Engineering Earth

Stanley D. Brunn
Editor

Engineering Earth

The Impacts of Megaengineering Projects

Springer

Editor

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Gilbert F. White

pioneering scientist

transdisciplinary

humanitarian

peace activist

international scholarly diplomat

Preface

This volume is an outgrowth of an international and interdisciplinary conference that I initiated and co-organized at the University of Kentucky in July 2008. The purpose of this conference, the title the same as this volume, was to bring together a group of scholars from different disciplines and perspectives who are interested in megaengineering projects who usually do not communicate with each other, even if they study the same topic. These included dams, highways, and mining. The conference was successful because the fifty presentations by social, engineering, and environmental scientists from nine countries addressed the impacts of various megaprojects and because it demonstrated the need for increased dialogue and collaboration.

The conference was dedicated to Dr. Gilbert White, who, for more than seven decades was an enthusiastic advocate of those conducting research on important global resource and public policy initiatives and the perception of natural and technological hazards at local and international scales. He was also keenly interested in disseminating research findings to those in the classroom and a wider public. Throughout his professional life, including at TVA, Haverford College, the University of Chicago, and the University of Colorado, he influenced generations of students and professionals of all ages and ranks and those with varying professional interests. Many scholars today, including many who contributed to this volume and who work at the geography/technology/policy/environment interfaces trace some of their intellectual roots to Gil. He received many national and international awards for his achievements, including the National Medal of Science presented to him by President Clinton in 2000. As a long time friend, a fellow Quaker, a solid humanitarian, a peace activist, and international scholarly diplomat, it is fitting to dedicate this volume to him.

As I was organizing the conference and also editing this volume, I was asked often how I became interested in the engineering earth topic and megaprojects specifically. The simple answer is that they are an outgrowth of where I have lived and the many conversations and interactions with friends over the years. For many geographers of my generation, we received training in the natural, social, and policy sciences, so studying the impacts of large engineering projects from economic, cultural, and environmental perspectives at local and global scales was understandable. During my lifetime I have witnessed in the many places I have lived, taught and traveled the construction of various megaprojects and

their impacts on people's daily lives. These include memories of nuclear testing years of the 1950s and 1960s, the construction of the Interstate Highway System, mass-produced "cookie cutter" suburbs and the "mallings and Wal-Martization" of America," the computer worlds before the Internet, GIS, and Google Earth, and social justice issues that result from the social engineering of political America. My research career includes projects examining various geography/technology issues, including the impacts of Three Mile Island in 1979 with Jim Johnson and Don Zeigler, co-editing volumes on the geographies of information and communication and E-commerce with my colleague Tom Leinbach, co-editing with Susan Cutter and J. W. Harrington a centennial volume for the Association of American Geographers on geography and technology, and editing an interdisciplinary book on Wal-Mart. Also I have benefitted from numerous conversations with my own colleagues, especially Matt Zook and Karl Raitz, but also my many friends at the University of Kentucky in biology, astronomy, landscape architecture, economics, engineering, public health, education, social theory, and the Appalachian Center.

Living in Kentucky since 1980 and teaching undergraduate classes and seminars on various topics have kept me sensitive to engineering earth questions in my backyard. There are a number of megaprojects that Kentuckians can easily identify. These include the destruction to communities and ecosystems brought on by mountain top removal, the burial of low level nerve gas in rotting canisters stored at the Bluegrass Army Depot near Richmond, the social and environmental engineering of the Bluegrass as an amenity region, the drawing down of water in the Cumberland River dam which negatively impacted the local recreation economies, and the construction of various architectural, landscaping and engineering projects in Lexington for its hosting the World Equestrian Games in fall 2010.

A series of other events have also affected my thinking about nature/society issues in recent years. These include the on-going wars in Iraq and Afghanistan, which are/were certainly megaengineering projects with impacts on economies, culture, and environments, the devastation resulting from Hurricane Katrina in the fall of 2005, the BP oil spill in the Gulf of Mexico in Spring 2010, the construction and enforcement of security landscapes since 9/11, and the constant searching for energy alternatives. A key ingredient in my thinking was the field trip at the annual meetings of the Southeast Division, Association of American Geographers in Morgantown, West Virginia in November 2006 that was organized by my good friend, Ken Martis. He showed us firsthand the environmental destruction caused by mountaintop removal, not only the heavy machinery used, but the dynamiting. Understanding fully the impacts of any of the above projects does not come from research within a single discipline, but rather thinking outside our intellectual comfort zones.

