specific” (Klein 2003: 107). In an effort to advance reflection and practice, Klein formulated 42 questions divided into five categories (initiation, organization, social learning, collaboration and integration, and evaluation and dissemination), which any interdisciplinary team might well ask itself as it attempts to advance its work. As Klein argued: “Building a collaborative identity depends on a willingness to learn from each other, regardless of the disciplinary and social status hierarchies that individuals carry into projects. . . . Language is crucial. Projects generate a common lingua franca that is typically a hybrid of specialized terms. . . . Provision for ongoing communication is also important, in order to capture the knowledge production that is occurring and to insure long-term dissemination of results and insights in pertinent fields” (Klein 2003: 107).

Clearly, the humanities have an important role to play in such activities as developing a willingness to learn from one another and appreciating the linguistic basis of knowledge production that is the outcome of social learning. This is especially true if the experience is disseminated beyond the bounds of any particular interdisciplinary experience. Moreover, bringing the humanities into the equation helps deal with what might be called factual fallacy—the belief (still surprisingly common across society) that scientific facts are sufficient for resolving societal problems. Rather, societal progress requires intelligent, context-sensitive discussions



where one's own and others' values are evaluated by standards of reasonable discourse.

Cities and Rivers: St. Petersburg, Russia

A second period of New Directions work was initiated by a fourth workshop, this one hosted by Polytechnic University in St. Petersburg, Russia in June 2004. This workshop took one of the original case study projects—the Neva River, in St. Petersburg—and gave the water-society theme more concrete form in terms of cities and rivers, and through such specificity sought greater depth in an intercultural as well as interdisciplinary framework. Participants in the Neva workshop³ included experts in river ecology, riverfront planning, ecological education, landscape ecology, and environmental activism, as well as environmental philosophy, anthropology, literature, and interdisciplinary studies. A professional photographer joined the group on its field trips to provide images for the Web site and other documentation.

The group spent its mornings in meetings at the university for formal presentations and discussion. Afternoons were spent touring important locations along the river, including the unfinished dam across Neva Bay, extensive urban embankments, the World of Water Museum, historic sites upriver at the mouth of the Izhora River, the Oreshek Fortress, the ancient city of Ladoga, and the extraordinary waterworks at Peter the Great's summer palace. Local historians and urban planners accompanied the group on these tours and provided background and insight into the relationship between the river and human settlements along it.

One product of the St. Petersburg workshop was an article in *Technology in Society* (May 2006) that analyzed conflicts and convergences between ecology and design in an urban river. Another was a bilingual, interdisciplinary Web site,⁴ which presents images and essays about the culturally significant sites along the river. All essays are presented in Russian and English, and the Web site is designed as a "tour" along the river. The aim is to develop this site into a significant teaching and research tool.

Cities and Rivers: New Orleans and Hurricane Katrina

From the stimulation of the Neva workshop, after Hurricane Katrina the New Directions team leaders sought to extend the cities and



rivers theme into a workshop on New Orleans and its interdisciplinary science, technology, and society interactions. As exemplified by St. Petersburg, urban rivers offer a particularly useful focus for exploring the complex challenges faced by human societies in an expanding scientific and technological world. Urban rivers often serve the needs of large populations for drinking water and sanitation. When located at river deltas, they handle the concentrated inputs of entire watersheds. They provide transportation routes for people and goods, but are also vectors for the movement of invasive species. Urban rivers are complex hydrological systems that are highly sensitive to weather, climate, development, and river management. River contours and bridges determine transportation flows in and around the city, which, along with river ecologies, shape urban design and development patterns. Culturally, rivers contribute to the identity of their cities, shaping narratives, aesthetic expectations, and relationships to the broader world. In the case of New Orleans, scientific, engineering, economic, ethical, political, and cultural perspectives interact in multiple, competing approaches to interpreting the life of a river-based urban cityscape with unique vulnerabilities, and debates about how best to respond to the devastation linked to Hurricane Katrina.

