Annual Report 2002

ALLIANCE FOR GLOBAL SUSTAINABILITY

Content

Introduction

2002 was an important year for the Alliance for Global Sustainability – one characterized by progress in implementing the results of AGS research and by new initiatives to strengthen the research and education portfolio. The year witnessed the addition of two new Board Members, the expansion of the AGS vision in Latin America, and the realization of a new dimension in the evolution of the AGS integrated research paradigm. The launch of the new research category "Research Partnerships for Sustainable Development" builds on the maturity of AGS research in several critical pathways to sustainable development, expands the community of scholars working on these problems, and brings in stakeholders at the earliest stage of research.

This Annual Report of the year in review summarizes the year's progress as well as its challenges and opportunities for the future. Among the milestones reported in 2002, the report highlights the following:

- First Annual Meeting outside of our member universities with participation of over 400 participants, up 25% from the previous year.
- Replication of the AGS model in Latin America with the formation of ALUDES, an alliance of Latin and Ibero-American universities committed to the goals of multidisciplinary research for sustainable development.
- Provision of support for an additional 15 projects with an investment of USD 2,6 million in research and USD 180'000 in education.
- First books published in the AGS Series on Science and Technology: Tools for Sustainable Development.
- Application of AGS research results in "the field".
- AGS Representation at the World Summit on Sustainable Development in Johannesburg.
- Two Youth Encounters on Sustainability (YES) held in Braunwald, Switzerland with representatives of 35 countries, bringing total number of participants in the YES program to 200.
- Additional YES course held in Costa Rica following the Annual Meeting.

The Year 2002 in brief

Presidents sign 5 year commitment renewal to AGS at IAB meeting in Miami, Florida.

AGB approves 15 new projects; AGS investments in sustainability research top USD 13 million.

- Second AGS Technical Meeting with over 100 participants.
- Launch of a new research category in the AGS portfolio aimed at achieving greater synergy, consolidation, integration, and partnership with external partners and "agents of change".
- A leap forward in translating AGS research results to action in a number of developing countries, with a particular focus on China.
- Review and evaluation of the AGS mission, objectives, and portfolio.

These achievements would not have been possible without the support and guidance provided to the AGS by the members of the International Advisory Board. We especially wish to acknowledge the contribution of Desi DeSimone, a founding IAB member and former CEO of 3M, who graciously served as interim chairman in 2002.

7th AGS Annual Meeting held in Costa Rica with support of INCAE on leadership, technology, and global citizenship – Oscar Arias speaks.

Investments in 2002

AGS funds are allocated to research, education, support for regional developments, outreach, and operation. In 2002, 90% of the budget was allocated to defined core activities. Of these 90%, 80% were invested in research and education.

The AGS investment of USD 2,65 million in scientific research in 2002 will support 15 projects over two years, bringing the total direct investment to USD 13,763 over the past six years (1997/2002).

in USD		
Research	2'650'000	70%
Education & student activities	207'000	6%
Outreach & Communication	175'800	5%
Support regional developments	250'000	7%
Operations & International Office	450'200	12%

Research by Category 2002

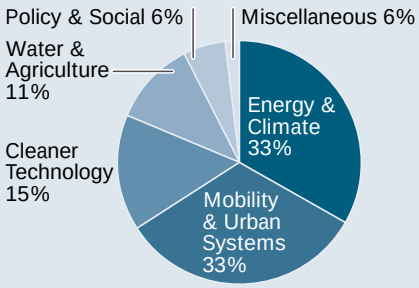

Figure 1

The direct investment of the AGS funds into scientific research has leveraged other resources from industry, public organizations, and local and international research funding agencies. Over the full 6 year period of operation, more than USD 16,8 million have been leveraged for direct research on sustainable development at the partner universities. In addition, members have raised and invested an additional USD 5 million for research on sustainability at their institutions.

The strong increase in available funds for investments in the AGS focus areas in the year under review will, however, likely remain an exception for the near term. In view of prevailing economic uncertainties, funding available in the years 2003 and 2004 will not reach the level of the year 2002. The AGS members recognize that endeavours to increase the income of the Alliance must have top priority if we are to fulfil our goals as a leading "voice of science" for sustainable development.

