



Presidents' Messages

End of the Prologue

Brad Allenby (Braden.Allenby@asu.edu)

It is with somewhat mixed feelings that I pass on the Presidency of the International Society of Industrial Ecology to Marina Fischer-Kowalski. On the one hand, I have enjoyed enormously my term and the people I've had a chance to work with, and the importance of our joint efforts remains inspiring. I also can't think of a better person for the job than Marina, and, like most of us, I look forward to her initiatives with high hopes. On the other hand, it marks another significant passage as what might be considered the first wave of industrial ecology-the folks who began working on these issues fifteen years ago, people like Tom Graedel, myself, and, with his retirement looming, John Ehrenfeld —continues to recede. This is not, of course, an entirely bad thing; in fact, it is highly desirable.

It is desirable for a number of reasons. First, it marks the continued institutionalization of industrial ecology as an interesting area of inquiry. This should not be regarded as accomplished by any means, but if there were not many more people, from many different backgrounds, increasingly interested in the field it would be problematic. Thus, recent months have seen proposals to develop ISIE chapters around the study of industrial eco-parks and sustainable consumption; the potential for regional chapters, especially in Asia, is also promising. And the interest continues to grow. Recently, Professor Michael Gorman of the University of Virginia wrote me an email noting that the accelerating evolution and convergence of nanotechnology, biotechnology, information and communication technology, and applied cognitive sciences were outstripping existing Continued on page 2

Stepping into Office: A First Note

Marina Fischer-Kowalski

(marina.fischer-kowalski@uni-klu.ac.at)

You elected a female social scientist from Europe as President of The International Society for Industrial Ecology. So far as I can see, these three new presidential attributes will not make a great difference to the Society. I have the privilege to be able to build upon many achievements of my predecessors, Tom Graedel and Brad Allenby, and have continued support from John Ehrenfeld as Executive Director as well as **Beverly Chevalier** as Program Coordinator. They have breathed life into this international scientific society since its startup in 2001. With the prestigious address at Yale University, recognition by the Gordon Research Organization in sponsoring a biannual conference for the new field and-maybe most important-the Journal of Industrial Ecology, edited by **Reid Lifset** with the support of **Ned** Gordon, as a flagship publication, they have created a setting in which a novel, interdisciplinary and non-mainstream (anti-mainstream?) research field could thrive. However, industrial ecology is not only one of the youngest, but also one of the smallest siblings in the ecological/environmental family. And, in contrast to others-to stay with this metaphor-it lacks a strong father, such as eco-

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Inside....

ISIE conference grows

New ISIE Officers announced

G. Huppes and M. Ishikawa propose a Working Group

G. Assefa covers an IE course in China

R. Lifset announces online review for JIE

Allenby continued

analytical capabilities and institutional structures, especially given the current disciplinary silos in funding and academic organizations, and reactive and compartmentalized

We need to make sure that in supporting the development of interest groups within industrial ecology, we don't fragment the community.

regulatory and legal structures. Accordingly, he indicated his interest in convening a new group interested in the impacts of emerging technologies on global environmental, economic, and social systems (interested individuals may contact him at meg3c@virginia.edu).

As discussed in previous issues of this newsletter, the Society is developing a template for organizing chapters, which is a more complex undertaking than it might appear at first blush. For example, it is desirable that chapters provide added value for their members, and that we encourage their growth and membership by appropriate fees for publications and the like, but this must be done carefully so that the financial stability of the Society is maintained. We also need to make sure that in supporting the development of interest groups within industrial ecology, we don't fragment the community; we aren't yet strong enough to support heresies and schisms. This institutional work is only partially begun, and I encourage all of us to cooperate with Marina, John, and the leadership of the Society to see it through to a successful conclusion.

