



INITIATIVES IN
ENERGY *and the*
ENVIRONMENT

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AGS: Building the Future— Leadership, Technology and Global Citizenship

The Alliance for Global Sustainability (AGS) held its annual meeting in San José, Costa Rica, on March 21-23, hosted by the Instituto Centroamericano de Administración de Empresas (INCAE). This is the first time the AGS has held an annual meeting at a location other than one of its member institutions. In keeping with the location, the annual meeting focused on Latin America while advancing the AGS research portfolios. The meeting was attended by more than 400 participants, including 170 AGS members, presidents of six major research universities, industry representatives from 10 companies, representatives from 12 non-governmental organizations, and a delegation of over 150 people from Latin American industry, government, academia, and NGOs.

The AGS continues to explore ways in which its research institutions can increasingly contribute to solving sustainability problems and preparing the next generation of leaders. A sign of the success of the AGS model was the creation of a consortium modeled after the AGS consisting of 42 Latin American universities focused on sustainability—the Latin American Alliance of Universities for Sustainable Development (ALUDES). Said MIT President Charles Vest, "If the activities of the AGS have played even the smallest role in helping to initiate this, this gives us a great vision of how we can both stick to doing what we do best and also greatly leverage and expand our influence around the world."

In cooperation with the host institution, INCAE, scholars met to examine the AGS research and education portfolio and to consider ways in which the academic community—in partnership with industry, government, and civil society—can help generate a clear and focused agenda for the future. As the tenth anniversary of the Rio Conference on the Environment and Development approaches, participants in the Annual Meeting looked forward to building the future through enhanced leadership, improved technologies, and global citizenship.

In opening the meeting, José María Figueres, former president of Costa Rica and honorary chairman of the meeting as well as member of the AGS International Advisory Board, said, "If the fall of the Berlin Wall heralded a new era of opportunities, the fall of the World Trade Center towers has marked a new era of

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CALENDAR

july **13-27**

Third Youth Environmental Summit, Topic: Rio + 10, How realistic are the goals and what remains to be done? Hosted by the Alliance for Global Sustainability, First Session: July 13-27, 2002, Hotel Alpenblick, Braunwald, Switzerland. Contact: Ms. Heather Seyfang, 617-452-3199. (Email: seyfang@mit.edu).

august **17-31**

Third Youth Environmental Summit, Topic: Rio + 10, How realistic are the goals and what remains to be done? Hosted by the Alliance for Global Sustainability, Second Session (repeats First Session): August 17-31, 2002, Hotel Alpenblick, Braunwald, Switzerland. Contact: Ms. Heather Seyfang, 617-452-3199. (Email: seyfang@mit.edu).

september **23**

Third Annual Regional Sustainable Development Forum: A Closer Examination of the Issues. September 23, 2002, MIT, Building 10, Room 250. Information: www.newecology.org. Contact: Ms. Maddy Arnstein, 617-253-5724 (Email: maddy@mit.edu).

march **24-26**

The Alliance for Global Sustainability Annual Meeting 2003, Tokyo, Japan; March 24-26, 2003. For further information contact Ms. Karen Gibson, 617-258-6368 (Email: kgibson@mit.edu).

All events are held at MIT unless otherwise noted. For the most current listings, see the LFEE website: <http://lfee.mit.edu/>

Please send MIT sponsored event listings to Dr. Richard St. Clair, stclair@mit.edu, phone 617-253-9871.

vulnerability. In spite of all our progress on many fronts, how vulnerable we have made ourselves to be. Even as these adverse conditions depict today's reality, there are certainly other components of our reality that offer hope as well and upon which we can certainly build. Being the eternal optimist I consider myself to be, I invite you to see the real opportunities that we can leverage out of these adverse conditions."

European Commission member and AGS International Advisory Board member Margot Wallström, in a pre-recorded message to the participants of the meeting, highlighted some of the issues facing the AGS and their relevance to the Johannesburg Summit later this year. Said Wallström, "I believe the Johannesburg Summit must be a wake-up call for global sustainability...It is difficult to envisage another policy area being more dependent on research than environmental policy." Wallström emphasized, "We need to understand the natural processes that we are dealing with. Technology is an important part of the solution. And we have to justify our policies on the basis of research and good data." Ms. Wallström suggested two types of outcomes from the World Summit on Sustainable Development in Johannesburg in September: (1) a global declaration and action plan to show the results of the collective effort and of the new spirit of global partnership; and (2) a series of specific commitments or agreements by networks or partnerships, including governments, the private sector, and other stakeholders. Further, "Johannesburg must deliver regional actions for Africa building on ongoing initiatives like the New Partnership for Africa's Development," said Wallström.