Investments in Research 1997-2002: Leverage

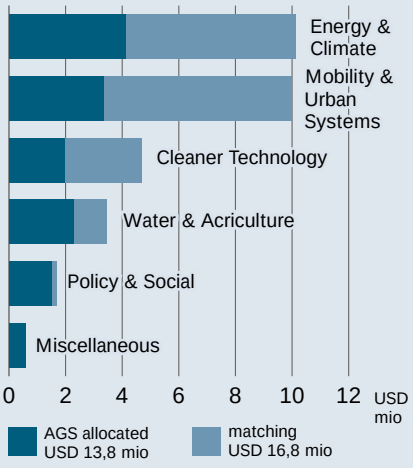

Figure 2

Special one-week short course, "Jungle YES", in Costa Rica focuses on biodiversity – hosts 30 students representing 17 nationalities.

Research that supports global society`s transition to sustainable development is the major focus of the AGS. Besides the primary strengths in the sectors of water, energy, mobility, and urban systems, research funds have also been invested in cross cutting projects such as cleaner technology, policy, and decision making. The 2002 "mapping" of the research portfolio which will be available in spring 2003 will show progress and results of our work and provide insights for future investments.

The major part of the investment in the core education activities in 2002 provided support for two YES courses in Braunwald and an additional one in Costa Rica held on the occasion of the Annual Meeting 2002. By reducing the operational costs of these courses, we realized a significant cost reduction of USD 100'000 from the budgeted amount. USD 30`000 were spent on other student activities, for exemple to support an international meeting of the student organization WSC (established in 2001), or to send a delegation of students to the World Summit on Sustainable Development held in August 2002 in Johannesburg.

The AGS is committed to furthering new knowledge in sustainability through research and education, and to "taking a step beyond": i.e. to inform decision makers in industry and policy of our findings, to take part in international dialogue on sustainability, and to communicate with the public at large.

The investment made in 2002 for outreach activities is modest. In this respect we focused on the Annual Meeting which for the first time was held outside the member universities and on a Technical Meeting aimed at informing industry partners of the findings of the AGS research and at building research partnerships. If AGS is to become a leading voice of science on sustainable development, we will need to improve our efforts in outreach considerable.

Sustainable Buildings project holds demonstration workshops in China – potential to make reductions in 30% CO_2 emissions from current building technologies.

AGS represented at WSSD in Johannesburg – AGS sponsored student delegation organizes the only officially recognized side-event for youth at WSSD.

The creation of the International Office in Zurich in spring 2002 did not raise the overall administrative costs of the AGS. In this context, however, it is important to note that the member universities invest additional support for the AGS through time of their faculty and staff as well as administrative funds to guarantee a low cost operation of the AGS.

Expenditure 2002

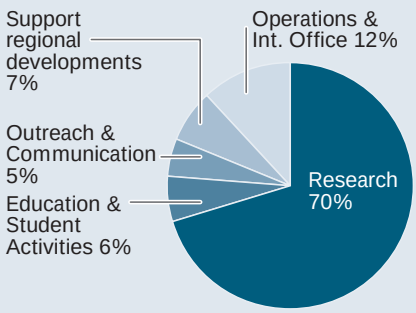

Figure 3

Technology, Energy, Environment, and Health project (TEEH) conducts education and training in Shanxi Province to reduce health and environmental impacts of expanding coke-making industry.

3rd year of YES hosts 75 students representing 35 countries and more than 25 disciplines, number of YES alumni reach 200.

Extending the AGS model

We began the year 2002 with preparations for our first Annual Meeting outside the Member institutions in Costa Rica. The meeting, focusing on Leadership for Sustainability in the New Millennium, brought together over 400 leading scholars, practitioners, and thought leaders from around the world – a quarter of them from Latin American countries. Presidents of 7 major universities participated in the meeting. A highlight of the meeting was the creation of a Latin and Ibero-American university alliance for sustainable development, modeled on the AGS. Over twenty universities joined ALUDES, pledging to make sustainable development a central focus of their research and education programs.

