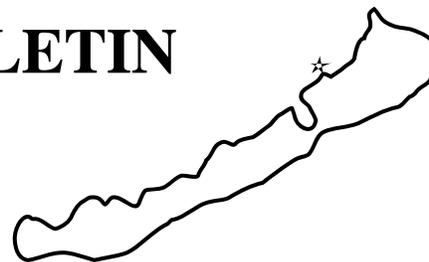


THE BALATON BULLETIN



Newsletter of The Balaton Group

JULY 2002

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FROM THE EDITORS

It is mid-summer in the northern hemisphere and, parallel with holiday time, a lot of preparatory activities are still going on. The World Summit on Sustainable Development (WSSD) will be held in August/September and after that we'll have our Annual Balaton Group (BG) Meeting from 7 to 10 September. Of course, several Balaton Group members will attend the WSSD. Gillian collected some material about the WSSD from several BG members and compiled an interesting overview of their contributions, expectations and interests in the WSSD. During the next BG meeting we will create an opportunity to get better informed about, and discuss the results of, the WSSD. The WSSD is planning to try to develop and capture something called "Type II" Agreements, which are basically partnerships, and everyone is talking about how to develop, manage and monitor partnerships now. The BG is a great example of ongoing partnership and collaborative relationships amongst a group of like-minded professionals. We have had a number of successful joint projects in the past and are hoping to have some more collaborative project proposals come out of the meeting this year.

The Annual Balaton Meeting

In the Bulletin of April 2002 we informed you about the program of the next Balaton Group meeting. There will be some minor changes to the program and those who will attend the meeting will get the definite program on their arrival at Csopak.

To reflect developments and respond to the postings to the Balaton Group list, the focus of the first day will be slightly changed. Instead of looking at oil depletion and possible conflict implications, conflict prevention will be more generally addressed. The main speaker for this day will be Professor John Richardson, who attended the very first Balaton Group meeting in 1982. He has just finished a ten-year empirical study of the civil war in Sri Lanka, while living there and meeting all the parties. His new book, *Development without Deadly Conflict*, will be published near the end of this year. He has developed a systems model of conflict, and he will describe his work and his general principles for moving society in paths that resolve differences without resorting to violence. Michael Odhiambo will also give a major address about concrete measures for avoiding conflict in Africa. Dennis Meadows also plans to present a set of system dynamics models that illustrate different aspects of the relation between resource depletion and conflict. For this issue of the Bulletin, Steven de Bie wrote a summary of the oil peak scenarios that Shell recently presented.

Another important theme of the Balaton Meeting will address the theory and the practice of the precautionary principle — how to embed an abstract concept into practical law and regulations. The European Community will be the case study. Speakers will be: Dr. Matthias Kaiser, Director of NENT in Oslo, Professor Poul Harremoes from Copenhagen, and Niels Meyer. To introduce you to the abstract part of this theme, we put a recent article of Poul Harremoes in the Bulletin: "Scientific uncertainty in environmental analysis and decision making".

With this year's meeting an attempt will be made to start moving the BG into a new kind of openness and functionality — providing more opportunities for members to share skills and information in a structured way (a workshop day), to try to open up some of the history and key vocabulary to new people (an introduction day that is organized on 6 September as a pre-meeting for new people), and to generate some collaborative project proposals (a project day). For this last theme, see Laszlo Pinter's article on Lake Balaton!

Balaton Group Donella Meadows Fellows

Nineteen nominations and applications for the fellowship were received from which four interesting women were selected and invited to come to the BG meeting. They are from Japan, Venezuela, Egypt, and Scotland. In addition, a woman from the University of New Hampshire will be attending as the UNH Donella Meadows Fellow.

Other Articles

Furthermore, we have in this Bulletin a very interesting article on Vicki Robin's recent visit to China, where she promoted the Chinese version of the book, *Your Money Your Life*, and participated in a conference on Sustainable Consumption in China. Bert de Vries provided us with a personal report about his whereabouts with respect to the publishing of his *Mappa Mundi* book and of course there are several other articles and personal news and announcements of BG members. We hope you find pleasure in reading this Bulletin and look forward to your contributions, reactions and suggestions for the next Bulletin in the Fall of 2002.

With warm greetings from,
Nanda Gilden-de Bie and Gillian Martin Mehers

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SCIENTIFIC INCERTITUDE IN ENVIRONMENTAL ANALYSIS AND DECISION MAKING

Poul Harremoës

Prof. Harremoës is a member of the Department of Environmental Science and Engineering, Technical University of Denmark. Following is the text of his "Heineken Lecture", given at The Royal Netherlands Academy of Arts and Sciences on October 2nd 2000, on the occasion of receiving the Heineken Award for Environmental Sciences.

Introduction

During the last century there have been too many "surprises", situations where detrimental impacts on the environment occurred due to disregarded knowledge or ignorance with respect to the cause effect relationship between the pressures on the environment and consequences to society. It is essential to distinguish between the different levels of incertitude: determinism, risk, uncertainty, ignorance and indeterminacy. There is need for a change of paradigm from an elitist, narrow approach to integrated environmental assessment and risk assessment. The incertitude has to be accounted for in order to prevent surprises. In case of recognised incertitude, solutions have to be flexible and robust, especially in situations involving irreversibility of the consequences of the decision. Participatory approaches should have a larger role in the procedural and institutional aspects of framing and implementation of the choices for environmental abatement.

The "DPSIR" Approach

In The European Environmental Agency, the problems related to the environment are fitted to a formal structure called the DPSIR-approach to integrated environmental assessment, European Environment Agency (1998). The structure is a formalisation of the interplay between the society and the environment with respect to *Driving forces*, by which *Pressures* are exerted on the environment. The changes to *State* of the environment is the basis for evaluating the *Impacts* due to the Pressures. That leads to *Responses* by society to the impacts, which requires identification of objectives and choice of tools by which to curb the pressures. From pressures to impacts is the cause-effect relationship, based on physical, chemical and biological mechanisms, describing the relationship between pressures and impacts. This environmental cause-effect relationship involves the natural sciences, while the driving forces and the responses involve the political, judicial and the social sciences. The role of social sciences is as important as the role of the natural sciences - a fact, frequently ignored, because there is a general favour for natural sciences as being the exact, factual science (frequently an incorrect assumption), as opposed to the more ambiguous social sciences.

Alternative Approaches

There are two approaches to design and operation of technology:

- The **empirical iterative approach**, also called "trial and error".
- The **deterministic predictive approach**, also called "design".

Remarkable engineering accomplishments have been achieved by the **empirical iterative approach**: Roman aqueducts still standing, drainage in ancient Athens, middle age gothic cathedrals and many other famous structures. Many mistakes paved the road to these successes: the tower in Pisa is still (just) standing. The bridge over the St. Lawrence River in Quebec was designed by scaling up the bridge in Scotland across the river Forth, but columns cannot be scaled up proportionally and the bridge fell down! The empirical iterative approach is still a valid approach. Those favouring this approach tend to take pride in being called: "practitioners".

In the other end of the scale is the **deterministic predictive approach**, which favours to develop an understanding of all elements in the structure, so that the performance of the structure can be predicted. On that basis the structure can be designed to meet predetermined requirements. The enthusiasts of this approach will be called "theoretists".

There has always been a schism between the practitioners and the theoretists, frequently in relation to value judgement on contributions to international conferences, at which it is difficult to satisfy both. The fact is that there is little justification for this schism, because there is need for both, e.g. expressed by the joke: "There is nothing more practical than a good theory".

The schism between the two approaches can also be illustrated by the development of engineering education, which has become still more theoretical – leaving the student to achieve know-how from practise after graduation. It is a valid question to pose, whether the tendency to educate by exemplified application of

models is a good approach. Do the students get a basic understanding of theory and/or practise, or do they get entangled in the mechanisms of futile handling of hard- and software, which will be obsolete before the students leave the university?