The passing of the initial cohort also marks a shift in the geographic centroid of the subject from the United States, to Europe and increasingly to Asia. This is not only a welcome deepening and broadening of industrial ecology, with both institutional and substantive benefits, but a reflection of changing industrial and social patterns over the past decade or so. Among other developments, much manufacturing has shifted to China, India and other new economic powers as traditional developed economies become more service oriented (although it is useful to remember that the United States is still the leading manufacturer in the world). Globalization, shifts in resource conhttp://www.is4ie.org

sumption patterns, different regulatory regimes, dramatically increased complexity of supply networks . . . all of these are of course grist for the industrial ecology mill. But there are also interesting cultural shifts involved: Japan, Europe and the United States, for example, have diverged somewhat in their approaches to environmental and sustainability policies and underlying worldviews. How different regions will react to new technologies, from biotech and stem cells to GMOs and nanomaterials, remains a fascinating puzzle; in particular, the efforts of American and European regimes to continue to define technological horizons and worldviews appear somewhat parochial and increasingly ineffective as developing country powers in Asia and Latin America continue to assert their own interests. There certainly appears to be no lack of subject matter for our field.

But I would like to close on a more personal note. I would like to thank each of you, for I have learned a huge amount from you, even though you may not realize it (and it may not show . . .). The conferences, the discussions, the papers, and especially the fresh ideas and energy of the IE students—all have been remarkably informative, and have made memorable my experiences with industrial ecology so far. It's sometimes hard to remember we're all working in a field that, twenty years ago, didn't even exist—and, judging by the initiatives and energy and opportunities out there right now, one that has just begun to flower. May it continue.



Fischer-Kowalski continued

nomics (as environmental/ecological economics has), or political science (as with political ecology), history or anthropology. The closest relatives are to be found among the engineers, but for a proper father, engineers are too diverse; rather, they constitute a whole phylogenetic tree. Such fatherlessness has its drawbacks, but also its advantages. One drawback consists of a lack of distinct intellectual guidance. While there is a whole generation of high profile intellectual leaders that pointed the way and addressed most key insights very early on (some of which I will refer to in more detail below), the next generation is bound to choose its priorities anew, and remain always a little insecure in the choice of its identity. The advantage of fatherlessness is a freedom from-to use a term from psychoanalysis-counter-dependency. While you find ecological economists, for example, continuously struggling against neoclassical economics, or social ecologists against culturalism, industrial ecologists are generally more dispassionate, setting out an approach grounded in the technological folk tradition: work to achieve your goals, but find out how to do so more effectively. What distinguishes them, though, is a wider "systems" perspective, a perspective that also includes the natural environment and has a longer time horizon.

Recognizing that industrial ecology is something of an intellectual orphan, I have set myself three major interrelated priorities as President, assisted by president-elect **Roland Clift**, and with support from John and Beverly:

- 1. To work on clarifying the intellectual claims and aims of industrial ecology;
- To extend the society's membership regionally and in terms of academic discipline and subject matter;
- 3. To bear a larger share in the financial responsibility for the Journal of Industrial Ecology.

As far as the intellectual claim of industrial ecology is concerned, I, of course, build upon the descriptions given very early on, of which I wish to recall two, and the circumstances of their origin, for our collective memory. One of these definitions refers http://www.is4ie.org to industrial ecology, the term finally coined for the field, and the other refers to industrial metabolism, the field's major focus:

The goal of industrial ecology is the evolution of the world's industrial activity into a sustainable and environmentally benign system. As a field of study, it requires a long-range view and a deep analysis of the environmental implications of today's industrial systems, and a creative approach to the design of services, products, and governmental policy (Socolow et al.[eds.] 1994).

This book is based upon a 1992 meeting in Snowmass, Colorado, organized by the Office for Interdisciplinary Earth Studies, chaired by William Moomaw.

Industrial Metabolism, by analogy [to the biological term], is the set of physico-chemical transformations that convert raw materials (biomass, fuels, minerals, metals) into manufactured products and structures (i.e. 'goods') and wastes. To an economist these processes, in the aggregate, are called 'production'. A further transformation of economic goods into services (and wastes) is also implied by the economic term 'consumption'. Thus industrial metabolism comprehends all the materials/energy transformations that enable the economic system to function, i.e. to produce and consume.... Continuing with the biological metaphor, the spread of the industrial activity in the last two centuries can best be described as a cancer: industrialization, in its present form, is a process of uncontrolled, unsustainable 'growth' that eventually destroys its host - the biosphere (Ayres and Simonis [eds.] 1994).

This book derived from a 1989 Workshop on industrial metabolism in Maastricht, The Netherlands, under the joint auspices of the UNU and the International Federation of Institutes for Advanced Studies.