The Instituto Centro Americano de Administración y Epresa (INCAE) served as host of the meeting where Nobel Peace Laureate and former President of Costa Rica, Oscar Arias, delivered a major address.

2nd AGS Technical Meeting held at MIT to explore and launch integrated research partnerships for sustainable development. Over 100 attend.

TM workshops focus on new integrated topics to build AGS model: New Materials, IT Support for Managing the Mega-cities; Consumption and Production Strategies for S.D., and Mountain Waters.

AGS Research Portfolio

In 2002, the AGS Governing Board approved the addition of 15 projects, which brought the total number of projects to 75. The addition of new projects increased the number of faculty at the four schools to over 150 and added support for 151 students including 52 undergraduates to work on the new projects.

In 2002, the AGS research portfolio reflected a balanced portfolio across problems and movement from problem identification and basic research to outreach and action.

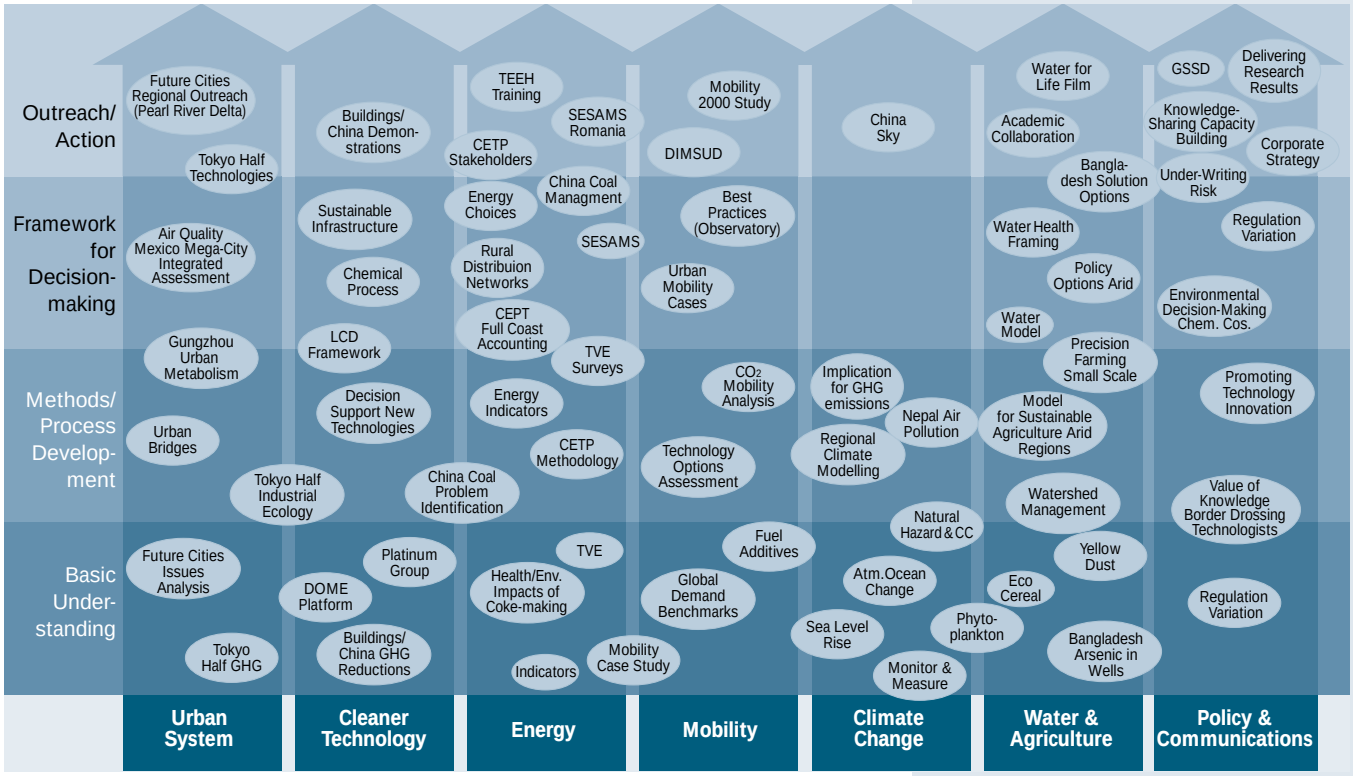

Figure 4
AGS Research Portfolio
75 Projects – USD 13 million – 150+ Faculty – 400+ Students

AGS projects leverage over USD 10 million in research and education for sustainability at partner schools. Report of mapping portfolio due 2003.