Determinism

Determinism is based on a **reductionist philosophy**. It is based on the concept that a full understanding can be achieved by identification and description of all underlying physical, chemical and biological laws of nature that govern the engineering application. On reflection, there is reason the question the validity of this basic axiom.

We have many indications from practise that this is a reasonable axiom, but philosophically we have counter-indications that the validity is limited:

- Moving from macrophysics to microphysics, the Bohr-model of the atom is not deterministic and Heisenberg's uncertainty theorem quantifies the limitation.
- Theory of "chaos" showed us that there might not be unique solutions to even simple differential equations. In fact, at university we are taught only the soluble problems, which turns out to be a small fraction of the universe of problems.
- Neural networks illustrate a totally different set of learning and "understanding": pattern recognition – the holistic approach. Are we back to the empirical-iterative approach?

The university graduated engineer go into practise with an exaggerated faith in determinism, while the practitioners, who - after years in practise - have forgotten the theoretical background, defensively show disrespect to theoretical approaches. The reality is somewhere in-between – but where?

The Deterministic Model

The deterministic model is a mathematical description of the physical, chemical and biological phenomena involved in the engineering problem of concern. They can be very simple and they can be very complicated. However, it must be emphasised as a philosophical fact that no model is anything but an approximation to the reality. It may be a good approximation or a poor one, but always an approximation.

In the engineering application, the issue is not to develop an ever "better" description. That is frequently the model developers apparent goal. The issue is to iden-

tify and develop the model that fits the engineering problem to which it shall be applied. There is no one solution to this. To a multitude of engineering problems fit a multitude of models. Flexibility is a virtue.

From the last twenty years of model development, one gets the impression that "better" models are interpreted as more detailed models. The more that can be described, the better. That is not necessarily the case, as will be discussed in the following. Parsimony is a principle introduced by Ockham (eng. philosopher, 1290-1349). **Parsimony** means that the best approach is the simplest that fits the purpose of the application. Again, flexibility of model features is a virtue that fits with parsimony.

A good example of the need for parsimony is **model reduction** for application in real time control. Due to the limited time available for reaching a solution within a time step, the very complicated models are too time consuming for practical application. In a few years time, faster computers might overcome that. However, the complicated models may be difficult to keep stable. It may be difficult to analyse the reason for an error, because the model complexity complicates the understanding of performance.

The key point is that an engineering model has to model the essential features that are important to the resulting design or operation (Harremoës and Madsen, 1999). All other details just obscure the picture and hamper engineering application. The slide-rule engineers of the past had to simplify down to the bare essentials, a few combinations of key parameters, and to incorporate the rest in safety factors. That is (was?) an engineering art. Models and computers have just shifted the level of comprehension; but the art of choosing a perceivable and manageable structure and a corresponding set of parameters is the same at another level. Is the art about to be forgotten?

Determinism and Incertitude

How predictable is the performance of the technologies associated with environmental abatement? How well can scientific understanding and/or experience provide sufficient assurance of reliability.

In the development of natural sciences since Galilæi, Kepler, Newton, etc., the deterministic description of cause-effect relationships has been the core of development. It is axiomatically assumed that there is a unique relationship between the action taken and the effects (in the environment or on human health). However, during the last century it has been realised that there are both inherited and practical uncertainties associated with this relationship and more recently questions have been raised as to whether there is such an identifiable, unique relationship at all. The precautionary principle is in fact

a response to that realisation.

The cause-effect relationship can be written as follows:

$$e = f(i_1, i_2, \dots, i_n; p_1, p_2, \dots, p_n) + \mathcal{E}$$

Where:

e	is the effect
f	is a functional relationship
i	are input variables
p	are parameters
\mathcal{E}	is incertitude

The functional relationship may be empirical in the form of correlations or theoretical in the form of generic relationships, based on a-priori knowledge of the phenomena involved. In relation to environmental cause-effect relationships the phenomena are physical, chemical and biological.

The input consists of the variables associated with natural phenomena and the anthropocentric pressures on the environment. The parameters characterise the functional relationship. In some cases such parameters are very well known from a-priori scientific knowledge, in many cases they have to be determined in each individual case by experiments and analysis of the phenomena involved.

The incertitude describes the extent to which it has not been possible to predict the effect on the basis of a deterministic functional relationship. That includes both the statistical uncertainty in cases where sufficient experimental data provide information by which to estimate the statistical error, but it also include the incertitude associated with not knowing the essential phenomena and the lack of data by which to estimate the incertitude.

This has also been expressed by the following words: *Determinism, Risk, Uncertainty, Ignorance, Indeterminacy* (Wynne, 1992).

Determinism is an ideal that is never achieved. However, history has demonstrated beyond any doubt that determinism is worth striving for. Even with the best of determinism, the input variables show statistical properties. However, we have statistical instruments with which to handle variable input data and *risk* expressed statistically is a rational approach to description of variation. There is always statistical uncertainty involved, due to the mere fact that all relationships have to be calibrated with data. With a well known functional relationship and an adequate combination of number of parameters plus number and character of data, the uncertainty can be expressed statistically and can be incorporated in the risk analysis.

Uncertainty beyond the statistical uncertainty is experienced when we know the range of outcome, but not

the statistics of it. That is where we can use scenarios as an approach to analysis, because we can describe a set of outcomes to be expected, but we cannot associate probabilities.

Ignorance applies when we do not know essential functional relationships. They may become known later due to research and development on the issue, but they may not be known at the time, when far-reaching decisions have to be made.

Practical indeterminacy is the situation where the functional relationships are so complicated and the number of parameters so large that neither determinism nor stochasticity is within reach. The functions and the parameters become unidentifiable. *Theoretical indeterminacy* is the situation where the relationships are inherently unidentifiable, e.g. due to chaotic properties that make predictions impossible.

The precautionary principle has been introduced as a way in which to formulate an approach to the situations where ignorance and indeterminacy dominate the cause-effect relationships. The importance is due to the realisation that many of the cause-effect relationships between the pressures from development of society and the environmental impacts are less than well known.

The Burden of Proof

It is a frequent interpretation of the precautionary principle that the burden of proof shall be shifted from the environmental stakeholder to the polluter. It is not that simple (Harremoës, 1998).

Imagine a situation associated with risk assessment of a chemical, interpreted according to Popper (1965).

Imagine the claim that the chemical does cause harmful effects in the environment or to human health. If those adverse effects are well defined, the burden of proof can in fact be lifted. One example will prove the claim. It may be quite complicated to do so, but in principle it is feasible.

The opposing claim that the chemical does not cause harmful effects in the environment or to human health, cannot be lifted. There will always be situations, which have not been covered with adequate investigations. The claim can only be evaluated by induction. The better and the more comprehensive the investigation, the more likely the claim is; but there can never be certainty. Just one example would falsify the claim.

The conclusion is that environmental and human health acceptance can only be demonstrated by induction and only by likelihood. In the end, it becomes a question of confidence. That confidence is based on procedure: Have the authorities or the polluter performed adequate investigations in order to establish a reasonable likelihood that the chemical is harmless according to acceptable criteria?

One interpretation of the precautionary principle is that it is the polluter who shall demonstrate by induction based on acceptable procedures that the chemical is acceptable according to agreed criteria.

Pro et Con

Where adequate information on cause-effect relationships and acceptable effects is available based on determinism and statistical uncertainty analysis, the political choice becomes a balancing act between opposing concerns: the benefit to society versus the acceptance of a level of effects in the environment and/or effects to human health.