At the present moment, I perceive three major changes in the relevant landscape that should *Continued on page 6* **ISIE News**

ISIE 2007 Coming Soon!

Christopher Kennedy (christopher.kennedy@utoronto.ca) Helga Weisz and Shi Lei

The ISIE 2007 conference is growing into a festival! As the world's industrial ecology community converges on Toronto for the conference, a number of "fringe" workshops and symposia will be taking place. These include gatherings on Industrial Symbiosis, the Yale Stocks and Flows project, Eco-efficiency, Complex Systems, and Applications of Input-output Economics for IE.

In reading the conference program and all the other events, JIE editor Reid Lifset exclaimed "I feel like a kid in a candy store!" These fringe events are not organized by the ISIE; for more information see the conference website http://www.isie.ca.

The ISIE will be hosting four educational workshops in Toronto:

• Material Flow Analysis - Progress in Methods and Policy Applications

ISIE Leadership Changes

Beverly Chevalier (is4ie@yale.edu)

The ISIE office is pleased to announce the results of the 2006 ISIE election:

- President-Elect—Roland Clift
- Treasurer—Joule Bergerson
- Secretary—Claudia Binder
- Council—Ramesh Ramaswamy and Thomas Theis
- Nominating Committee—Diana Bauer and Sinichiro Nakamura

For a complete listing of the ISIE governance, see the last page of ISIE News or visit the ISIE website and click "Who We Are".

The ISIE staff and leadership are extremely grateful to those members whose terms on the ISIE governance body has ended and look forward to working with you in other capacities to grow and strengthen our Society. We offer special thanks to the Nominating Committee for their hard work in putting together the slate of candidates for the 2006 ISIE elections.

What's New In ISIE?



- Regional Material Flow Analysis
- Complex Systems Fundamentals
- Thermodynamics for IE

The conference registration page is up and abstract acceptance notices went out in early February. The schedule of presentations will be out in early March. Note that the early bird registration deadline is April 20. Conference scholarship applications from students and developing world participants must be submitted to the ISIE by March 15 (instructions are on the registration page).

We are pleased to announce sponsorship of the conference by the Cement Association of Canada. Sponsorship opportunities still remain— contact Cody Copeman: 416-946-5665 cody@ecf.utoronto.ca

IE Education

KTH Offers Course in Weihai, China.

Getachew Assefa

(getachew@ket.kth.se)

The Department of Industrial Ecology of the Royal Institute of Technology (KTH) in Stockholm successfully carried out a Ph.D. course in Weihai, China in August 2006. The course was organized through the Joint Research Center for Industrial Ecology (http://www.jrcie.org). This center, located at Shandong University (SDU), was established as a collaborative initiative between KTH and SDU.

Participants were from different

universities in China and they were introduced to the concepts of industrial ecology as a platform for research in sustainable development. The course featured lectures and case studies. Prior to the start of the course, participants had to write a report reflecting on the sustainability aspects of the 2008 Beijing Olympic Games. These reports were used for discussion and feedback at the beginning of the course.

The six lectures included in the course covered global perspective on sustainable development; introduction to industrial ecology; global perspective on water; global perspective on energy; sustainability assessment; and technology and sustainable development.

The 10-year plan for developing the Shandong Province into an "Ecological Province" was used as a basic reference for the course. Participants worked in groups and focused on two case studies on sustainability perspectives of supply and management of water and energy in Shandong Province. Students delivered presentations and engaged in discussions on these issues.



Students and teachers in the PhD course offered in Weihai China in 2006.



New Master's Program at Linköping University

Olof Hjelm (Olof.Hjelm@liu.se)

A new graduate program in Energy ad Environmental Engineering at Linköping University in Sweden offers students opportunities to study industrial ecology. This is a two-year program and includes a thesis requirement.

For more information go to

http://www.ikp.lie.se/envtech/masterEEE.asp

Fischer-Kowalski continued

provide new opportunities for industrial ecology, and I will try to help the society to recognise and take advantage of them.