In his keynote address on the prospects of sustainable development for the new millennium, Jeffrey Sachs, director of the Center for International Development at Harvard University, said, "The solutions to the problems of the human impact on the local and global environment, the challenges of raising living standards in ecologically stressed regions, and the challenges of pandemic disease will, first and foremost, be met technologically...The future is not to be predicted but to be shaped. It's not a matter of running our models and deciding which scenario is the most likely; it's a matter of mobilizing human agency to address the ills and to champion the positive tendencies."



Ms. Astrid Fischel Volio, First Vice President of Costa Rica, welcoming participants during the reception at INCAE



In a stirring address at the gala dinner, Oscar Arias, former president of Costa Rica and Nobel laureate, exhorted attendees and the countries they represent to embrace and seek peaceful solutions to the problems that plague mankind. Said Arias, "I believe that we all have a vision for the world that motivates us to act in our varied capacities to achieve sustainability as we see it. My motivating vision of the world a hundred years from now is a planet Earth in which each government is democratically elected, is able to fulfill its people's needs, remains at peace with both its neighbors and its internal opposition, and uses the tools of economics and science to the benefit of all its people. This, in brief, is my idea of sustainable development; and though simply stated, these goals will require prolonged and complex efforts in order to be achieved."

Professor Roberto Artavia, Rector of INCAE and the host of the annual meeting, described the four-point program of INCAE to promote sustainability, consisting of education, applied research, continuous innovation in the executive training programs, and a strategic alliance for sustainability leading to the formation of the ALUDES consortium. INCAE is a highly specialized school with a single degree, the MBA. But the 250 MBAs that graduate from INCAE each year must complete a course on the principles of sustainable development, and an eco-efficiency management course is compulsory for all of its students. In 1996 INCAE founded a Center for Competitiveness and Sustainable Development that represents up to 40% of its institutional budget.

A set of concurrent working groups examined the question of why existing technologies and strategies for promoting sustainable development within both developed and developing countries are slow to materialize and be implemented. One reason that emerged is the difficulty in communicating research results and other information to such disparate audiences as decision makers, policy makers, research peers, the media, the public, and students. New

applications and technologies must be developed to help developing countries assess and address local needs. One working group noted that, even though some technological improvements are not as costly as might be thought, poor countries often lack the resources to afford even the most basic technologies. A second session of concurrent working groups examined the tensions generated by the growing divide between affluent and poor people, nations, and regions that threaten to undermine progress toward sustainable development.

The working groups focused on the areas of energy and climate change, water and food, buildings, infrastructure for managing the megacities, digital opportunities, mobility, and vulnerability posed by natural and man-made disasters. While the developed world concentrates on increasing fuel efficiency, searching for alternative fuels, and renewable energy, the developing world continues to struggle with a shortage of energy. Workshop participants noted that the global community must make supplying energy to the poor a priority in order to fight increasing levels of poverty; however, it was agreed that in order to address concerns over global warming and general climate change, a scheme must be developed that provides non-polluting energy to developing countries.

Solving Asia's transportation problem was seen by participants as being one of the keys to sustainability. The paratransit services in large cities in developing countries are labor intensive and are dependent upon cheap labor. As poverty is eliminated, these services will be dramatically reduced, causing a significant problem in the provision of paratransit. Developing countries are at a significant disadvantage regarding the procurement of infrastructure, and the majority of transportation equipment used in developing countries is imported from industrialized countries at high cost. Transferring these costs onto



AGS Presidents' Panel (left to right): Roberto Artavia Loria, Rector, INCAE; Alberto Bustani, Monterrey Tech (ITESM), President, Monterrey Campus; Atsushi Koma, Vice President, UT; Olaf Kübler, President, ETH-Z; Charles Vest, President, MIT; Jan-Eric Sundgren, President, Chalmers.

the customer is not a feasible option in many developing countries.

There was also discussion of case studies in areas where water is scarce due to human activity. Of particular concern was the amount of water used in agriculture (70% of global water demand is for agricultural production) and the need for conservation of wetlands and other ecologically valuable regions. With regard to issues of water and food in Asian countries, as in many other areas, water has not been adequately included and accounted for in theories of growth. Agriculture is the biggest user of water in most of the Pacific countries, where more efficient management of water resources is needed.

Attendees were given a demonstration of ThinkCycle, an innovative program that seeks to create a culture of open-source design innovation with ongoing collaboration among individuals, communities, and organizations around the world. The model sought by ThinkCycle is for NGOs and stakeholders to submit problems and test the solutions in the field, during which academia can perform non-profit R&D and industry can create new models of sustainability and local enterprises.

In his keynote speech on the closing day of the meeting, Eduardo Lizano, president of the Central Bank of Costa Rica, said, "No country, no society can live isolated or apart from what we call today the global village. So it is for the sake of our own security and our own prosperity that we must be very much interested in what happens in all the four corners of our planet and beyond." Further, "It is necessary to establish firmly ethical principles and a moral code," said Lizano. "Without them, it will be actually impossible to avoid social conflicts and economic exploitation and will leave many countries and societies outside the benefits of development. Without these two conditions, the institutions and the alliances needed will not be forthcoming and, consequently, development—be it economic, social or sustainable—and progress will not be attained."