It is frequently postulated that the public does not have a rational approach to the acceptable levels of effects, because it is a well known fact that people accept harmful effects with probabilities orders of magnitude apart (e.g. traffic, alcohol). However, people have a much better perception of the pro et con than recognised by the specialists in risk assessment. It is when adequate information on the pro et con is unknown to the public that the reaction is fear and unrealistic wishes for action. Risk assessment is performed by an elitist profession. Public participation and stakeholder information has to be expanded and improved in quality, in order to improve the confidence in the system.

In relation to the "pro et con" in evaluation of risk assessment, the precautionary principle is an expressed concern regarding uncertainties in favour of the environment and human health.

The Risk of Being Wrong

In the weighting of concerns, the precautionary principle can be interpreted as an urge to evaluate the risk of being wrong. What are the consequences of not doing anything, in case the harmful effects turn out to be severe? The occupational health problems associated with asbestos, is a striking historical example. In relation to environment, the problem with mercury is a similar example. What are the consequences of an action, in case the action turns out to be not necessary or non-proportional?

Many issues fall into this category of concern for being wrong. At present, in Denmark, the hottest issue is the regulation, ultimately ban, of pesticides in agri-

culture. The very same issues will be faced with the introduction of water reuse - plus many more.

Example: MtBE

The example chosen to illustrate the problem is the introduction of MtBE as a substitute to the use of methyl-lead as an anti-knocking constituent in gasoline. The toxicity of lead and methyl-lead has been known for a long time, but it was not until the early 1980's that this fact got recognition to the extent that an alternative was introduced. The choice as a substitute was MtBE, which combine a number of advantageous properties, including also to serve as an oxygenate for the reduction of air pollution. In USA the addition of MtBE was initiated in the late 1980's. In EU a policy on gasoline composition was adopted in 1997, with the consequence that MtBE could be the massively produced compound that reduce the air pollution from car engines. However, already since 1990 papers were published in the scientific community that MtBE might be a serious groundwater contaminant. That became obvious in 1997 when severe groundwater pollution was detected in Santa Monica, California, from leaking gasoline stations. Similar incidents during the late 1990's have been revealed in Denmark. In March 2000, a ban of the use of MtBE was announced in USA.

This story calls for analysis of the story behind, in an attempt to learn from a development that could have been avoided, Kraye von Krauss and Harremoes, 2000. Looking into the scientific background it can be revealed that the detrimental properties of MtBE in groundwater was known in the 1950's and could be found in the textbooks in the 1960's. MtBE has a high solubility in water. It does not adsorb to the soil structure. It does not degrade in groundwater. It gives an unpleasant taste and odour to water at low concentrations. Leaking tanks have made water supply wells unusable. EU is now under pressure to ban MtBE. The whole traffic paradigm is under pressure to change approach, because the traditional engine designs are lacking alternative that satisfy modern air and water quality standards. There is room for a lot of innovations on the path to solutions in the traffic sector, which has not yet been environmentally decoupled from economic growth.

This is a case of "reducible ignorance". The information was there, but it was either unknown to the decision makers or ignored. In both cases, there is reason to wonder how a chemical with such known properties can be made one of the greatest mass produced compounds in society.

The European Environmental Agency (2000) has launched a project looking into the history of such surprises, derived from ignorance or lack of attention to existing knowledge in environmental decision making.

The list of cases examined is:

- Antibiotic as animal growth promoters
- Hormones as animal growth promoters
- BSE, Mad Cow Disease
- Hormones in fertility treatment
- Spectrum of persistent pollutants
- Asbestos
- SO₂ and acid rain
- CFCs and the ozone layer
- PCBs
- Benzene
- MtBE as a substitute anti-knocking agent
- Radiation
- Marine overfishing

While MtBE is a case of ignoring/disregarding existing knowledge, CFC and PCB is a case of sheer ignorance. At introduction, the concept was that these compounds were ideal due to being inert and apparently without detrimental effects.

The No-Know Situation

The real importance of the precautionary principle is in the situation where either ignorance or indeterminacy prevails. However, still it is quite unexpected that actions should be taken in situations of no knowledge of a cause-effect relationship at all. There has to be some reason on which to argue a reasonable suspicion, based on an expected cause-effect relationship - however uncertain. Otherwise the arguments change from a rational utilitarian concept to deontological dogmas or just superstition or non-structured empiricism.

This situation is in fact not unfamiliar from engineering approaches. This can be looked at from two extreme points of view, described in the introduction:

The empirical, iterative approach
The predictive, scientific approach

The empirical, iterative approach was the way in which craftsmanship developed before modern science provided much better means for design. That empiricism did in fact thrive is visible from antic and middle-age structures, e.g. cathedrals. However, it was the Greek heritage of logic and scientific development that created the basis for modern technology after the renaissance. This is in particular visible by comparison between two cultural developments in parallel: the European development on the basis of science versus the Chinese development on the basis of an empirical correlation philosophy and technology, which worked extremely well by comparison until the scientific break-through in Europe. In fact, the Chinese had cast iron, pumps, suspension bridges, china, etc. long before Europe (Temple, 1998).

In case of ignorance and indeterminacy as described above, the precautionary principle comes in as an approach, which combines with an empirical, iterative approach, where a predictive, scientific approach fails or suffers from a predominance of uncertainty. In relation to risk assessment, the chemical properties to be concerned with are:

Persistency in the environment
 Bio-accumulation in the environment
 Severity of toxicity to humans
 Irreversibility of consequences

The greater the suspicion of harmful effects to the environment and/or to human health is, the more pre-emptive measures are called for. In view of the level of ignorance and indeterminacy, it is important to make development in the right direction in a stepwise fashion, because the risk of being wrong must be counter balanced by the advantages of a new technology or chemical. At the same time, it is urgent to increase monitoring and research on the issues of concern. It must be in everybody's interest to improve, where possible, the knowledge of the cause-effect relationship (remove the uncertainty and ignorance) and to decrease the uncertainty (provision of more and better data and establishment of safe procedures for implementation) associated with design and operation of technologies.

There has to be a much greater attention to irreversibility. In such cases, the primary demand is for thorough investigation of existing knowledge, investigation of potential consequences, analysis of alternatives, assessment of risk perception and intensified monitoring of the environment and initiation of research on identified suspicion. The precautionary approach is not a rationale by which to tighten the regulatory screw on well known issues. It is an integrated attempt to avoid scientific surprises in the future.

Participatory versus Modelling Approaches

The approach of the recent decades has been to rely on the knowledge on the cause-effect relationship as the means for predicting results of optional policies and to ignore the uncertainty/ignorance associated. The models have become more and more complex and less and less interpretable to the non-expert. This in combination with surprises/mistakes of the past has increased the mistrust on the part of the politicians and the public. The way forward is not to curtail development in fear of new failures, but to involve all stakeholders in the process of formulating, assessing and choosing policies, Stirling (1999). Quotation from Stockholm Water Prize laureate year 2000 (SIWI, 2000): Kader Asmal, Minister of South Africa: "When moving forward we shall make mistakes, but it is wise to do so with open eyes and with a democratic consensus behind us". Do present elitist science/engineering procedures for integrated environmental assessment and

risk assessment live up to such ideals?

New Paradigm

In the context of scientific development there is a need for change of paradigm. According to Kuhn (1970) science moves in stages. A fundamentally new concept/approach, called a new paradigm revolutionise science at certain intervals. In the interim period "normal science" works to improve knowledge within the frame of the prevailing paradigm. Slowly, the fundamental concept is threatened by mismatches to reality. A new paradigm emerges as a fundamentally new approach to the framing, structuring, analysis and interpretation to the craftsmanship of science - much to the dislike of the establishment. The question is whether we are approaching a new paradigm, where uncertainty (uncertainty, ignorance and indeterminacy) become an accepted fact on both side of the borderline between the scientists on the one side and the public and the politicians on the other side. That will require a change of attitude on both sides: The politicians have to accept that fuzzy answers may be the best expression of expertise. The scientists have to learn that identification of the fuzzy borderline between knowledge and ignorance may be the sign of real competence.