The magnitude of the problem is greater than technological, economic, or even political assessments typically measure. Hurricane Katrina, as the intersection of geological and human history, presents a unique teaching moment for the Earth sciences, challenging citizens to reflect on their relation to nonhuman realities. It also calls into question a particular kind of faith in science and technology that draws attention away from social science and humanities questions. For example, in a provocative study of hurricane damage across the twentieth century, Roger Pielke, Jr. and Daniel Sarewitz (2005) show that although monetary damages have increased, this cannot be attributed to increases in the number of hurricanes or their intensity. In consequence, they argue, to focus on producing long-range scientific hurricane predictions may not be a reasonable use of limited resources. In their words, "The primary cause for the growth in impacts is the increasing vulnerability of human and environmental systems to climate variability and change, not changes in climate per se" (Pielke and Sarewitz 2005: 256). Initially, this argument appears to diminish concern for issues such as climate change, which many sought to highlight when interpreting the impact of Hurricane Katrina. At the same time,



Pielke and Sarewitz emphasize that “the central role played by the characteristics of population and society” is a factor that increases vulnerability (2005: 265). Of course, it should be clear that an interest in climate change does not necessarily detract from concern about increasing vulnerabilities; on the contrary, climate change as projected could exacerbate vulnerabilities that are increasing for societal and other reasons.

One aspect of population and society that Pielke and Sarewitz slight is the way some groups become more vulnerable than others not simply as a result of hurricane intensities or engineering particulars. Often it is complex social and economic forces that contribute to enhancing the vulnerabilities of some while enhancing the securities of others. It is such human-made vulnerabilities and securities that call for social justice analyses of the kind more likely to be emphasized in the humanities. And it is the discussion of such social justice issues that post-Katrina New Orleans has the power to stimulate. Scientific and technological knowledge are incomplete without the inclusion of moral and political knowledge.

It is not just nature but everything from building codes and zoning ordinances to insurance standards and transportation systems—and their willingness to appreciate the existing realities of geology and climate—that are key factors. To quote Pielke and Sarewitz, “Focusing more attention on the integrated, multidisciplinary aspects of climate impacts will likely show that current research portfolios . . . are out of balance with respect to the information needs of decision makers” (2005: 267). Social and political factors, including how to integrate scientific and technological understanding into social and cultural orders, as a special concern of the humanities, must be of special interest to all experts. Indeed, the popular faith in scientific knowledge and technological inventiveness as answers to the problems highlighted by Hurricane Katrina is not directly subject to scientific or technological criticism. It is necessary but not sufficient to point out that some engineered structures, such as levees, may not be adequate for their purpose. It would be a mistake to assume that better engineering alone would solve the problem.

What is called for in addition is a more general criticism of the cultural pattern of reliance on science and technology in place of a critical self-examination of human behaviors. Time after time, engineers and others charged with responding to the devastation in New Orleans found the human and cultural aspects of the city’s



plight colliding with their professional judgments about the vulnerability of the city to future floods and the difficulty of rebuilding in a wise and responsible way. For example, to one interviewer's comment that, "It just isn't a great place for a city," an engineer and environmental scientist from Louisiana State University responded by saying, "Well, it's how you look at it. If it's your city, if you fall in love with this city, it doesn't matter how the city looks, you still love it" (Turner et al. 2006). In effect, this scientist found himself defending the city's right to remain below sea level. In the aftermath of Hurricane Katrina, scientists and humanists—often incomprehensible to one another—have found themselves seeking a common language. Questions of ethics and aesthetics, of love and beauty, are intertwined with questions about levees, wetland buffers, and sedimentation rates. The goal of the New Directions workshop was to create a setting in which scientists, humanists, and urban planners and designers could explore the implications of this new—or newly obvious—proximity of their interests.

Current Essays and Upcoming Projects

This issue of *Nature and Culture* has two articles by New Directions participants. Anna J. Wesselink and colleagues' "Dutch Dealings with the Delta" shows how Dutch technological culture has historically dealt with, and developed around, vulnerability with respect to flooding, and indicates recent developments in attitude towards the flood threat. The flooding of New Orleans in the wake of Katrina temporarily shook the Dutch public's confidence in their flood defense infrastructure, exemplified by the Delta Works. Could this happen in the Netherlands? Second, Nancy Tuana's "Human–Environment Interactions: A Plea for the Humanities" argues that research on human–environment interactions often neglects the resources of the humanities. Katrina and the resulting levee breaches in New Orleans offer a case study of the need for inclusion of the humanities in the study of human–environment interactions, particularly the resources they provide in examining ethics and value concerns. Methods from the humanities, when developed in partnership with scientists and social scientists, can provide a more accurate, effective, and just response to the scientific and technological challenges we face as a global community.



As of 2007, *New Directions* is focusing on two projects: the creation of a handbook of interdisciplinarity; and the development of a field station at Cape Horn, Patagonia, Chile.

Oxford Handbook on Interdisciplinarity

Over the last century the tremendous development of disciplinary expertise—by one count, now totaling more than 4,000 specialties—has bred a complementary demand for synoptic and synthesizing perspectives on knowledge. Academics, policy makers, and citizens at large are asking for methods and approaches to help organize (or limit) the incredible amounts of knowledge being produced, both within research (in problem identification as well as solution) and at all levels of education.