The first of those changes can be discerned in academia with

"sustainability science" drawing increasing attention and resources. Just a few symptoms: both the US National Academy of Sciences and CNRS in France have created sections with this focus. Universities worldwide have established high profile institutes and networks for sustainability research (e.g. the University of Michigan, the University of Arizona, Free University and Humboldt University Berlin, ETH Zurich, University of East Anglia/Tyndall Centre-to mention just a few). Substantial research programs have been established (for example Netherlands: Knowledge Network for Systems Innovations and Transitions -coordinated by DRIFT in Rotterdam). So while one may have the impression that sustainability as a political program has been diluted to the point of being meaningless, at least in the United States and Europe, its academic profile is now being strengthened.

The second change is being acted out in the policy arena. Two important Asian states, China and Japan, have put 'industrial-ecological' goals high on their political agenda. China has declared that it wishes to become a "circular economy" and is seeking to invent its own, novel path of industrialization. This is a difficult goal, and one may have doubts whether China's authorities are able to move in this direction. Nevertheless, the attempt should receive as much international support as possible. Similarly, Japan is trying to move in the direction of a "sound cycle economy", with defined targets and a multi-level policy towards the "three Rs: reduce, re-use, recycle". So in these countries, and as a consequence all over Asia, there will be a high demand for industrial ecology insights, tools and skills.

The third change is already evident in the eco-

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> nomic arena: I believe we face a future of substantially higher energy prices. Oil and gas will peak within the next decade. This will create an environment for technological change with pretty different framework conditions, promoting a need for major systemic change—again an excellent opportunity for industrial ecology.

> On my second priority as President, expanding the membership base is necessary for the consolidation of the Society's finances, its ability to maintain a small permanent staff, and for relieving the Journal's staff of fund raising activities. Such an expansion always bears certain risks concerning coherence and continuity. We will seek a path that maintains an intellectual focus and the comfort of an intellectual and social home, but still allows for the challenges from new communities. There has already been a change in the Society's bylaws to allow for chapters, on a regional or topic basis. The idea is to give chapters enough independence and room to maneuver (such as having their own bi-annual conferences) that they appreciate the backing from the mother society without feeling constrained, and may contribute to the overall goals in their own way. I strongly encourage initiatives in this direction and hope that at the conference in Toronto we will already be able to constitute a few of those chapters. This expansion of membership should also contribute to a further internationalization of the Society, by gaining members from Asia and Australasia on the one hand and from Europe on the other. We will have to accommodate the demands and tensions that these developments may bring by allowing for enough independence on the one hand, and providing smart integration mechanisms on the other.

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Fischer-Kowalski continued

In the long run, I do not find it acceptable that the Journal's (few) senior staff need to invest so much of their time in fund raising. The Journal is an absolutely indispensable element of the Society's identity, and so the Society must at least have a share in maintaining the Journal's economic viability. How this can be achieved is not entirely clear yet—but certainly the expansion of the member base is a step in the right direction. I invite the editors of the Journal to present their ideas on how we could progress, and I invite the Society members to contribute their own ideas.

Finally, I wish to thank all previous members of the Society's governance board for their support. This refers in particular to **Mak Dehejia**, the Society's long-term treasurer, a function that is now fulfilled by **Joule Bergerson**, whom I heartily welcome in office. My dear thanks go to **Kristan Cockerill** who acted as a long-term secretary and reliable co-organizer of important events; her role is now taken by **Claudia Binder** who, I am convinced, will more than live up to our expectations. The Society's council includes several new members; I can assure them I will heavily draw upon their advice, and I thank all current and past Council members for their service. I welcome Roland as president-elect, and will draw him into office as much as he allows me to, in order to secure a certain continuity of policy.

Brad, my predecessor, talks about a generation change in industrial ecology. In a similar vein, John wanted me to establish a committee to find someone to replace him as Executive Director. I am very happy now that he does not seem to be pressing me on this. I may be radical in my intellectual outlook - and, as said above, I am female, a social scientist, and European – but I hope to keep as much continuity in this superb Society as I can.

ISIE Member News

New IE-Relevant Books

ISIE member **Matthias Ruth** edited two books published in 2006 that may be of interest to the ISIE community.

Ruth, M., K. Donaghy and P.H. Kirshen (eds.) 2006. *Regional Climate Change and Variability: Impacts and Responses*. Edward Elgar Publishers, Cheltenham, England, 260 pp.