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PRECAUTIONARY PRINCIPLE SOME THOUGHTS by Hermann Knoflachner

Everything in the evolution which exist has followed the precautionary principle. All our organs, the heart, the eyes the lungs or whatever has its position in our body due to the rules of this principle. This principle is seen as the outcome of the endless process of trial and error under changing circumstance. It is the basic principle of sustainable systems on all levels of the evolution.

The accumulation of energy in different forms in organisms (plants, animals) or societies (bees, human societies etc),

Technicians are imitating this principle by introducing "safety factors" into their constructions and calculations,

Social systems which are much more complex have also developed some precautionary principles like the Ten Commandments, tax rules etc.

Each evolutionary level is taking care on its precautionary principle as each scientific discipline is doing it.

Our problem of today is the helplessness and lack of understanding the effects of our new technologies influencing levels far outside of our sensorial experience and responsibility, the lack of understanding complex systems and the longitudinal section view, across different disciplines and the magnitude of necessary "safety factors".

Our society is excellent in producing trials and hopes, but very resilient against errors and disappointments.

Since the precautionary principle is a burden in the short term view, but a need in the long term, it is a cost factor for the short term orientated economy, the religion of the prevailing policy of today

THE WORLD WE LIVE ON – AT A GLANCE:

Shell Scenarios Address Possible (Energy) Futures in a World of Dramatic Change

Steven de Bie

Steven de Bie is the manager of Sustainable Development, Sakhalin Energy Investment Comp. The following information was taken from the Shell report 2001, with permission from Shell. For further details on both sets of the Shell scenarios visit: www.shell.com/scenarios

In the past several years rumours and often undocumented articles have fuelled the debate about the finiteness of natural resources, especially fossil fuels, and many have speculated on the effect that running out of oil will have on (global) economy. Some of us trust that technological innovation will help us to continue with the life we are living today in the western world. Others have argued that the demand for energy is such that the advancement of technological solutions cannot cope with this demand and consequently, that the decreasing supply of oil will have a large adverse impact on our economy and wealth.

Predictions are difficult with respect to the available oil reserves on this earth: political uncertainties can cause higher oil prices and through that stimulate the search for new oil fields in areas not yet visited. Such was the case in the early 1970s. The discovery of the huge oil and gas fields in the North Sea was the result of the political unrest in the Middle East and the cutoff of oil supply to some western countries.

The political and social dimensions of our society drive the energy market and through that the demand for energy services. Not so much the availability of oil (or fossil fuels in general), but the societal context in which these sources of energy are to be used, determines the energy demand and stimulates or discourages the search for sustainable alternatives. Hence, it pays off to spend time on the possible directions our society could take from here onwards.

The Shell Group of Companies ('Shell') has long experience developing scenarios that helps Shell companies to plan for a wide range of uncertainties. Recently new scenarios have been developed that describe how the world may evolve over the coming 20 years. Such scenarios are the output of a multidisciplinary team of experts working together for several years. Building on their knowledge on developments in their fields of expertise and in close consultation with all sectors of society they identify possible scenarios that describe how the world may evolve over the next decades.

The Shell report 2001 - People, planet and profits – tells us that underlying the recently published scenarios is the conclusion that the powerful forces of globalisation, liberalisation and advances in technology have dominated the late 20th century. They brought rapid

change and advancement, but the scale and speed of the impacts are posing deep questions and exposing dilemmas and threats as they push the boundaries of natural and man-made systems, ethics and even humanity itself (take for example, human cloning).

These global forces, which shape the economic and political environment, will remain strong so concluded Shell's scenario team, but there will be increased questioning of the consequences. The ethical dilemmas that technology poses, may call for serious restraints on implementation of certain technologies. The world might see different rules slowing the pace of globalisation and regulations to temper unrestricted market growth.

Shell identifies two potentially dominant types of interactions between people, and developed Global Scenarios on how these might impact the future over the next 20 years: one Scenario called *Business Class* and the other, *Prism*.

Business Class assumes a high level of connectedness and shared values between people of a global elite that crosses national boundaries and moves the world to greater economic integration. The US takes up a dominant role on the world's stage. There is a willingness to tackle selected problems on a global scale. Established authorities face continual challenge with power diffusing from states to other institutions. Key in this world is individual freedom of choice.

Prism assumes interactions between people within nations and cultures predominate. People question the value of global integration and spurn it in favour of a world of diversity and local allegiance. Over time, this leads to a world of regional groupings.

Implications for Energy

The Shell Report 2001 explores the consequences of both scenarios for the energy market.

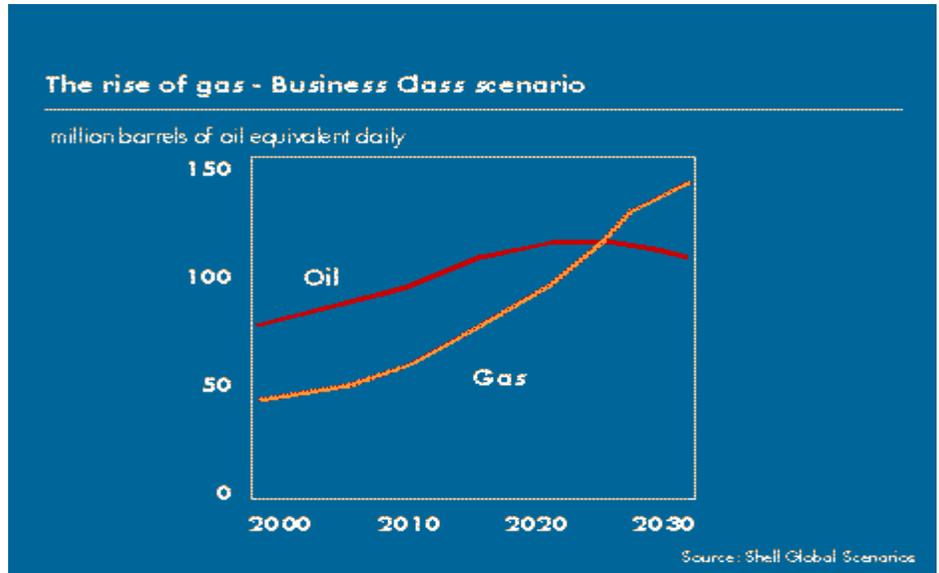
In the *Business Class* scenario of a globally connected and highly innovative world, consumers drive energy markets with their demands for more convenient and flexible energy services. Gas becomes increasingly important and provides the backbone for new energy services and, longer-term, a bridge to a (more sustain-

able?) hydrogen economy. In this scenario oil production peaks in the 2020s with the rise of gas. Innovation delivers radical new technologies such as fuel cells for both stationary heat and power and mobility services. Ultra-clean gasoline and diesel fuels initially provide fuel for fuel cell vehicles. During this period there is intense and highly uncertain experimentation, with difficult technology choices to be confronted.

The world is more diverse according to the *Prism* scenario and the emphasis is on ensuring secure, reliable and clean energy. Indigenous resources such as coal and renewables are favoured. Gas plays an important but lesser role due to the complexity of cross-border infrastructure and concerns over security of supply. Innovation focuses on improvements to existing technologies that increase efficiency and cleanliness and slow the move from hydrocarbons. The peak in oil production is deferred by some 20 years or more. Highly efficient internal combustion, diesel and hybrid vehicles run on conventional fuels often with bio-fuel blends. There is great demand for local adaptation of brands, products and services.

In both these Shell scenarios, wind becomes a competitive source of power generation in some markets, but more particularly in *Prism*. New solar technologies extend the range of applications but contribute little to the overall energy scene. New renewables comprise 4%-7% of primary energy supply by 2020.