Steven R. L. Millman, doctoral candidate at MIT and chair of the AGS World Student Community Symposium in Costa Rica, presented certificates of appreciation to the six members of the Presidents' Panel for their support of the AGS World Student Community, which held its annual meeting in San José this year prior to the AGS meeting. Said Millman, "These students, some of whom you've heard from already, have created an explosion of sustainability projects around the globe. The World Student Community appreciates this opportunity to say two things to the presidents of the AGS universities: First, we want



Steven R. L. Millman, MIT

you to know that your support has led to positive, concrete, and widespread results for sustainability in the lives of our students and in the communities in which they live; second, we are grateful beyond words for your support and your confidence in our ability to succeed when

we have the room, the freedom, and the support to do so."

For more information and presentations made at this year's annual meeting, visit the meeting website at <http://www.globalsustainability.org/AGS2002/>. Next year's annual meeting will be held at the University of Tokyo, March 24-26, 2003. For further information contact Ms. Karen Gibson (kgibson@mit.edu). 

New Research Partnerships for Sustainability

This year the Alliance for Global Sustainability (AGS) will set aside a portion of available research funds to stimulate the development of a new category of research: Research Partnerships for Sustainability. These partnerships will be in addition to the traditional seed and full projects of the AGS. The purpose of the new AGS partnerships is to facilitate the creation of large, integrated projects—or a number of smaller projects that collectively address a larger problem—in a specific arena of sustainability.

Genuine collaboration will be emphasized between academics and the broader stakeholder community (including government and industry). A high quality of project management and coordination will be necessary to meet the demands of these larger-scale initiatives. The partnerships will influence policy and decision making through both the process of partnering on research and the content of integrated research that leads to new knowledge.

AGS researchers are in the process of developing proposals in two stages for the new category of research partnerships. The first stage is a set of workshops on a proposed partnership during the upcoming AGS Technical Meeting to be held at MIT on November 18-19. Following the November workshops, organizers will develop proposals

for AGS funding to support the proposed partnerships. These proposals will be due February 14, 2003. Proposals for traditional AGS research project funding are due October 30, 2002.

Existing models for these projects are the China Energy Technology Project and the Mexico City Program (see book review on p. 7 and interview on p. 8), which were largely funded by external sources. Both projects have required dedicated project management and coordination across disciplines, partners, and geographic regions; and both are highly successful in implementation of results and recommendations, because the research was developed and carried out in partnership with the most relevant stakeholders (e.g., industry) and targets of influence (government).

The AGS is in its sixth year and now has four member universities: Massachusetts Institute of Technology, the University of Tokyo, the Swiss Federal Institute of Technology, and Chalmers University of Technology. Current AGS-sponsored research concentrates on global issues related to the provision of water and food, energy, and mobility. Cross-cutting research is also carried out on urban systems, cleaner technologies, and policies and institutions. In keeping with the goals and objectives of the AGS, typical projects are not limited to science and technology issues but also address social, economic, and political dimensions of the problem at hand. In addition, projects that address ethical and behavioral issues and education are encouraged. The overall mission of the AGS is to effect a paradigm shift in structures and policies and to provide a solid foundation for sustainable development through the application of world-class research and education in science and technology and the social sciences.

Many questions of sustainability cannot be resolved without a global view and without taking into consideration project partners from less-developed countries. Proposals that include research groups from less-developed countries are encouraged. The AGS remains committed to finding additional funding for projects with active partners from these countries.

New AGS research partnerships must demonstrate relevance to global sustainability and environmental impact and be multi-disciplinary and—to the greatest extent possible—include consideration of social and economic as well as scientific and technical dimensions of the problem. Further, the new projects must demonstrate the potential to leverage ongoing activity and external funding, contribute to the AGS goals, and provide plans for outreach to

a larger community for dissemination of results. They must also involve the participation of at least two (and preferably three) member universities as well as reflect geographical diversity in composition of partners. Together, these criteria suggest partnerships that will clearly demonstrate innovative, multi-disciplinary approaches to sustainability issues.

Summaries of the research projects currently supported by the AGS are available on the AGS website at www.globalsustainability.org. These summaries provide a clear picture of the type of research the AGS seeks to promote. As the AGS enters its second five-year phase, it seeks to expand its portfolio by adding projects that address the implications for sustainable development of advances in materials science and engineering and in the increasing use of information technologies.

Following the workshops in November, proponents of the projects will work with partners to develop proposals for project funding. Final selection of research partnerships to support with AGS funds as well as the more traditional full and seed projects will be announced in March 2003, prior to the AGS Annual Meeting. 