AGS research results reported in Science (Nov. 2002); point to solutions for arsenic poisoning of wells in Bangladesh.

The AGS research model is solutions driven, with annual investments intended to balance moving projects forward to implementation and maintaining flexibility to respond to new challenges as they are identified. In 2002, the AGS Governing Board approved investment of USD 2.6 million.

Six of the 15 approved proposals will further research in existing areas to advance the projects toward implementation and impact. Among these are:

Cleaner Technologies

Sustainable Buildings in Developing Countries: to put what has been learned from previous research in a simple integrated assessment tool that will lead designers to the most environmentally acceptable building designs. In many countries 30% of CO_2 emissions and other impacts from energy inefficiencies stem from buildings. Low cost/low-polluting technologies can improve building construction in countries such as China and India. The sustainable buildings team used AGS funding to carry out demonstration projects in China in 2002.

"AGS gives the project managers involved a sense of participating in a larger whole. In providing a tangible network of research institutions around the world, it has provided a framework on which to build."
L. Susskind, Principal Investigator

Breakthroughs in the System of Sustainable Technologies: to deepen understanding of "entrepreneurial networks" that are necessary to foster implementation of innovative technologies for sustainable development (2002 focus on energy and mobility sector – project leaders coordinate with other AGS projects).

Urban Systems

AGS Future Cities – Guangzhou: A Partnership for Sustainable Urban and Regional Development in the Pearl River Delta with city authorities to apply practices developed in preceding research in three critical areas: sustainable regional transportation, integrated water management, urban renewal and improvements of settlements.

AGS Book Series, "Science and Technology: Tools for Sustainable Development" – first two books published. Focus on strategies to meet needs of burgeoning megacities.

SESAMS – Romania: received seed funding to continue development of externally funded SESAMS case study in Romania to demonstrate the utility of the AGS tradeoff analysis model. SESAMS is a comprehensive methodology to address sustainable development strategies for electricity generation. The model has been successfully applied in Switzerland and China.

Energy

Mitigation of Groundwater-derived Arsenic Hazards and Sustainable Water Supply system in Asian Countries: to focus on mitigation of arsenic hazards in Bangladesh and Nepal. This project builds on successful achievements of team's previous AGS project with findings and strategies published in Science (Nov. 23, 2002, vol. 162, p. 325) and elsewhere.

Water

"Seventy-seven million Bangladeshis are either sick from or considered at high risk for arsenic-related diseases."
Science 11/23/02

Implications for Greenhouse Gas Emissions of Technological Learning in the Transport Sector: to gain better understanding of the role of technological learning (learning by doing) in models for assessing the impact of global warming policies in the transportation sector. (Builds on prior research and AGS/WBCSD mobility study).

Mobility

"It is safe to say that our participation in AGS projects hat substantially strengthent the reputation and standing of the groups involved."
Prof. A. Wokaun, AGS PI

In addition to the support provided to strengthen and deepen on-going work, in 2002 the AGS provided funds to support start-up of multidisciplinary research in seven new projects, including two integrated or holistic studies of severe air pollution problems in Asia.

Expanding the portfolio in 2002

Corporate Strategy, Regulation and Global Competition was awarded AGS funding to focus on the "business case for sustainable development". The research program seeks to identify ways for businesses to improve their competitive position by leveraging improvements of their environmental performance. The project grows out of previously funded AGS research on the effects on trade stemming from cross-national variation in environmental regulation.

Policies and Institutions

"The project findings point clearly toward pathways for moving toward cleaner and more sustainable development".
Prof. Kenneth Oye, AGS PI

Urban Systems

Designing, Implementing, and Measuring Sustainable Urban Development expands the AGS portfolio in our effort to contribute to strategies for sustainable management of the rise of the world's burgeoning mega-cities. It also expands our focus from Mexico and Asia to cities in Africa and other parts of Latin America. Building networks to determine best practices and realizable strategies, the project enables a global overview of core problems and provides a scientific forum and "urban field laboratory" for joint learning.