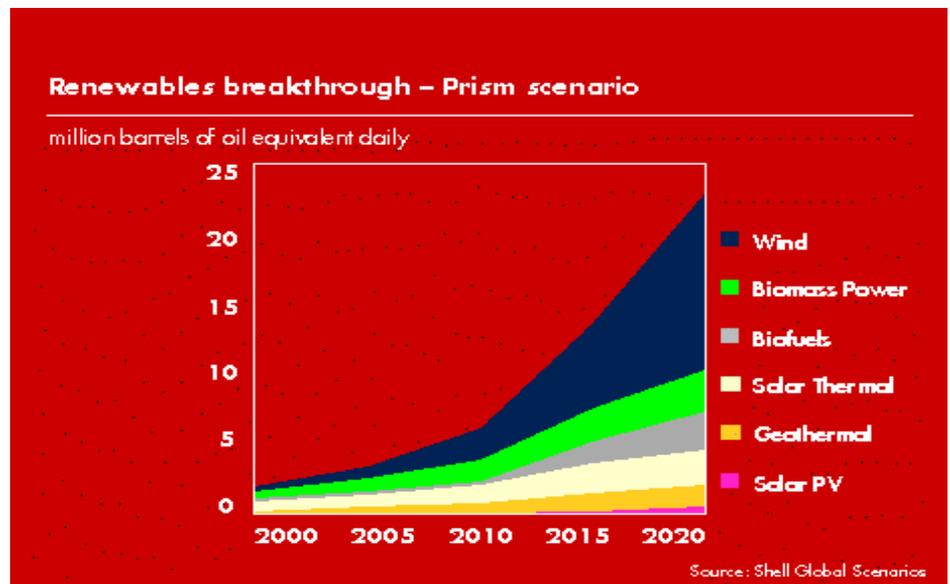
Building upon these scenarios, Shell also developed Long Term Energy scenarios – these explore the future of energy over a 50 year period. Those scenarios show a rapid economic growth in the developing world, and being on track in 2050 to achieve a fully sustainable energy mix and stable climate. Sustained economic growth would bring the 2.5 billion people of India and China to a standard of living comparable to Europe in the 1990s. The atmosphere would be heading towards stabilisation of carbon dioxide levels at 550 parts per million. This is about twice pre-industrial levels and considered by many to be a realistic limit to acceptable climate change. The amount of energy



needed to support this will be two to three times greater than now. Gas will play an important bridging role while new technologies mature, with renewables comprising up to a third of primary energy supply by 2050.

Conclusion

Both *Business Class* and *Prism* demonstrate that the world will depend on hydrocarbons for decades to come. They also demonstrate that a peak in the supply of oil and a subsequent decline does not adversely impact upon the world's economy. Gas, innovation to existing technologies and the development of new technologies enable the world to continue economic growth independent of oil supply.



OILPEAK

Comments from Jane King and Malcolm Slesser

The world oil and gas peak can be modelled using the ECCO global model, GlobEcco developed by Malcolm Slesser and Anupam Saraph in 1994. This model treated the world as two regions: developed and developing. Being a Natural Capital Accounting model, it measures economic activities in terms of the primary energy that has to be won from the Earth in order to (eventually) carry out any desired or inherent economic activity. GlobEcco is modelled in such a way as to determine the maxim possible growth rate of the system. In the context of present policies and technologies this growth eventually becomes negative later in this century. The outcome naturally is sensitive to the data, which showed a peak in 2002 for the ratio of oil and gas supply to demand. This data need not be taken too seriously as much has changed since the model was completed in 1994. There have been many changes of policy (e.g. Kyoto 1997) and fresh knowledge of ultimate resources, so there is much need for up-dating. What follows below is a simple account of the algorithms built into the model.

The presumption is that rationally that energy source will be tapped that calls for the least dissipation of energy to bring it into the market place; in other words the source that has the lowest ERE (energy requirement for energy - IFIAS definition). This assumption will be distorted by various artificial market mechanism, royalties, embargoes and so forth, but our contention is that in the long run such rationality is bound to prevail.

Since coal has one of the lowest increasing EREs it begins to take over from oil as the century evolves. However this is without taking into account the present concern with carbon dioxide emissions which will shift the emphasis back towards gas, exacerbating the situation and bringing forward the oil (and eventually) the gas peak.

Anyone is free to use this model whose listing we can provide, together with a technical manual explaining the model structure. It requires substantial data research, none of which is inaccessible, to be useful today.

BALATON GROUP MEMBERS CONTRIBUTE TO THE WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT – LET'S HOPE IT HELPS

Gillian Martin Mehers

Whether the Johannesburg Summit is a turning point for the sustainability debate or a fiasco, one thing is for certain, it will be the largest gathering of sustainable development proponents (and in some cases opponents) that this decade will see. Expecting more than 60,000 participants in August, the World Summit on Sustainable Development (WSSD), with the Global Forum of NGOs and hundreds of side and parallel events, will be a month long gathering that has had several years of preparation.

During this process, members of the Balaton Group have acted as experts, researchers, and writers helping their countries and civil society, all over the world to develop their positions, create innovative new tools and organize events for the Summit. Others are working with their communities to support the Summit through local events that celebrate the message and spirit of the gathering in Johannesburg. Below is a brief summary of some of their contributions and planned activities surrounding the event (please note that the official events for the WSSD are still pending confirmation by the UN Secretariat):

Bishan Singh has developed a position paper for the Sustainable Development Network (SUSDEN) Malaysia on the Rio+10 process. The paper, which cri-

tiques the Rio process and points out the challenges faced in implementing Agenda 21, provides six pillars for sustainable development which must be adopted before a paradigm shift can be achieved. The six pillars are: 1) development must be made socially just; 2) development must ensure ecological regeneration; 3) development must be economically viable; 4) development must ensure governance becomes politically participatory; 5) development must promote diversity and cultural vibrancy; and 6) development that is sustainable must ensure spiritual fulfilment. The full paper explaining these pillars is available on request.

Writing from Scotland, **Samantha Graham** reports that they are running a week of events at Findhorn to coincide with the WSSD. It's part of the People's Earth Summit and will include tree planting, awareness raising workshops, talks, a green trade fair, eco-entertainment and a car-free day etc. One of the main objectives is to provide community level education on the issues of the Summit.

Working under contract for the US Government, **David Berry**, is putting together a set of indicators of sustainable development for that country to take to World Summit. There are 30 indicators - 10 each for environmental, economic and social areas.

Samir Ghabbour is writing an article for the Arab Science Review of the Arab League Educational, Cultural and Scientific Organization (ALECSO) in Tunis about "Arabs and the Johannesburg Summit". This is a 20-page paper that should appear at the time of the Summit. ALECSO, which commissioned the article, is to the Arab League of Nations what UNESCO is to the UN. The article will be published in Arabic.

Writing from Vermont, **Gwen Hallsmith** sent news that she would be going to the Summit, and will be working on two projects there. One is a side event with the Earth Charter and the Ark of Hope. Second, she will also likely be a speaker at the Local Government Summit session on "Building a Culture of Sustainability".

Children of the Earth and the Ark of Hope are working with children in Diepsloot, a squatter camp/informal settlement in Johannesburg, to bring the inspiration, affirmation, and prayers of the people of New England to Africa, and to encourage the children in Diepsloot to create their own handmade Temenos Books filled with their hopes for the future. The side event proposed for the World Summit on Sustainable Development will include a presentation and dance by the children of Diepsloot in an exhibit of the Ark of Hope and the Temenos books it has carried with it from people all over New England. The artwork captured in the Temenos Books and the Ark are all based on the Earth Charter, a document drafted by thousands of people all over the world to create guiding principles for building a just, sustainable, and peaceful global society.