AGS Book Series Launched

This year Kluwer Academic Publishers launched the Alliance for Global Sustainability (AGS) Book Series, “Science and Technology: Tools for Sustainable Development” with the publication of the first two books in the series (for reviews, see p. 6 and p. 7). Both of these books attack the problem of sustainability in the burgeoning megacities of the developing world, but from different angles. One takes a broader look at megacities, while the other focuses in depth on one megacity, the Mexico City Metropolitan Area.

The aim of the AGS book series is to provide timely accounts by authoritative scholars of the results of cutting-edge research into emerging barriers to sustainable development, and methodologies and tools to help governments, industry, and civil society overcome them. The work presented in the book series will draw mainly on results of the research being carried out by the AGS. The level of presentation in the series is for graduate students in natural, social, and engineering sciences well as policy and decision makers around the world in government, industry, and civil society.

The Series Editor for the AGS book series is Dr. Joanne M. Kauffman, Senior Research Scientist at the Massachusetts Institute of Technology’s new Laboratory for Energy and the Environment (LFEE). The distinguished members of the

Series Advisory Board are Dr. John H. Gibbons (President, Resource Strategies, USA), Professor Atsushi Koma (Vice President, University of Tokyo [UT]), Professor Hiroshi Komiyama (UT), MIT Professor David Marks (Director of MIT's LFEE and AGS coordinator for MIT), Professor Mario Molina (MIT Institute Professor and Nobel laureate), Dr. Rajendra Pachauri (Director, Tata Energy Research Institute, India), Professor Roland Scholz (Swiss Federal Institute of Technology at Zürich [ETH-Z]), Dr. Ellen Stechel (Manager, ACCRO, Ford Motor Co., USA), and Professor Peter Edwards (ETH-Z). Reviews of the two books follow.

Cities and Sustainability: Obstacles or Opportunities?

First in the AGS book series is *Future Cities: Dynamics and Sustainability*. Edited by Professor Fred Moavenzadeh (James Mason Crafts Professor, MIT), Professor Keisuke Hanaki (UT, School of Engineering), and Professor Peter Baccini (ETH-Z), the book presents a new view of the world's burgeoning megacities. These cities are a critical fact of the 21st century and represent one of the greatest challenges to the future. Nearly half the world's population now lives in cities (75% in developed countries), and the rate of urbanization is increasing rapidly in developing countries. The book notes that urban centers now absorb two-thirds of the population increase in the developing world. It is estimated that the number of cities with populations over three million will more than double from 70 today to over 150 by the year 2050 according to present growth rates.

But contrary to conventional wisdom, which holds that cities distort natural processes, the authors of this book claim the opposite. Far more than sinks of energy, vast drains of natural resources, and obstacles to sustainable development, the authors say that cities, if properly managed, "...can be transformative arenas in which raw materials may be rationally and economically developed to support people decently, and whole regions sustainably." This book provides new ideas for managing the megacities of the future. The editors' goal is to shape a new way of thinking about megacities—one that promotes their function in modern societies as engines of the ideas, technologies, and loci of political will needed to build a new regime of global sustainability.

According to the introductory chapter, "Only in the last 200 years, the industrial era, have urban areas grown so rapidly, and their populations increased so dramatically that

their impacts on the natural environment are being felt beyond their immediate geographic surroundings." The concentration of large populations in megacities is "placing stress on the natural environment so great that it is beginning to have extensive regional, and even global impacts.... The management of these megacities (those having populations of over eight million), in their current formative stages so taxing to natural systems, paradoxically presents the opportunity to restore sustainable regional and global environments."

As a whole, the chapters emphasize the importance of cities to global futures, policies, technologies, and research methodologies suitable for addressing sustainability problems. The perspective of this book is that the physical, chemical, and biological (i.e., ecological) concerns and basic human needs, including social and cultural systems, are all key areas of sustainable development.

The book is divided into three sections:

- 1) Resource management on a regional scale: the management and balance of urban and regional resources from a systems point of view;
- 2) Urban activities: local and global impacts; and
- 3) Developing and developed countries: challenges and cooperation, exploring the urbanization-environment nexus in terms of global accords and relationships between developed and developing countries; one of the most challenging problems for the sustainability paradigm is the risk of humanly induced global climate change.

In an interview with *Initiatives in Energy and the Environment*, Prof. Moavenzadeh said, "The book was the outcome of four or five years' collaborative work with the researchers, focusing on our experience with megacities and coming from many different cultures and backgrounds. It is being used as a vehicle to provide a focus for study to look at the spectrum of issues facing megacities around the world." The city of Guangzhou, China, has been selected for particular emphasis for a number of reasons: it has been growing at a very rapid rate; Hong Kong, a nearby neighbor, has been pouring investment into Guangzhou; the per capita income of Guangzhou was the highest among the major cities in China and it had grown at the fastest rate; and it is an ideal place to look at the types of growing pains such a city goes through. The Guangzhou case study, Moavenzadeh said, "proved some of the hunches we had in writing the book."