Integrated assessments of the impacts of and adaptation to, climate change and variability at urban and regional scales are presented in this comprehensive volume. Six thematically distinct yet methodologically related projects illustrate 'horizontal' integration, which focuses on impacts and responses across different sectors, and 'vertical' integration, which traces changes from the climate system through to the economy and society. Areas of application include water resource allocation, wildfire management, agriculture, public health and urban infrastructure in the United States. Ruth, M. (ed.) 2006. *Smart Growth and Climate Change*. Edward Elgar Publishers, Cheltenham, England, 403 pp.

This innovative volume systematically brings together two strands of applied research that, to date, have been carried out separately - 'smart growth' research and climate change adaptability research. By providing theory, models, and case studies from North America, Oceania and Europe, the book creates synergies between the two strands, reconciles differences, and provides insights for decision-makers at national and local levels.

Web-based Review and Special Issues

Reid Lifset (reid.lifset@yale.edu)

JIE Moving to Web-based Submission and Peer Review

The JIE has signed a contract with Thomson Scientific/Scholar One to use ManuscriptCentral, a web-based system for submission and peer review. This system, used by such publishers as the American Chemical Society, Blackwell Publishing, the IEEE, and Taylor & Francis, automates manuscript submission and allows for easy administration, editing and reviewing. It will reduce

time to decision, eliminate paper distribution, and decrease administrative overhead. The process of transitioning from the existing system for receiving and tracking manuscripts and reviews is a complicated one, but the JIE editorial office hopes to have the new system up and running before the Toronto conference.

Special Feature on Industrial Symbiosis The winter issue (11:1), includes a special feature on industrial symbiosis. The feature contains four cutting edge articles available for free download at http://www.mitpressjournals.org/toc/jiec/11/1 The articles include: "Uncovering" Industrial Symbiosis by Chertow • Industrial Symbiosis in China: A Case Study of the Guitang Group by **Zhu**, Lowe, Wei, and Barnes • A Spatial Analysis of Loop Closing Among Recycling, Remanufacturing, and Waste Treatment Firms in Texas by Lyons

• Industrial Symbiosis in the Australian Minerals Industry: The Cases of Kwinana and Gladstone by Van Beers, Corder, Bossilkov and Van Berkel Industrial symbiosis, and the related notions of ecoindustrial development, industrial ecosystems and eco-industrial parks, as ISIE members know, are one of the signature concepts in the field of industrial ecology. This special feature is de-

signed to highlight the latest work in this growing area.

Don't Forget...

- New JIE URL http://www.mitpressjournals.org/jie
- JIE Table of Contents notice http://www.mitpressjournals.org/action/show-AlertSettings
- JIE template for EndNote http://www.endnote.com/support/enstyledetail. asp?DKEY=714200664531UAA
- Call for Papers on *Material Use Across World* Regions due 15 April 2007 http://www.yale.edu/jie/cfpglobalmfa.htm

Web Reviews

U.S. Green Building Council—http://www.usgbc.org

Lincoln R. Best (In613538@dal.ca)

The U.S. Green Building Council (USGBC) is a nonprofit organization, consisting of more than 7500 member groups representing every aspect of the building industry. Their objective is to develop sustainability focused design in the building market-place. The principal contribution of the USGBC is the Leadership in Energy and Environmental Design (LEED) Green Building Rating System. The council provides certification for projects, and bases its rating on; sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. The new standard for neighborhood developments takes a systems approach. The focus of LEED is design for environment and the site provides brochures, FAQs, case studies, PowerPoint presentations and 'how-to' manuals for both building design and LEED certification.

Some content is restricted to National Members. The site is up to date and contains numerous links to other sources of information on green building and environmental design. The site is primarily a vehicle to disseminate the USGBC's LEED certification program nationally, but is also a great resource for environmental design.

Wuppertal Institute for Climate, Environment, And Energy-

http://www.wupperinst.org/en/service/sitemap/index.html

Ben Postance (BN902792@dal.ca)

The Wuppertal Institute's mission is to "explore and develop models, strategies and instruments to support sustainable development at local, national and international level." The website exemplifies this non-profit's deep commitment to communicating research findings on sustainable development in an open and accessible manner, whether it is to the scientific community, policy makers, young people or the general public. As such, the site presents remarkably comprehensive coverage of interesting and relevant information. The Institute has made available its numerous reports, studies, papers, databases, downloadable tools and ongoing projects which span a diverse range of subjects, including climate, environment, energy, transport, education, consumption, production, material flows, and resource management. Repeated visits can be valuable as the website is regularly revised with news briefs and updated project reports. The institute's network of partners and clients, which include the United Nations Environment Program, state governments, universities and research facilities around the world, clearly demonstrate that the institute is a well reputed authority in the field of sustainability and that information obtained from the site is of high quality.