Energy

Isolated Rural Distribution Networks with a Large Penetration of Renewable Sources is an investment in the development of methods for assessing the performance of rural electricity distribution networks with a large penetration of renewable sources of energy (like wind, sun, and flow-of-river). We expect the results of the project to be applied to large interconnected (urban) networks with renewable sources of energy as well. What we are after here is (in the words of one of the PIs) "the propagation of a new way of thinking in the design of electric power systems".

Air Pollution

Building understanding of severe air pollution in Asia through integrated assessments where three new projects were assigned, that is:

- *Yellow Dust: Holistic interactive model approaches to understanding and mitigating the problem.*
- *Understanding and Mitigating Air Pollution in the Kathmandu Valley, Nepal.*
- *An Urban Air Monitoring Network in China.*

Innovative Solutions

A cornerstone of AGS research is the fact that it is solutions driven – aimed at providing tools and methodologies that others can use to "walk the talk".

As early funded AGS projects come to fruition, these tools are being put to use in many corners of the world where they contribute to improving quality of life today and ensuring sustainable development for the future. The many results will be assessed and presented in our report on mapping the AGS portfolio, 1996-2002, which will be presented at the Annual Meeting in Tokyo, March 2003.

Innovative Solutions reported in 2002 include:

- Policy recommendations to improve air quality in Mexico City.
- Cleaner technologies for new buildings in China (where buildings contribute to over 30% of total CO_2 emissions).
- Practical strategies to address the problem of arsenic poisoned well water in Bangladesh.
- Methods to assess sustainable water management for rapidly developing urban regions in Guangzhou, China.
- Comprehensive methodology to address sustainable strategies for electricity generation in Switzerland, Romania, and specific provinces of China.
- Planning and traffic management tools to reduce the total costs of travel within two Asian mega-cities: Tokyo and Bangkok.
- Corporate strategies for promoting improved environmental performance in firms and gaining competitive advantage.