Continued Moavenzadeh, "We looked to see where the problems are in urban transportation. One of the major problems is not necessarily technology or rapid growth but rather institutions in the metropolitan government: these institutions, how they are organized, what authorities and

responsibilities they have, and what are their mandates and the chain of command are found to be the crux of the problems, particularly with regard to transportation issues." The researchers asked, are there appropriate institutions in place to handle these issues? "We found that Guangzhou made substantial progress, but it is not something that can be accomplished in a short period of time." Moavenzadeh continued, "On the transportation side, the city of Guangzhou is on its way to expanding its rapid transit in a very substantial way: we are looking at how this rapid transit could be put in context of what we call transit-oriented development. This is similar to what was done in Portland, Oregon, where a transit system was designed and developed with an eye to the future of residential as well as workplace issues."

The researchers have looked at a number of large "city-states," such as Singapore, Hong Kong, Kuwait City, and Qatar. "What lessons can we learn? The authorities in these city-states are more independent and much more powerful than those in cities of the same size in nation-states of developed countries, cities like Chicago or New York or Paris. How can those cities develop administratively, socially and economically, where decision-making power is commensurate with their economic might?" asks Moavenzadeh. The great cities are dynamos: "They have been able to create value and increase productivities while providing better access to health, education, and culture; so they have become the engine of economic growth."

Prof. Moavenzadeh and fellow researcher and co-author Dr. Brantley Liddle (post-doctoral fellow at the Max Planck Institute for Demographic Research) define sustainability as "restraining present consumption to ensure that future generations will inherit a resource base or opportunity set no smaller than that enjoyed by previous generations." The authors go on to explain that sustainability is concerned with two types of limits the environment imposes on growth or development—source limits and sink limits. "Source limits refer to the environment's finite capacity to provide resources, while sink limits refer to the environment's capacity to assimilate the wastes that economic growth and development cause." A major sink problem they consider is the climate change issue. The authors examine how this issue should be viewed "through the sustainability lens."

Nazli Choucri, professor of Political Science and Associate Director of the Technology and Development Program at MIT and an analyst of international political and economic change, devotes a chapter in the book to megacities and global accords. She addresses some of the daunting institutional challenges raised by tension between the

increasing urbanization of the world's population and the demands generated by megacities, and the expansion of formal and informal accords among nations. She concludes, "In the last analysis, effective representation and participation of megacities is necessary—perhaps even sufficient—to ensure transitions toward effective global environmental responses."

Air Quality in the Mexico Megacity

Second in the new AGS book series is *Air Quality in Mexico: An Integrated Assessment*, edited by Dr. Luisa T. Molina and Professor Mario Molina of MIT (see interview, p. 8). In this book, 35 American and Mexican experts in atmospheric sciences, human health, economics, and social and political sciences contribute to an integrated assessment of the complex elements needed to structure air quality policy in the 21st century through a case study of the Mexico City Metropolitan Area (MCMA), one of the world's largest megacities where air pollution grew unchecked for decades.

As in numerous megacities of the world, many MCMA residents suffer from high levels of traffic congestion, pollution, impaired health, and other problems exacerbated by political and institutional barriers. Continuing economic growth in the MCMA will drive transport demand still higher. The authors stress that it will be a difficult and complex task to create a transport system in proper balance with the environment. The book uses an integrated assessment approach to develop recommendations emphasizing the interaction between a wide range of disciplines including health, atmospheric science, economics, technology, and policy.

Improvements in Mexico City's air quality in the 1990s in conjunction with this research effort attest to the power of determined and enlightened policy making and throw into relief the tough problems that remain to be solved. The large and complex case study presented in this book demonstrates ways to work toward the comprehensive knowledge needed to build a robust environmental policy to deal further with the remaining air quality problems. But successful implementation strongly depends on high-level political commitment and strong public support through the participation of stakeholders from academia, industry, and social organizations.

The authors make clear that only good science and well-chosen technologies can direct the way to corrective regulatory measures; but, at the same time, without strong commitment from government, no amount of science or technology can

help. While the book is intended to guide policy makers in the Mexico Megacity, its recommendations form a provocative challenge to the leadership of other megacities in the world that have looming air pollution issues.

The high levels of pollution that occurred in the 1980s have been reduced substantially; however, ozone and particulate matter are still major concerns in the MCMA. A major factor is an old vehicle fleet whose turnover needs to be greatly accelerated. The largest contributors to total emissions in the MCMA are mobile sources.

It is well-established that air pollution can affect human health. The authors explain that ozone, formed by photochemical reactions, is a strong oxidant that affects the respiratory system and damages lung tissue. Chronic exposures to elevated ozone levels are responsible for losses in immune system functions, accelerated aging, and increased susceptibility to other infections. Elevated levels of ozone can also cause serious damage to crops and other vegetation.