> Out of intense *Complexities* intense *Simplicities* emerge. *Winston Churchill*

(more) Web Reviews

U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy Industrial Technologies Program—

http://www1.eere.energy.gov/industry/

Kevin Reinhardt (KV666434@dal.ca)

The Industrial Technologies Program (ITP) is a leading U.S. attempt to improve industrial energy efficiency and environmental performance. Through public-private partnership this government program is involved in diffusing operation technologies with emphasis on research and development. Focusing primarily on energy intensive industries (e.g. chemical, petroleum), industrial technologies (e.g. combustion, materials) and best practice management the ITP offers extensive information geared to reduce energy use and to help industry evolve. The site includes downloadable software, an energy footprint calculator, databases and the Energy Technology Solutions, a publication listing current and future industrial efficiency technologies and their relevant contact information. While its programs target U.S industries, ITP's information is free, practical and reliable. This extremely comprehensive website, however, risks overwhelming first time users with its breadth and scattered organization. The site is frequently updated with recent news and events. It provides links to specific organizations and has an interactive question center.

welcome	foon vina	bienvenidos	dobro pozhalovat	willkommen	vo koso

New ISIE Members

Michael Amoah, Sweden Sean Bell, Canada Xavier Bengoa, Switzerland Renata Bogucka, Austria Lawrence Brown, USA Macdonald Burgess, USA Ekanem Edet, United Kingdom Michael Gorman, USA Almudena Hospido, Spain Alissa Kendall, USA Anna Peccoud, France Yvonne Ryan, Ireland Maria Sousa, Portugal Sangwon Suh, USA Charles Sule, Canada Lara Yacob, Canada

Spread the word to others to join ISIE to promote industrial ecology throughout the WOrld.

http://www.is4ie.org

Student Chapter

Student Research Briefs

These briefs are part of a continuing feature in ISIE News to highlight student research.



Soumya Chatterjee recently completed his dissertation on metal sequestration and phytoremediation in a Calcutta wetland. His poster on this project received the 2nd place prize at the 2006 Gordon Research Conference.

Sequestration of Waste Metals and Opportunities for Phytoremediation at East Calcutta Wetlands

Soumya Chatterjee (chats.75@gmail.com) Government College of Engineering and Leather Technology, Calcutta

At the eastern fringe of Calcutta, India, lies a cluster of marshlands, known as East Calcutta Wetlands (ECW). This 12,500ha area is a Ramsar Site that has attracted global attention as a model of a multiple-use wetland. For the past century, ECW has received untreated municipal and industrial wastewater from Calcutta (as the city has no effluent treatment plant). The wastewater, tainted with different elements, poses a serious risk to the ECW. However, the recovery systems of ECW, indigenously developed by the local agrarian people who utilize the wastewater in agriculture and pisciculture, recover the precious nutrients from the wastes, and improve the wastewater quality through sustainable practices. Around 50,000 agro-workers are involved, producing nearly

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Ruud Kempener is a graduate student at the University of Sydney using agent-based models to study behavior in industry.

Agent Behavior in Industrial Networks

Ruud Kempener

(kempener@chem.eng.usyd.edu.au) School of Biomolecular and Chemical Engineering/ Complex Systems & Sustainability, University of Sydney

The focus of my research is to determine how the strategic behavior of industrial organizations, customers, governmental organizations and advocacy groups affects the evolution of industrial networks. Analysis and development of instruments to improve the sustainability performance of industrial networks take place by developing evolutionary agent-based models. The psychological, social and economic factors affecting agents' decisions to invest in new technologies or to exchange and/or recycle resources are quantified and used to determine the functional performance of the industrial network through time.