Outreach

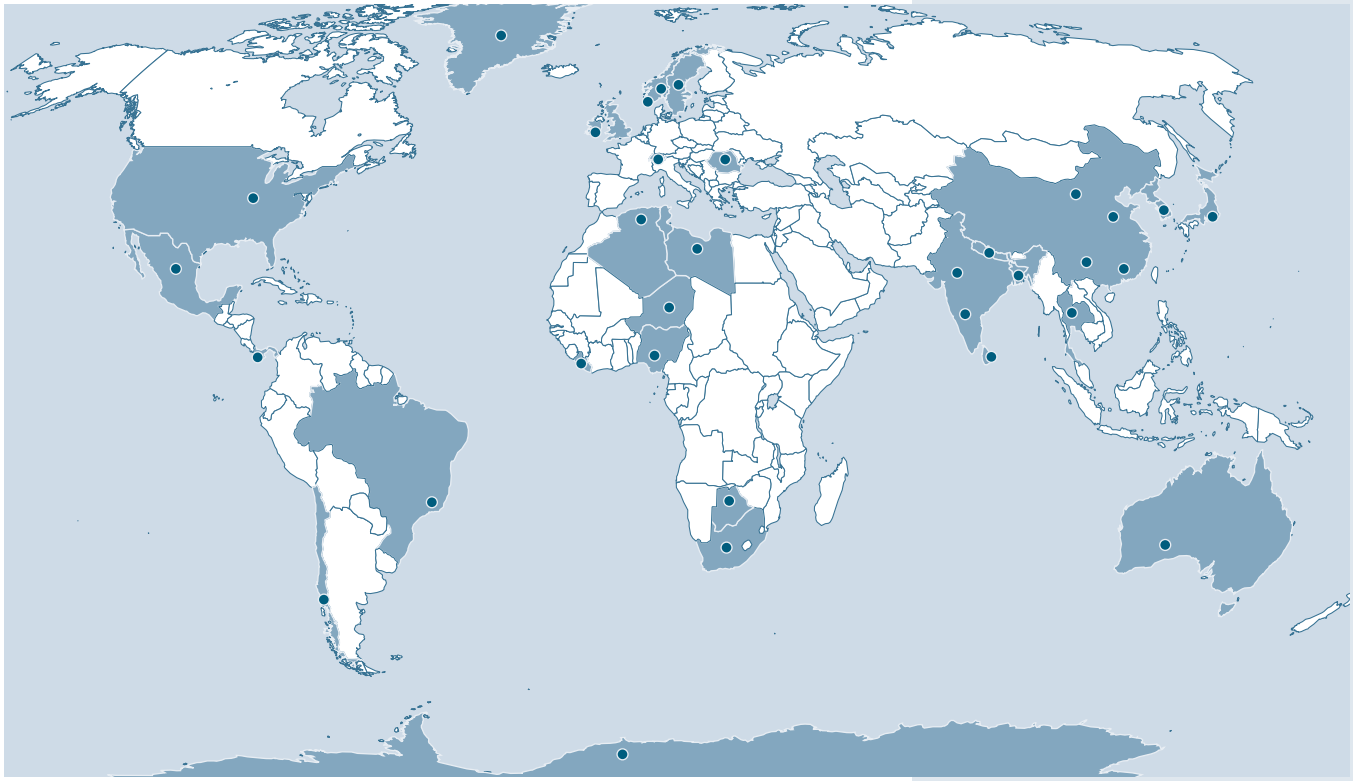

Figure 5
AGS Projects consider Issues around the World

Growing Networks for Research and Implementation

AGS is leading to the emergence of a world-wide community of scholars whose research in many science and technology focused fields has much to contribute to "changing course" in business and industry, government, and consumption patterns. Virtually every major research initiative has led to the creation of an international network of scholars and practitioners. Examples from the field include:

AGS Future Cities project has built a network for partnership among concerned institutions in the Pearl River Delta including the University of Hong Kong, the government of the city of Guangzhou, China, and a multi-disciplinary team of engineers and natural and social scientists on three continents.

In Mexico City, the research team brought in stakeholders from the very beginning including key government officials at local and national levels, academic partners in Mexican Universities, and industry participants as well as partners from the Harvard School of Public Health to build understanding of relevant health issues in the study and integrated assessment of air quality issues. This large network of stakeholders helps to ensure

that the research is geared toward policy relevant problems, and is more likely to have practical long-term impact on the decision-making process as new knowledge is jointly generated.

"As the DIMSUD project, research and education is based on worldwide networking on the case study cities, neither the project as a whole could have been carried out, nor the results achieved. The funding of AGS is indispensable". DISMUD Project Team

A new project on "Designing, Implementing, and Measuring Sustainable Urban Development" extends the AGS urban systems focus to smaller cities – still with "mega-problems". A partnership has been established between universities in the North (AGS universities), the South (universities in the study cities), between the universities and the national, regional and local authorities of Santiago, Gaborone, and Johannesburg. The dense network is the starting point for case studies with innovative workable solutions to existing problems the end-point.

AGS Education Initiatives
Student Networks of Future Leaders

In addition to researcher/stakeholder networks, the AGS has also spawned a growing number of networks among young leaders in sustainability.

The WSC SD was formed by students with the mission "to create a new generation of students who recognize the world's needs and place sustainability at the center of research and education".

- The success of the Youth Encounter on Sustainability (YES, formerly known as Youth Environmental Summit) is reflected in the growing student networks it has fostered.
- Student alumni of YES self-organized into the World Student Community (WSC) for Sustainable Development. In 2002, AGS supported the participation of nine WSC students in the World Summit on Sustainable Development in Johannesburg where they presented the only student filed papers and recommendations for future sustainability.
- The MIT-based "Think Cycle" program is a student-driven initiative that provides a global network of young engineers and scientists who are committed to applying their skills to solving problems of development in poor countries of the world.