Suspended particulate matter continues to be the other major problem. From the standpoint of health, the authors note the most important particles are PM_{10} , those with a diameter of 10 microns (mm, or millionths of a meter) or less. Recently it has been found that even finer particles—those with diameters of 2.5mm or less—have an even larger impact on human health. The coarser PM_{10} particles have a higher probability of depositing in the tracheo-bronchial region, while the finer $PM_{2.5}$ particles can reach the periphery of the lung, the respiratory bronchioles, and alveoli. Both, of course, are dangerous pollutants.

The book accomplishes a number of things: it details the science of measuring, understanding, and mitigating air pollution; it correlates health effects with specific pollutants and conditions; and it focuses on the history, nature, and impact of transportation in the MCMA.

Before technological remedies can come into play, the jurisdictions of the MCMA must successfully implement and enforce environmental regulations and relevant laws, make adequate financial and human resources available, and strengthen the institutional, negotiating, and implementing capacity of relevant government agencies. The most important underlying factor in the successful environmental management of the MCMA is the political will to transform the best available knowledge into action.

The authors observe that it is critically important to reduce scientific uncertainty through accelerated research. The appropriate incorporation of scientific findings into the decision making process lays the foundation for robust pol-

icy design. In addition, it is possible to avoid costly mistakes by learning about successful experiences and lessons in Mexico and in other countries. But the authors caution that delays today in tackling the air pollution problem may create the need for more drastic measures in the future. 🌐

Air Quality Management in the Mexico City Metropolitan Area: An Interview with Mario Molina and Luisa Molina



The Integrated Program on Urban, Regional and Global Air Pollution (website: <http://eaps.mit.edu/megacities/>) is a collaborative research and education program initiated at MIT in 1999 to address the urban, regional, and global air pollution problems stemming from human activities in megacities in a coordinated and interdisciplinary manner. The initial focus of the program is the air pollution problem in the Mexico City Metropolitan Area. A bi-national Mexico-US case study, the Mexico City Program involves the participation of a multidisciplinary group of researchers from more than a dozen Mexican institutions working in close collaboration with researchers at MIT and other US and international institutions and active collaboration with Mexican government officials and decision makers.

MIT Institute Professor Mario Molina, 1995 Nobel laureate in Chemistry, has been involved in developing the understanding of the chemistry of the stratospheric ozone layer and its susceptibility to human-made perturbations. He and his wife, Dr. Luisa Molina, are the directors of the Mexico City Program.

Initiatives in Energy and the Environment (IE&E): Professor Molina, you have said that stakeholder involvement is critical in addressing the air quality problems of the Mexico City Metropolitan Area.

Mario Molina (MM): What we did is recommend that stake-

holders *be* involved in Mexico City in the process of designing and implementing the new programs on air quality management. The most recent program is PROAIRE 2002-2010, which contains a series of some 89 individual measures that are fairly ambitious, covering everything from transportation to renewal of the automotive fleet. PROAIRE 2002-2010, a Spanish acronym for Program to Improve the Air Quality in the Valley of Mexico, for the period 2002-2010, was delayed for a couple of years because of a change of administration, so it really got started this February. When we began our project, it coincided with the time that the air quality management program in the Mexico City Metropolitan Area (PROAIRE 1995-2000) was going to expire, and the Metropolitan Environmental Commission (CAM) had to come up with a new plan. So our Mexico City Program was contracted to write a series of white papers ranging from atmospheric sciences to health to what to do with transport, which is the main source of the air pollution in the Mexico City Metropolitan Area.

IE&E: Dr. Molina, how does politics impact the work you are doing in Mexico?

Luisa Molina (LM): There are really three political entities when we speak of the Mexico City Metropolitan Area: The national government of Mexico, the Federal District (like the US District of Columbia), and the State of Mexico. This complicates our work with policy makers and other stakeholders. Further, there was recently a change in the national administration as well as a change in the mayor of the Federal District. Because of this, there was some delay to starting the second phase of our Mexico City Program. Incidentally, our recommendations are really only recommendations—we do not make policy. Policy is strictly done by the government officials. We advise them, but we don't tell them what to do. Nevertheless, the new air quality program was based on a large portion of our recommendations, and some of the members of our project team have gone on to hold prominent environmental positions in the Mexican government.

IE&E: So you work directly with the government?

LM: Yes. During the process when we were writing the white papers we worked very closely with the government. That's one of the unique features of our program, that it is interdisciplinary, integrated, and multidisciplinary, and it's based on very strong science. But also we worked very closely with the decision makers so that whatever control options we recommended would be realistic. The problem is, in many cases, when you recommend certain measures they could turn out to be very costly or could simply be impossible to enforce and would just sit on the shelf. So

what we have tried to do is to work not only with the government to get their input but also with a large group of stakeholders through forming working groups made up of people from industry, some of the non-governmental organizations, and people from academia. These working groups focus on emissions, modeling, health, and so on.

IE&E: What are some examples of how stakeholders are affected by environmental policy in Mexico?