This research is motivated by the need to engage with the practical side of introducing industrial ecology into industrial networks. Although several sophisticated economic-technical models have been developed to inform the stakeholders about

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Wetland continued

3,70,650 kg/ha of vegetables and 10,915 metric tons of fish annually.

I have studied the sequestration and accumulation pattern of different elements (Ca, Cr, Mn, Fe, Cu, Zn and Pb) in abiotic (water and soil) and biotic (including weeds, vegetables and fish) components of ECW. The efficiency of the wetland biota to counter elemental stress by ligand-binding (higher expression of metallothionein has been recorded) and compartmentalization (accumulated within membrane-limited vesicles in tissues) within the body is remarkable. These findings imply that their adaptive way of living in the stressful environment is helpful to consumers as it reduces the bioavailability of unwanted metals. The profile of elemental uptake and biomass development by wetland plants, including plants for floriculture, envisages a feasible role in phytoremediation and an alternative economically viable practice of the contaminated area.

This study on ECW manifests its excellent ameliorative capacity and resource-recovery using composite wastewater. Indigenous planning and technical aspects of sustainable wastewater use by local farmers undoubtedly deserves a note of appreciation. Analysis of the microbial community and metagenomics along with the waste recycling structures, material flow from an industrial ecology perspective would optimize the wise-use of the wetland. Motivated conservation efforts can resist further crisis of this immensely productive and excellently effective natural effluent treatment plant in Calcutta's own backyard.

Behavior continued

ecology, it is ultimately the agents' decisions that determine whether industrial ecology is implemented. Therefore, agent-based models are required to capture the complexity of agent behavior and its effects on industrial network evolution.

The analytical framework and agent-based models can be applied to any industrial network from a regional to an international scale. They are particularly useful for modeling industrial networks involving multiple agents in free markets.

I believe that you can only succeed in pursuing sustainability if you actively engage with all stakeholders in order to understand their behavioral drivers. Technological development should thus be complemented with behavioral studies in order to contribute to achieving sustainability over time. I feel lucky that my research gives me the opportunity to engage with many different scientific disciplines, something which I always found most interesting. In the future I hope to be able to continue to work in an interdisciplinary fashion either for industry or with a research institute developing government policies.

Students have again organized a conference to focus explicitly on student research and activities within the industrial ecology community. This regional meeting helps students network outside their universities. Students can present their research and participate in discussion sessions. Faculty advisers are asked to participate to enhance their students' experience by informing the discussions, providing tips on presentation styles, and contributing advice on grant writing and publishing.

For more information see http://www.psiec.org

2nd Potawatomi Student Conference 23-25 March 2007

http://www.is4ie.org

Linking Efforts

Editor's Note: As both Presidential messages in this issue indicate and as announced in the September **ISIE News** (v6n3), ISIE is actively pursuing formal relationships with related organizations. This article highlights our ongoing efforts to identify potential linkages between the ISIE community and other groups.

SETAC Working Group on Modelling and Evaluation for Sustainability

Gjalt Huppes (huppes@cml.leidenuniv.nl) Masanobu Ishikawa

(ishikawa@econ.kobe-u.ac.jp)

ISIE News

7/1-2007

Striving for sustainability, who could be opposed to such a well respected goal? Nobody of course, but agreement on action does not follow directly. There are two fundamental reasons why such agreement does not follow from the goal. One is that sustainability is a composite goal, involving the three pillars and within each pillar are many relevant goals. The multitude of relevant issues are to be combined in practical decision making, somehow based on priorities and tradeoffs. The second reason is that insight in empirical relations is limited and conditional. Combining the two, modelling and evaluation of specific actions can lead to fundamentally conflicting outcomes. One may love biofuel for climate reasons or hate it for biodiversity reasons, which require a land use model not available and not fitting in most sustainability models. Is that all we can say, and leave what will happen to the dynamics of social and political discourse? That is what is currently happening. There are at least four domains of analysis (see Huppes and Ishikawa 2005), all legitimate of course, which have their own sustainability discourses. They are hardly connected and result in conflicting outcomes in a practical sense. Boundaries may not be sharp but here the four are, in arbitrary order, and with example references.