The need to identify a method or logic of interdisciplinarity has, however, proven to be much easier to proclaim than to meet. The most salient characteristics of interdisciplinary studies across the last 60 years have been oscillations between

- The announcement of the need for interdisciplinary approaches to knowledge;
- Historically naive attempts to reinvent the interdisciplinary wheel, ending in partial accomplishment and frustration;
- Then periods of abandonment, followed by
- New recognition that the continued development and use of disciplinary knowledge make interdisciplinary approaches to research and education ever more crucial.

The *Oxford Handbook of Interdisciplinarity* (Frodeman et al., forthcoming) seeks to introduce a greater degree of order into the field of interdisciplinary research, education, and practice by creating a work that will become the bible for all future attempts at interdisciplinarity. Along with its review of academic work, it will also draw out relations for the promotion of collaborative activities in other areas of social life, from work and business to law and government.

Field Station at Cape Horn

In 2005 the University of North Texas (UNT) Department of Philosophy created its field station in environmental science, philosophy, and policy at the extreme southern tip of South America (<http://>



www.phil.unt.edu/chile). Created in partnership with a consortium of Chilean public–private research and conservation groups, the UNT field station is the site of an ongoing experiment in the theory and practice of interdisciplinary research and education. It seeks to identify new ways to integrate the insights of environmental philosophy with the research of environmental scientists and environmental decision makers in practical or “field” settings. Topics of investigation within the Patagonian region include:

- Reflections on how national parks such as Torres del Paine (Chile) and Los Glaciares National Park (Argentina) can be developed in ways that include the perspectives of environmental philosophy
- The different forms that burgeoning ecotourism can take throughout the region
- Questions of ethics and environmental justice surrounding the development of salmon farming
- Management issues surrounding the introduction of exotic species (such as beaver) in the region

The goals of the field station are to create a cohort of researchers adept at interdisciplinary collaborations, and prompt the development of institutional structures that understand and promote interdisciplinary approaches to problem solving. One or more of the case studies tied to the field station should also form a chapter in the *Oxford Handbook*.

Obviously, the natural sciences and engineering are extremely good at providing knowledge about the physical world. But as Hurricane Katrina’s devastation demonstrated, we must also understand the intersection between things and people, between the natural environment, science and engineering, and social and cultural orders. The broader impact of efforts like New Directions lies in their potential for improving the relevance of scientific and engineering knowledge to the social realm, and the relevance of ethics and cultural understanding to the scientific and technological realms.

Acknowledgments

The Katrina workshop and production of these selected proceedings was funded by National Science Foundation grant no. EAR-055035.



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Julie Thompson Klein is Professor of Humanities at Wayne State University. She is the author of *Interdisciplinarity: History, Theory, and Practice* (1990) and, most recently, *Humanities, Culture, and Interdisciplinarity: The Changing American Academy* (2005). She also does extensive consulting on interdisciplinary skill and knowledge development both in the United States and abroad. Klein is a frequent consultant on interdisciplinarity for the U.S. National Science Foundation, the National Institutes of Health, and the National Endowment for the Humanities.

Carl Mitcham is Professor of Liberal Arts and International Studies at the Colorado School of Mines, where he also directs the Hennebach Program in the Humanities and coordinates a graduate-level Individualized Interdisciplinary Program. He recently served as editor-in-chief of the four-volume *Encyclopedia of Science, Technology, and Ethics* (2005).

Nancy Tuana is DuPont/Class of 1949 Professor of Philosophy, Women's Studies, and STS and Director of the Rock Ethics Institute at Pennsylvania State University. She works in the areas of philosophy of science, epistemology, ethics, and feminist science studies. Her forthcoming article, "Viscous Porosity: Witnessing Katrina" (*Material Feminisms*, ed. Susan Hekman and Stacy Alaimo, Duke University Press) examines the centrality of humanities perspectives in examinations of human-environment interactions. She also serves as cofounder and secretariat of the Collaborative Program on the Ethical Dimensions of Climate Change, which recently released the *White Paper on the Ethical Dimensions of Climate Change* (<http://rocketethics.psu.edu/climate>).

Notes

1. See the New Directions: Science, Humanities, Policy Web site at www.ndsciencehumanitiespolicy.org
2. For an overview, see the New Directions Initiative Web site: <http://newdirections.unt.edu/katrina/index.html>
3. For more information on the Neva workshop see <http://enspire.syr.edu/nevaproject/river&city/land&sea.html>
4. Still evolving at: enspire.syr.edu/Nevaworkshop

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