As we read in the last Balaton Bulletin, Gwen has led a campaign over the past two years to get Vermont cities and towns to endorse the Earth Charter. This past spring, 21 towns voted to endorse it at their annual Town Meetings. In June, the Vermont Conference of the United Church of Christ voted to endorse the Earth Charter, which is the church where Gwen serves as a pastor. She introduced it to the annual conference, where all the churches get together. The UCC represents over 150 churches statewide, with 18,000 members. The Vermont Earth Charter campaign is what she plans to speak about at the Local Government Summit, and then afterwards at the Balaton Group meeting in Csopak.

Herman Daly wrote that he is not going to Johannesburg, but sent a speech titled, "Sustainable Development: Definitions, Principles, Policies" which he gave recently as an invited address at the World Bank. The speech included comments on World Bank's contribution to the sustainable development discussion, its World Development Report 2003. In the speech, he considers two competing definitions of sustainability (utility-based versus throughput-based) and provides reasons to reject the former and accept the latter. He also makes the point that international development aid

should more and more take the form of freely and actively shared knowledge, and less and less the form of interest-bearing loans. He concludes his speech in an addendum about the World Bank's Report stating that "the *WDR 2003* draft is a welcome improvement over the *WDR 1992* treatment of the same theme (the latter can be found in pp5-10 in H. Daly, *Beyond Growth*, Beacon Press, Boston, 1996) The discussions of complementarity of assets, limits to substitution, and the non-rival, non-excludable nature of many environmental services were especially welcome. The intention to include a final chapter on "open questions which could not be resolved" is an excellent idea." The complete speech was circulated on the Balaton Group Listserv on 13 June 2002.

Mathis Wackernagel is contributing to the following two (to three) activities and may most likely go to the WSSD (with some hesitation though, he says, after the rather discouraging preparatory conferences). With WWF International, he will be distributing the soon to be launched Living Planet Report 2002, possibly with some additional inserts. With the Earth Day Network, he will be putting the Ecological Footprint quiz on the web at www.Earthday.net and hopefully some WSSD events. Mathis adds that if they can raise enough money, they also want to distribute the footprint calculator on CDs at the WSSD.

A Side Event on "The Dashboard of Sustainability: Indicator Guidance into the 21st Century", http://esl.jrc.it/dc/csd_cut4/csdtoc.htm, is planned to be held at the Summit formally hosted by IISD, with **Peter Hardi** and **Jochen Jesinghaus**, from IISD and the European Commission Joint Research Centre respectively. The contribution of the side event would be the presentation of a decade long trend analysis, from Rio to Johannesburg, identifying the most important issues and trends on which national policy makers need to focus in achieving sustainability in the 21st century. The analysis will be based on the indicators of the UN CSD core set, covering data for 230 countries for the years 1990 and 2000. They intend to present three sets of dashboards, one for the beginning, one for the ending of the decade between the Rio de Janeiro Earth Summit and the Johannesburg WSSD, and one for the results of the trend analysis. They would be able to show how any or all of the selected indicators have changed. The presentation would also justify the usefulness and applicability of the UN CSD indicator set.

Attending the World Summit as a part of the delegation of LEAD International, **Gillian Martin Mehers**, will be working with a number of partners on three side events that focus on issues of leadership, capacity development and sustainable development. "Leadership for Sustainable Partnerships: Understanding the Past, Thinking for the Future", will bring together various

leadership organizations to examine how they have faced the challenge of training leaders to contribute to sustainable development. The parallel event titled "Working the Corridors: Practical Tips from Negotiation and Lobbying Experts on Making the UN System Work for You " will be organized at the Global Forum of NGOs and include the official launch of a training CD-ROM on "Exploring the Intergovernmental System". "Bridging Science with Local Concerns: Developing Cross-Sectoral Capacity on Key Aspects of Sustainable Development" will be the third parallel event organized with ICSU during their Forum on Science. This workshop will explore ways of bridging the outputs of scientific research and local stakeholders' information and knowledge needs. This latter event will also feature a demonstration of a new LEAD CD-ROM which provides an overview of 10 key aspects of sustainable development. LEAD has also built an extensive, open access website with more information on the World Summit, and on the events mentioned above.

Genady Golubev describes his main involvement in the WSSD as follows: He is a scientific editor of the Russian version of the GEO-3, which was launched in Moscow on 31 May 2002. He also expects to go to

Johannesburg for the WSSD as a member of the delegation of the United Nations Association of Russia. Finally, **Joe Alcamo** and his colleagues from Kassel, Germany, and Gennady together with Nikolai Dronin from Moscow are running a joint project on the systems analysis of food supply problems in Russia.

Working for equal representation of women among decision-makers, with strong governmental policy support for equality in society in general, **Marie Haisova**, has prepared a Rio +10 policy paper for her organization, Agentura Gaia, in Prague. The paper calls for global action for women towards sustainable and equitable development, and is based on the Agenda 21's Chapter 24. She notes that she is taking these principles with her to Johannesburg. Her full paper was published in the last Balaton Bulletin.

So, it appears that there will be a number of Balaton Group Members present in Johannesburg at the upcoming World Summit on Sustainable Development and many others working on supporting issues from other venues. Let us hope that the combined energy of the Group might have some influence on the outcome of this important global event.

BOOKS

***Limits to Growth*: summary of German article by Stephanie Weis-Gerherdt**

In April, 2002, there were several articles in German papers reviewing the last 30 years since Limits. Here are abstracts in English: the authors' opinion with no editorial comment. The first part is a summary of a large one page article, the second part gives some statements made by different representatives in a series of articles about the present state of the world.

“The Blue Shock - Thirty Years Limits To Growth”, by Jens Hohensee (Senior Analyst, Boston Consulting Group, Hamburg), *DIE ZEIT*, 2002/04/11, page 16.

Rachel Carsons' *Silent Spring*, the early days of the Club of Rome, Jay Forrester's System Dynamics. And then this non-technical report of a great research work done at MIT in 18 months by a young team.

The book was so eminently successful and popular because of its intent, its method and its findings.

The intend and method: To examine the complex of problems troubling men of all nations. A project on the predicament of mankind. To look at the world from a systems point of view and to think about the world 's long-term problems. To find the basic factors that determine growth on this planet, to see how they interact under different sets of assumptions, to learn about exponential growth, to devise effective responses. That was the challenge for the world 's first computer model.

The findings: A shock. Under the assumption of industry growing, pollution growing, population growing and resource use growing – the world would collapse. And before 2001: First resource shortages and famines. Yet there could be hope, if action towards equilibrium would be taken soon, corresponding to long term view.

The book was attacked: Insufficient data base and not including technical innovations and political dimensions. 20 years later Meadows published results from up- dates, the same outcome, the same criticism and the reproach that the forecasts had proven wrong.

Important is not the debate on the coming true of the forecasts or not. What counts is the effect the book had in the long run. *Limits* made the breakthrough into general public's mind. This book became the point from which

the global environmental movement did start, culminating in Brundlandt's making sustainable development the guideline for business and economics worldwide.

What reminds of Malthus' work: Population growth

“30 Years since Limits To Growth”, *Bild der Wissenschaft*, 2002/4

The book was provocative and the beginning of the environmental era.

— Uwe Moeller, Secretary General, Club of Rome, page 94

It was by this book that the idea of a limited world became common knowledge

— Dieter Rucht, Science Centre, Berlin), page 94

Meadows was soon identified with doomsday prophesies, which he actually never had intended to articulate. What he did was working with a model and telling people what would happen if they continued the path they were on. And he asked them please not to continue.

— Erhard Eppler, former Minister, page 94

We need not worry so much about resources. Meadows underestimated innovation. Yet the book was an eye opener and the corner stone to many initiatives.. In 1992 Meadows was successful in showing that not resources are the crucial point but pollution. Pollution is the limiting factor.