1. Industrial ecology approaches with a mass orientation, as in MFA and SFA (Brunner and Rechberger 2003)

- 2. Technology oriented life cycle approaches, exemplified in ISO-LCA and EIOA (ISO14044, 2006; Tukker et al 2006; Huppes et al 2006; Leontief 1970) .
- 3. Main stream economists taking into account market relations, exemplified in CBA and CGE modelling (Barbier et al 1990; Eshet et al 2006; E3ME; GEM-E3).
- 4. Ecological economists, refraining from general approaches, focussing at multi-criteria analysis at a case level, and therefore lacking an acronym (Martinez-Alier et al 1998).

The approach chosen to a substantial degree determines what is sustainable. Established policy aims, like reducing resource use and preventing waste, come from the mass oriented approach. In Asia the 3R (Reduce, Reuse, and Recycle) comes from the same background. Technology regulation is often based on life cycle analysis, focusing on emissions and primary resource extraction. Policies, especially in the energy and waste domains, often are based on CBA and CGE models. Ecological economic approaches tend to be case specific, focusing on multi-criteria analysis or link to other approaches in a more reflexive manner. Crossboundary options of course exist, like economists linking willingness-to-pay measures to LCA outcomes (Rabl et al 2004), and industrial ecologists linking LCA-type analysis to materials use (van der Voet et al 2005). These approaches differ not only in terms of the central values reflected in the variables in their models, but also in the empirical analysis. Basic differences are in terms of timeindependent static models, like steady state LCA models; guasi-dynamic models specified 'by hand', like most CBA models; and time-dependent dynamic models, like CGE models, and with MFA and EcolEcon models functioning at all three levels.

The empirical and the evaluative part of modelling of course are intertwined. It is not possible to discount future effects in a steady state model, to give an obvious example.

It will never be possible to align everybody on the same goals, let alone the same priorities between them. Nor will there be a single model covering all empirical relations. What will be possible, we think, is to clarify the relations between these overlapping approaches, and in so doing advance the science and the practice of sustainability.

How might this be brought about? SETAC has set up the Working Group on Modelling and Evaluation for Sustainability (WG-MES). This working group is in the start-up phase now. The intention is that participation will cover these main domains of sustainability analysis. An Advisory Board is being set up and we are preparing for broader institutional linkages, especially to UNEP-TIE, the SCP program, and to the ongoing work in Eco-Efficiency Analysis. The working group will meet physically in connection with other events. The first meeting will be at the SETAC-Europe conference in May 2007; the second will be following the ISIE Conference in June 2007. This meeting will partly be combined with the International Workshop on Eco-Efficiency. An Asian meeting is planned for the fall.

For more information see the website http://www.wg-mes.com/

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7th Gathering of the Social Enterprise Alliance 7-10 March 2006, Atlanta, USA

The 22nd International Conference on Solid Waste Technology and Management 18-21 March 2007, Philadelphia, USA

NHA Annual Hydrogen Conference 2007 19-22 March 2007, San Antonia, USA

7th International Automobile Recycling Congress IARC 21-23 March 2007, Amsterdam, Netherlands

World Congress on Industrial Biotechnology and Bioprocessing 21-24 March 2007, Orlando, USA

2nd Potawatomi Student Conference in Industrial Ecology

23-25 March 2007, Angola, USA

18TH Global Warming International Conference and EXPO

19-20 April 2007, Miami, USA

2007 Greening Rooftops for Sustainable Communities 29 April-2 May 2007, Minneapolis, USA

Bio International Convention 6-9 May 2007, Boston, USA

2007 International Symposium on Electronics and the Environment 7-10 May 2007, Orlando, USA

World of Coal Ash 7-10 May 2007, Covington, USA

Conferences on the Human Dimensions of Global Environmental Change 24-26 May 2007, Amsterdam, Netherlands

Second Environmental Studies Summit 7-9 June 2007, Syracuse, USA

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National Energy from Waste Conference 2007 18-20 July 2007, Sydney, Australia

3rd International Conference on Environmental Science and Technology 6-9 August 2007, Houston, USA

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Bioenergy 2007: International Bioenergy Conference and Exhibition

3-6 September 2007, Jyvaskyla, Finland

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c/o Yale School of Forestry and Environmental Studies 205 Prospect Street New Haven, CT 06511-2189 USA Tel +1-203-436-4835 Fax +1-203-432-5556 is4ie@yale.edu http://www.is4ie.org