Youth Encounter on Sustainability (YES)

The AGS Annual Report 2001 indicated that an overall evaluation of the YES program was being conducted with the oversight of faculty representing all four AGS universities. The evaluation consisted of reviewing questionnaires completed during 2000 and 2001 YES sessions, and of surveying over two dozen 2001 YES students via email. YES faculty and staff were also surveyed, via email, telephone, or in person.

Distributed to the AGS Faculty Coordinators and Governing Board in spring 2002, the evaluation report "Lessons in Integrated Sustainability Education" identified areas of success and areas for improvement, and documented participants' suggestions for enhancing the intellectual, networking, and transformational benefits of YES.

Areas of success identified in the evaluation report were:
- Transforming understanding about sustainability.
- Changing student lives.
- Establishing community.

Areas for improvement identified in the evaluation report were:
- Enhance opportunities for student interaction.
- Improve integration of Sustainability principles.
- Clarify identity as summit or school.
- Modify group work component.

Student evaluations from the 2002 YES sessions indicate that students continue to experience powerful impacts in these three areas during and as a result of their YES participation. The evaluation identified achievements of YES as transforming student understanding about sustainability and equipping them with critical insights regarding how to help encourage sustainable development within their own countries and internationally.

AGS Book Series

The AGS Book Series, "Science and Technology: Tools for Sustainable Development" provides a powerful outreach tool for research results. The level of presentation is for graduate students in natural, social, and engineering sciences as well as for policy and decision makers around the world in government, industry, and civil society. The series is published by Kluwer Academic Publishers. Dr. Joanne Kauffman, MIT and co-Executive Director of the AGS is series editor.

In 2002, the series published its first two books, focused on the challenges of the world's burgeoning mega-cities:

- *Air Quality in the Mexico Mega-City:* An Integrated Assessment by Mario J. Molina and Luisa T. Molina, editors.
- *Future Cities: Dynamics and Sustainability.*

There are already over 1700 books in circulation. With more active marketing and outreach foreseen in the future, we hope to increase the numbers of copies sold in 2003.

Recent Publications:

- *Energy for China`s Future: The China Energy Technology Program*
  by Baldur Eliasson and Yam Lee presents the findings and methodologies for sustainable electricity systems decision-making. It will be presented in a public ceremony to be held in Bejing in March 2003.

- *Ecodesign Pilot – Product Investigation, Learning, and Optimization Tool for Sustainable Product Development*
  by Wolfgang Wimmer and Rainer Züst will be used to bring environmental information to engineers in product development in order to support the decision-making process towards more environmentally conscious products.

Subjects of new books in the pipeline include works on:

- Sustainable Buildings Technology, Leon Glicksman as editor,
- Environmental and Health Impacts of coke-making in China, Karen Polenske as editor, and
- Impacts of Cross-national Variation in Environmental Regulation on Trade, Kenneth A. Oye and Thomas Bernauer, editors.

Outlook

More active integration

The AGS Technical Meeting held at MIT in November 2002 witnessed the launch of the new research category: *Research Partnerships for Sustainable Development.* The aim is four-fold:

- to foster greater synergy across AGS focused projects,
- bring in stakeholders at the earliest stage of research design to facilitate application of results,
- increase participation of external partners, and
- build the base of support for cutting edge research to overcome barriers to sustainable development.

Workshops were held in five critical areas: carbon management and sequestration, new materials for sustainable development, managing the rise of the world's mega-cities with IT, providing incentives for improving environmental performance, and understanding the impacts of climate change on mountain waters – a resource and risk in many countries, particularly in the developing world. Proposals for seed funding of the new research partnerships are expected in 2003.

Position AGS for the future

At the March meeting of the International Advisory Board, the IAB members instructed the AGS coordinators to carry out a mapping exercise of the AGS portfolio. The results of this exercise, led by the AGS project on "Value of Knowledge" and consisting of a student and faculty team will be presented to the IAB in March 2003. It included screening of all AGS Principal Investigators for project updates and interviews with Advisory Board members to help us develop recommendations and position the AGS for the future. IAB members provided a number of suggestions for improving the effectiveness of AGS through more deliberate outreach and translating the results of AGS research into a language and form that business can understand and apply in implementing its own strategies for sustainable development.

AGS Organisation in brief

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