MM: One example is taxis. It turns out that there are lots of taxis, and some of them are very old. Initially, by law, they could not be any older than 5 years. But that didn't work. They couldn't enforce that, so they extended it to 6, 7, or 8 years or more. As a result, there are many older taxis. There are even some that do not have catalytic converters, although by law that's not supposed to be the case. What happens is it's not enough to have laws on paper, and it's also not practical to suddenly try to enforce the existing laws about taxis very forcefully, because you have a large number of people that are making a living from them. One way to deal with this is to consider various groups of taxi owners or taxi drivers as stakeholders and have meetings with their representatives and try to come up with practical solutions. As it turned out, in this case, there are some government loan programs with low interest rates to buy new taxis, so that the government can effectively get the older taxis off the road and phase in a much stronger enforcement while leaving options that people can live with. This is the sort of thing that is best worked out by talking to the taxi owners directly, by having them be at the same table to suggest what works and what is practical.

So the stakeholders are groups that are affected by environmental policy. On the one hand, they can be involved to protect their interests. But, on the other hand, recognizing that there are the larger interests of the population as a whole, they can also contribute by coming up with more efficient solutions. So the idea is to have a much more open process as is the case in many of the western European countries. It hasn't worked when the government makes policy behind closed doors when the stakeholders don't know how it was worked out, whether it was some small group deciding arbitrary policy. Such solutions have been either impractical, or just inefficient, and sometimes there are unintended consequences.

There's a very good example in Mexico City, a program in which one day in the week you don't drive, which in Spanish is "Hoy no circula" ("No driving day"). It worked very well when it was put in place experimentally.

LM: We have an appendix describing this program in our

book, *Air Quality in the Mexico Megacity* [see review, p. 7]. It was a grass-roots initiative and was eventually adopted by the government as a permanent program. This is perhaps one of the most well-known and controversial programs.

MM: What happened is it worked at the beginning. Indeed, the traffic improved and pollution improved because you had one-fifth of the cars off the road, and it would have stayed that way if it could have been enforced properly. But when it was made permanent, people did not adapt to this. In fact, whoever could afford it bought a second car because they needed to move every day, not just not work or not have mobility one day a week. And the second car tended to be older, more polluting. Things were complicated by an economic recession at that time, but in the end it was possible to conclude that the program did not lead to the expected improvement that they saw at the very beginning. However, in the context of getting people involved, it was a good experience. After all, people accepted initially not to drive for a day—people wanted to do something about air pollution. But it would have been, in hindsight, a lot better to examine this plan more carefully so it could have been better designed or perhaps implemented in a different way.

Whichever way the decisions are made which we are suggesting, it's best to make them in the open with stakeholder input. It's also important to communicate effectively with the public to implement some of these decisions, to work with them so that the decisions function well.

LM: The program has been modified. It is now coupled to the inspection and maintenance program and is used as an incentive to replace high-emitting cars with newer and cleaner cars. So what is changing in Mexico—and we see that in this air quality issue that we are working with—is a larger political process. It's more transparent. People are expecting more from their politicians, so it's an important process, and we are trying to make sure that it also works well in terms of the environment.

IE&E: But the politicians have to expect more from the people too. I mean, it has to be both ways, right?

MM: Right, right. But along the same lines there is yet another component of this. Whichever way the decisions are made which we are suggesting, it's best to make them in the open with stakeholder input. It's also important to communicate effectively with the public to implement some of these decisions, to work with them so that the decisions function well.

There is also the question of public trust in the govern-

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ment. If the public perceives that when some new measure comes out it is just another measure that is arbitrarily taken by the government, then it's much less likely that the measure will succeed because the people will not be likely to collaborate with an arbitrary measure. If on the other hand it is something that has been clearly explained and has been out in the open and people do feel that it will benefit their environment, it's much more likely that the measure will succeed with their cooperation.

IE&E: Is public education a component in the Mexico City Program?

LM: Yes. Some of the many different aspects of education in which we are involved is giving seminars and talking to students, providing satellite transmissions, and developing a web-based educational resource program targeting the general public as well as high school students. We also are running what we call Mid-Career Workshops in Mexico City which we began two years ago. This year's workshop will be in August. It is open to various invited stakeholders—representatives of the media, industry, academia, and the government. And in the fall we will go back to Mexico and talk about atmospheric science, particularly modeling, monitoring, and emissions inventory. And we also work together with the government agencies. They have a lot of publications on environmental education, so we actually work with them even closer just to make sure that we have coordination between each other. This is important since we all have limited resources.