In many ways the July 2008 conference was, and this book is, about "bridges," that is, bridges that span "spaces" where the dialogue and scholarly research have often been narrowly conceived and carried out. I am describing those worlds where scholars operate in parallel universes. The conference and this volume are efforts that transcend the all too familiar and intellectually comfortable worlds

of those interested primarily in economic, environmental, cultural, or engineering solutions as solutions to megaengineering impact questions. I would extend the need for intellectually bridge-building efforts and communities to include those interested in sustainability, empowering (and re-engineering) local institutions, humane landscape designing, megainstitutions (universities, churches, entertainment complexes), alternative energy projects, tourism and event planning, virtual communities, and large scale ICT projects.

Organizing this conference and editing this book with contributors from the social, environmental, and engineering scientists have been enjoyable learning experiences. But neither could have been accomplished without the help of a wide network of local and global friends or the Internet. I have “met” many new scholars, especially from the engineering sciences, via email. The first emails were sent in late November 2006. Since then I have sent or received nearly 12,000 emails from local and international friends, conference participants, authors, reviewers, financial supporters, and the publisher. Most of these exchanges were in 2008 and 2009.

There are a number of specific individuals who deserve mention for the important roles they have played both with the conference and this publication. First is my colleague, Andy Wood, who prepared proposals for funding, identifying conference topics and themes, and helped organize the conference. Andy also assumed leadership responsibilities when I was a Fulbright professor in Kazakhstan in fall semester 2007. He is a good and valuable colleague. Second is Lori Tyndall, the department’s business officer; she helped organize many tasks both before and after the conference, including meals, accommodations, travel arrangements, and reimbursements. She was a tireless, cheerful and invaluable member of the conference team. Third, I want to acknowledge the financial support provided by various University of Kentucky offices and departments; these include very generous contributions from the Office of the Provost and Dr. Kumble Subbaswamy; the Office of the Vice President for Research, Dr. Jim Tracy; and the following colleges and deans (in alphabetical order): Arts and Sciences (former Dean Steve Hoch and Associate Dean Leonidas Bachas), Business and Economics (Dean Devanathan Sudharshan), Engineering (Tom Lester), the Graduate School (Jeanine Blackwell), and Public Health (Steve Wyatt). We also received very generous support from the Center for Applied Energy Research and Director Rodney Andrews. Dr. Evelyn Knight, Director of the Appalachian Center, also provided financial assistance. And I want to thank Dr. Douglas Richardson, Executive Director of the Association of American Geographers and Ms. Mary Lynne Bird, Executive Director of the American Geographical Society for publicizing the conference to their members and constituents.

From the start the Department of Geography was supportive of the conference. I am grateful to Karl Raitz, previous chair, and Sue Roberts, current chair, for their enthusiasm and financial support. Richard Gilbreath, Director of the Cartography Laboratory, provided assistance in many ways: preparing the program, designing the creative coffee mug we gave all participants, and preparing last minute maps for some authors. The quality of Dick’s work is always outstanding and our department is richer because of his many contributions to faculty research. Finally, I want to

thank Boyd Shearer for designing the conference poster and Jeff Levy and Raegan Wilson for also assisting with some last minute tasks.

My task immediately following the conference was to prepare a volume for publication. I approached Springer because it is widely recognized as the leading international publisher in science and technology fields and because it published the AAG centennial volume on geography and technology mentioned above. My contacts at Springer, Evelien Bakker and Bernadette Deelen-Mans, expressed a keen interest in this topic the first time I suggested it and they remained constant sources of support as I patiently waited for last minute authors to come through. I very much appreciate the freedom Evelien gave me to identify authors and topics following the July conference, realizing that an international and interdisciplinary volume of this topic really required some additional efforts. A testimony to the international and multidisciplinary dimension of this project is documented by the several hundred professional and scientific journals cited in chapter bibliographies.