— Peter Hennis, President, Wuppertal Institute, page 91

will lead to famines with the food production not increasing equally. Malthus' statements did not come true because the industrial revolution and innovations took place. And Meadows' forecasts did not come true, because he might have been successful in shifting people's mindsets.

Meadows dramatized. He was right in making clear that resources are limited but they are not as limited as he said in 1972. According to the resources of metal he was naive. Meadows asked the wrong questions, because what we actually need is not resources but functions. Important - the book was a wake up call.

— Manfred Dalheimer, Director, Federal Institute for Geology and Resources, page 88

Putting it unfairly: With finding limits to growth MIT published a triviality. The message was listened to because it came from highly modern computers. Putting it fairly: In 1972 the MIT crew was successful in making clear that components of development are interlinked. The report could not be neglected. Jobs were created everywhere. But what was not taken into account by the model was innovation and humankind's ability to learn and after all humankind plays the most eminent role in this system.

— Ernst U. von Weizsäcker, Member of Parliament, former President Wuppertal Institute), page 95/96

***Not By Money Alone — Economics as Nature Intended*, by Jane King and Malcolm Slesser**

As we say in the back cover blurb ‘..... we must overcome our obsession with using money as a measure of evaluation. Though it is a great facilitator in harnessing human endeavour, when it comes to dealing with the environment it has one significant flaw; it cannot measure nature's contribution to our welfare. If we are to trace a path to true sustainability - or durability as

we prefer to call it - we must find an approach that relates the principles of market forces to the physical laws actually governing the real world’

Published by Jon Carpenter Publishing, ISBN 1-897766-72-6. Order from bookshops or +44-1689-870-437. Spread the word!!

***Mappa Mundi*, by Bert de Vries**

Dear friends,

After a period of silence there is some interesting news to tell. As it happens, I write it down being in a place which in various ways reminds me of Balatonian Csopak. I have been invited to talk about climate change models and their use during a Colloque de Cérisy. These are fairly well-known meetings in the beautiful castle at Cérisy-la-Salle in French Normandy, this one being on Langage scientifique et Pensée critique.

Cérisy is a Centre Culturel International which has emerged out of the efforts of Paul Desjardins and Anne Heurgon-Desjardins, the latter starting the Centre in 1952 in the present buildings. The castle's history is going back to the 11th century – as it should in France – and is exceptional in having been inhabited by a protestant family for long periods. In its present form it dates from early 17th century. It is built mostly in granite,

which, together with the low-hanging hardly-moving clouds confirms my earlier memories of Normandy being a somewhat sombre place where once Vikings roamed around. I might as well complement this with my impressions during a few walks: a deep green lush land of gentle sloping hills, the castle and the neighbouring 'seigneureries' being a place of great architectural simplicity, robustness and beauty.

Why it reminds me of the Balaton Group? Well, the two daughters of Anne Heurgon are running the place in a way which is, except for the French, similar to how our two elder wise women used to do it. The atmosphere is informal; simple and effective rules; simple but excellent food made in the castle kitchen by local people; and the topics. Since its creation there were over 400 colloques, on a wide variety of topics: Genesis and structure, Auto-organisation, Modernity and Cultures: war and peace, as well as many on literature and around philosophical and scientific celebrities such as Heidegger, Eco, Ionesco, Leviunas, Prigogine, Thom, Touraine and others. Obviously, the names are more famous and more French than in Balaton Groups – and also more of a focus on arts and social sciences, not on environment and sustainability. Yet, I recognize the same courage in trying to deal with the larger themes.

Evidently, some more major differences. First : french culture differs from Anglo-Saxon as most of you appreciate – not only in the cuisine but also in the tendency among French intellectuals to practice 'reflexion' on almost anything. During this colloques we discussed, for instance, a theory of models and a model of why all of sudden there has been an avalanche of models. Secondly: the organizers of the Colloque de Cérisy have managed to publish in bookform almost all their colloques which has become an interesting library in itself – a promise some Balaton Group members still hold to themselves too. The titles are inspiring and, as far as I have been able to look through them, also the content but for its occasional abundance of theory : *Les théories de la complexité*, *La production du social*, *La différence culturelle*, to mention three.

Well, that was a long introduction. With a mixture of pride, relief and contentment I can announce you that the book *Mappae Mundi - Humans and their habitats in a long-term socio-ecological perspective - myths maps and models* has been published (Amsterdam University Press, 450 pp. _ 39 ; www.aup.nl). The first three copies were officially presented to the Queen on may 25th as part of the 250th anniversary of the Hollandsche Maatschappij der Wetenschappen in Haarlem. They had approached me three years ago with the question whether I could write a follow-up on our global change work with the Targets model (Rotmans and De Vries 1997, Cambridge University Press). Instead, they accepted to go ahead with an idea I had been exploring

with several BG-members: trying to understand courses for a sustainable future by exploring past human-environment interactions. Thus it came that Dana Meadows was happily surprised to welcome in september 2000 our first archaeologist as a Balaton Group member.

I started the project travelling, with Annelies, to various BG-members in autumn 1999. We visited Genady Golubev, who has been of great help in getting some of the work of his colleagues into the *Mappae Mundi* book. Next, we went to India being the guest of Aromar Revi, his wife Poonam and their daughter Kaholi. As you can imagine, this visit gave a boost to my ideas about how to make an already ambitious undertaking even more ambitious – but the greatest achievement out of this may be that Aromar actually did write an important and interesting contribution for the book! Then, we visited Anupam Saraph and his family in Poonam and had some memorable visits in Goa. A couple of weeks later we arrived in Xi'an in China where a colleague of Qi Wenhui, Zhang Yuzhu, has been enormously helpful in making contact with interested Chinese scientists. In a later stage I met Sander van der Leeuw, an archaeologist from Université de Paris who gave a presentation at the BG 2000 meeting and wrote an impressive chapter on the rise and fall of the Roman Empire in the *Mappae Mundi* book. IN writing a chapter on unifying theories – a most difficult job I should say – I received an interesting contribution from Michael Thompson. Thanks to all these endeavours the book now has a broader than exclusively European/American outlook – a sine qua non for me in a book about past human-environment interactions and a distinctly Balatonian flavour in some chapters.

Obviously, I am not 100% happy and satisfied about the book as it is. Yet, it has some interesting research and insights to offer. I think my co-editor Goudsblom, a sociology professor, and I managed to fulfil at least partially my major objectives : explore past socio-natural systems using the latest empirical findings and insights, and provide a synthesis across scientific disciplines (climatology, ecology, archaeology, sociology...) and across methods (myths/narratives, models, maps...). The book starts with the early environments in which human groups were largely dependent on the opportunities as well as threats from natural change processes – vulcanoes and earthquakes as well as climate and vegetation change. In subsequent chapters the role of social complexity is investigated, culminating in the chapter on the Roman Empire; next, fragments of theory as well as some simulation models are discussed. With a 1500 year jump developments in India, Indonesia and Russia are touched upon after which the industrialization process is discussed as a process of further extensification and intensification of the anthroposphere. I hope to be able to give a presentation about the major findings in the book regarding the nature of complex

socio-natural systems and the quest for (more) sustainable development paths.

Another thing, which may be worth mentioning, is that I have worked hard over the last three months to conceptualize a RIVM-led Dutch 'Sustainability Report' for the Dutch government. A variety of Balaton topics and lessons are used and the reports of the 1997 workshop at RIVM, eloquently summarized by Dana, and the subsequent report and book by Hartmut Bossel, are key ingredients. Our discussion at the time proves to have been 'seminal'. More in general, we had in our group some interesting work published – if you would like me to bring publications let me know. The AirClim project on interactions between acidification and climate change, with Joe Alcamo as project leader, was finished recently; there are a few papers on climate change and the role of technology; and we are working on 'burden sharing issues' with regard to greenhouse gas emission reductions.