And the other thing that we did which is one of the important aspects of our project is that we have a large group of students here at MIT, and we also try to have Mexicans come here. For example, this summer we have two students that are going to be spending the summer here working with us, and we have visiting faculty from Mexico as well as high school teachers from Monterrey Tech. Like other universities in Mexico, Monterrey Tech not only is a university but also has high schools affiliated with it. The last workshop we had was held in January in the State of Mexico, where we had about 180 people from all walks of life. So this is all part of our educational commitment to try to bring up the capacity of Mexico, especially in the area of air quality management. 🌐

Professor David Marks Becomes Chalmers Honorary Doctor



On May 17, Chalmers University of Technology in Sweden conferred on Professor David H. Marks the degree of Honorary Doctor. Prof. Marks is the Director of the Laboratory for Energy and the Environment (LFEE) at the Massachusetts Institute of Technology (MIT) and is the Morton '42 and Claire Goulder Family Professor of Engineering Systems and Civil and Environmental Engineering at MIT.

Prof. Marks was cited for being “actively involved in the creation of the Chalmers Environmental Initiative, which centers on systems thinking within the environmental area.” Marks is a founding Coordinator for the Alliance for Global Sustainability (AGS), a partnership between MIT, the Swiss Federal Institute of Technology, the University of Tokyo, and Chalmers University of Technology. The Chalmers tribute states that Prof. Marks has been “a driving force [behind] Chalmers becoming a member [of the AGS] in 2001, in this important global partnership.”

Prof. Marks and four other honorees each presented a short “popular” lecture on May 16. Said Marks, “My vantage point for this talk is that of a civil and environmental engineer who has worked for more than 40 years in supplying large-scale water infrastructure to aid in sustainable development in the service of society. This has included work in Argentina, Venezuela, Columbia, Chile, China, Yugoslavia, Greece, Egypt, the Sudan, India, Korea, Thailand, China, and the United States. As an educator, my job has been not only to develop problem-solving knowledge but also to bring problem insights and methods of analysis back to the classroom and to the profession.”

Also of particular interest to Prof. Marks is sustainable mobility, how people and goods can be moved in an increasingly constrained urban and intercity setting while

maintaining the economic benefits derived from mobility. “But the technology of personal transportation excludes the poor, the old, the young, and the disabled,” said Marks. Another major theme in his work is globalization and the related problem of global climate change. Will the regional and global institutions needed to ease environmental and social impacts allow a good quality of life for all to arrive in time? “Energy for urban densities will eventually need to evolve to less greenhouse-gas-emitting sources,” said Marks. “These technologies are evolving much slower than energy use is increasing, and, again, institutions have not been put in force to deal with it.” And Marks emphasized “We will have fossil fuels around for a long time, and thus we must seek ways to mitigate their impacts as well as replace them.” 

Youth Environmental Summit

The Youth Environmental Summit (YES) that immediately followed the Alliance for Global Sustainability (AGS) annual meeting this year came to be known as “Jungle YES” for its excursions and explorations of Costa Rica’s natural systems. This special session of YES, held in San José from March 23-30, was hosted by the Instituto Centroamericano de Administración de Empresas (INCAE). 34 students representing 17 nationalities and twelve academic disciplines came together to discuss and learn from each other about sustainable development in the unique Costa Rican environment. The students were from the four AGS partner universities as well as from schools throughout Central America. Nine of the participants were students at INCAE. Jungle YES focused on excursions to provide students with first-hand knowledge and experience regarding human interaction with the natural environment in a rapidly developing country.

Lectures were given by visiting faculty members from the Swiss Federal Institute of Technology (ETH), the University of Tokyo, Chalmers University of Technology, Massachusetts Institute of Technology, and Humboldt University. Dr. Roger Baud and Professor Peter Edwards of ETH-Zürich presented on tourism and biodiversity respectively. Professor Göran Berndes from Chalmers discussed land use with participants. Globalization and sustainable development were addressed by Dr. Joanne Kauffman (Laboratory For Energy and the Environment, MIT).

This summer the AGS hosts two sessions of YES in Braunwald, Switzerland from July 13-27 and from August 17-31. This is the third consecutive year the partnership has brought together graduate and undergraduate students from around the world to discuss their role as the future leaders in sustainable development. The summer sessions will reprise

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the format of the previous summer sessions with two weeks of discussion, lectures and excursions revolving around the sustainable development topics of society and ethics, climate and energy, food and water, and technology.

Discussion will also focus on "Agenda 21," adopted in June 1992 at the UN Conference on Environment and Development held in Rio de Janeiro. The ten-year anniversary of the Rio Conference (commonly referred to as "Rio + 10") will be marked by the upcoming UN Summit on Sustainable Development on August 26-September 4 in Johannesburg, South Africa. YES participants will discuss several questions relating to Rio + 10, including how realistic are the Rio principles, how can we reach these goals, where are we ten years after Rio, what has been done, and what remains to be done?

Student working groups will collaborate to craft suggested plans for responding to the challenges of Agenda 21 and sustainable development. These proposals will focus on the Agenda 21 issues of sustainability as it relates to gender, technology, indigenous peoples, science, and globalization. The participants will research the local and national implementation of one of these five topics for their home country. The collaborating groups take advantage of the opportunity for small group discussions among this culturally and academically diverse group of students. 

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