The person who helped prepare all manuscripts for Springer was Donna Gilbreath, who has assisted me in previous editorial tasks. She is a very competent, trusted, and reliable professional who enjoys the many major and minor tasks that go with preparing book length manuscripts for a publisher; these include formatting manuscripts, inserting graphics and tables correctly, checking bibliographic entries, and working with authors. I also owe megathanks to Lydia Shinoj who, from half a world away from Lexington, patiently and cheerfully worked with authors on last minute citations, graphics, and phrasing. She is a professional proof-reader and copy-editor in the truest sense and another quality member of the Springer publication team.

This volume includes many who presented papers at the University of Kentucky conference, but also others who were unable to attend because of scheduling conflicts. And there are other chapters written by friends and friends of friends. Some chapters are written by individuals who have made a career of studying one or more megaproject; others are written by junior or senior scholars who welcomed the opportunity to conduct research on a new topic. What is very gratifying is that almost all of those who agreed to contribute chapters provided one. I want to thank all the nearly 200 individual authors who contributed original chapters to the volume; the list includes graduate students and senior scholars, 51 women, and scholars from 28 different countries. Projects are discussed in more than forty countries. Many authors have been friends for life; others became good “virtual” friends as a result of many email exchanges.

I also want to acknowledge those who suggested contributors. Four who deserve extra thanks are Richard Cathcart, Virginie Mamadouh, Jan Monk, and Herman van der Wusten. Others are (in alphabetical order): Stuart Aitken, Harri Andersson, Holly Barcus, Andy Bond, Kathy Braden, Anne Buttimer, Jean Comaroff, Eric Clark, Paul Claval, Harm de Blij, Alex Diener, Ron Eller, Patricia Ehrkamp, Bent Flyvberg, Brian Godfrey, Susan Hanson, Stuart Harris, Andre Horn, Graeme Hugo, John Jakle, P. P. Karan, Aharon Kellerman, Vladimir Kolossov, Evelyn Knight, David Lanegran, Alan Lew, Markku Löytönen, Ashley Lucas, Elizabeth Lunstrum, Lily Kong, Ken Martis, Julian Minghi, Ed Malecki, Peter Muller, Alex Murphy,

Tad Mutersbaugh, David Newman, Susan Parnell, Sangkom Pumipuntu, Karl Raitz, Marty Reuss, Curt Roseman, Gerry Rushton, Sue Roberts, Michael Samers, Rich Schein, Seven Scott, Anna Secor, Jeff Steller, Hal Simon, Devanathan Sudharshan, Markku Tykkyläinen, Ian Warrington, Jerry Webster, Mary White, Tom Wilbanks, Jack Williams, Julie Winkler, Antoinette WinklerPrins, Pentti Yli-Jokipii, Don Zeigler, and Matt Zook.

I also want to thank artist Adam White for permission to use a much reduced version of his “Children’s Games” for the cover. When I saw it at the Royal Dublin Society’s winter show in November 2009. I knew immediately that I would like to use it. He is a most gracious artist who weaves together technology and environment, a central theme of this volume.

I am pleased with those who contributed to this volume as it is truly an international and interdisciplinary effort. There authors include physicists and planetary scientists, anthropologists and economists, architects and historians, Internet and Google Earth specialists, environmental scientists and civil engineers, and those who study social justice, environmental risk, and community restructuring. Most authors are geographers and here are many who have different backgrounds and interests; some have strong regional and nature/society interests, others have major research interests in critical social theory and physical geography, and still others have a strong applied focus to their research. As I read and reread these chapters I was very pleased with the common ground that exists among the many contributors and contributions, whether they are writing about large scale dams, transportation projects, tourism developments or social engineering. Even those contributions dealing with GIS and the Internet, climate modeling, reforestation, megaenergy alternatives, and planetary engineering illustrate the contributions to understanding megaprojects that come from those with different scientific, technical, philosophical, and regional expertise.

I hope that the reader will find much in this volume that is of interest for future research. There is clearly much more work that might be, could be (and probably should be) conducted on the impacts of megaengineering projects at all scales and in all major world regions. If this collection stimulates such inquiry, it will have served its purpose.

Finally, I want to thank my wife, Natasha, for her interest and support throughout this project. She was a member of Ken Martis’s field trip to the West Virginia coal fields where she witnessed Appalachian megaengineering impacts firsthand, she faithfully attended the conference in 2008, and survived the fall 2007 Fulbright experience in Semipalatinsk, Kazakhstan. I am very grateful for her affection and constant companionship.

Lexington, Kentucky

Stanley D. Brunn

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