Finally: there has been good progress in La Taillède in France. A French forester with his family is living there now for 15 months – as a result there are 5 lamas, 5 donkeys, 5 sheep, over 100 ancient variety fruit trees and a forest plan which foresees a management towards more biodiversity as well as firewood exploitation. The large arcade, meant to be the seminar hall, has a new roof – and so does the adjacent house. There is great progress but, fortunately we might say after all, at the pace of the 'vie de la campagne'.

It is tempting to say a few words about the 'world problématique' as it was called in the 1960s by Peccei and others. After 9/11 – the terrorist attack only a few days after we parted – and subsequent events which were often somehow related to it, people are seeing what they didn't want to see before and reacting to it. This has not

made the world a more pleasant place to live for most of us, maybe a more honest one though. The forces against the fast, ruthless globalization process were, in my view, building up in the economic, social and psychological realm – Thurow talked in 1997 of plate tectonics. Liberalization and privatization had been eroding systematically the public space at the benefit of a few pockets of wealth and power. Prominent advocates of 'Free trade' increasingly showed their real face, which is dark of greed and opportunism. The gap in wealth and income, staggering as it was, kept growing. All these trends appear to continue – now under the guise of the war against terrorism. It is unclear whether the majority of the people will accept this overnight change in ideology – there are cracks in the outbursts of fear and anger. However, in the discussion I hear there is more focus on events than on behaviour, more on behaviour than on structure...

The stress from an ever-growing and exploited array of desires is mounting in many parts of the world – channelling them will be no easy game as soon as the economic war machine of multinational firms and banks slows down or falters. Suddenly, it seems, many people no longer believe we are on our way to a glorious Tiger World / Golden Economic Age (A1). The Balaton Group should be happy about this – after all, we associated it with Tyrannosaurus and Blade Runner. Instead, we hoped for A Better World, which could be one in which the noble goals of the United Nations are being aspired for and fulfilled (B1). Or for an Even Better World where anti globalisation forces could restore the balance between maintaining local cultural and ecological diversity on the one hand and the unquenchable thirst of humans for exchange and experience on the other.

Looking forward to see old and new friends in September –

Bert

AN ARMY FOR SUSTAINABILITY

Alan AtKisson

Alan AtKisson is president of AtKisson, Inc.; the author of "Believing Cassandra: An Optimist Looks at a Pessimist's World"; and a member of the Faculty for SustainAbility, Ltd. For more information, visit www.AtKisson.com.

If my 20-year-old self — long-haired, volunteer social worker, prone to wearing shirts made out of Guatemalan flour sacks — could see my 42-year-old consultant self, he would be very, very surprised.

For example, he would never have predicted that someday, he would be giving inspirational speeches to U.S. Army officers and civilian staff on the subject of transforming their operations in the direction of sustainability. And training them in strategic sustainability. And feeling very good about that.

Despite (or because) of his reading of "The Limits to Growth," "Small is Beautiful," and other early sustainability classics, my 20-year-old self would certainly be very suspicious about the whole affair.

How would I explain myself to him?

"It's like this," I might start. "First, the U.S. Army is huge. It touches every corner of American life, and a fairly huge hunk of the rest of the world. It's not going away any time soon, and it would certainly be bad news for global security and stability — given current realities — if it suddenly disappeared.

"Second, the Army is hugely unsustainable. It consumes enormous quantities of carbon-based fuel. It has a legacy of creating polluted grounds rivaled only by other military forces in the U.S., Russia, and elsewhere (and of course the Department of Energy's nuclear installations). The Army's strategy for fighting wars involves flying 70-ton gas-gulping tanks around the world, at a rate of one tank per kerosene-guzzling transport plane."

"Thirdly, the Army has decided to spend the next 20-30 years transforming itself. The whole 70-ton-tank thing doesn't make sense anymore. And when the Army decides to do something, it does it — with surprising swiftness and alacrity.

"It turns out that the Army's strategic transformation — with the intention of becoming lighter, quicker, and more efficient — lends itself to some creative nudging in the direction of sustainability.

"And if the U.S. Army moves toward sustainability, it will lead a lot of other people in the same direction."

If I have succeeded in getting my younger self's sustained attention, I would start offering more details

(perhaps in the hopes of convincing him to better prepare my future self for this challenging assignment).

For example, the U.S. Army Forces Command owns and runs ten major installations in the continental United States, and each of these is like a large town or small city. For every soldier getting trained and prepared to fly off to Afghanistan, there are nine other people doing various kinds of support work. Fort Lewis, in Washington State — a "small" installation with about 30,000 people living in and around it — has 800 people working in its child-care system *alone*.

So it is no small thing that the Forces Command installations have embarked on an "Installation Sustainability Program". And that these installations are busily setting long-term goals for transformation that are some of the most visionary I've ever seen.

In consultation with their surrounding communities, and a small invasion of American sustainability "wonks" — Paul Hawken, Ray Anderson, Bill McDonough and myself have all done tours of duty — they are setting long-term goals like 80% reduction in fossil fuel use. All new building constructed to Platinum standard on the U.S. Green Building Council's rating scale. Zero waste to landfill.

Why, I-at-20 might ask myself-at-42 with some cynicism, are they *really* doing this? What's their actual motivation?

Well, believe it or not, there are some living, breathing, idealistic "tree-huggers" in the Army, who care enough to work for years as internal change agents. And the Army has always been forced, in many ways, to show some leadership on environmental management, because of strict regulatory environments and the need to preserve training lands — "the outdoor classroom" — for future generations of soldiers..

But there are also new, external considerations. Even strategic considerations. And it is strategy that gets the attention of commanding generals.

First, the Army is worried about losing training grounds. These grounds have, for example, filled up with lead over time, as bullets have settled in for their long post-flight slumber. Pollution and noise considerations have already resulted in the loss of training grounds, or the threat thereof, with the most visible episode hap-

pening (rather messily) at Massachusetts Military Reservation on Cape Cod.

The Army is absolutely determined to win wars if called upon ... and that means soldiers must train constantly. Without training lands, no training. And without serious environmental stewardship, training lands will slowly become less and less usable.

Secondly, many Army installations are surrounded by growing communities. Some of these communities have air quality problems, or sprawl problems, or endangered species problems. Any of these problems can also reduce the training capacity of the Army.

Bad air quality day? No training today. New subdivision built on the edge of the installation, leading to complaints from the Army's new neighbors over the sound of gunfire? Reduced training ... despite the amazing lack of foresight on the part of the new homeowners, regarding what life next to an Army installation might be like.

Endangered bird species living in the forest? Reduced training ... and as the community grows/sprawls up around the base, the Army's training grounds become increasingly important habitat. (Military installations around the world are discovering a new, unexpected role as wildlife sanctuaries; one German base is now hosting the return of wolves to Germany.)

But securing training is not the only strategic consideration.

I've talked to Colonels in the Army — not necessarily known to be "green" in any but the military sense — who talk about global warming as a geopolitical stability issue, and see the Army's conversion away from

fossil fuels as essential both for internal purposes (hydrogen fuel cells are less prone to control by unfriendly dictators) and for global-leadership purposes. I have no idea how widely held this view is, but it is one among many sustainability-related threats that defense strategists must now consider. They must consider it because they would have to fight and win any wars that resulted from a worsening of the problem.

So, finally, I would take my 20-year-old self to a base like Fort Lewis, Washington, and invite him to watch the process. He would see environmental managers, officers responsible for training soldiers, and civilian community leaders sitting down together to talk through the issues — with surprising clarity and candor.

I would explain that my firm, AtKisson, Inc., really has a small part to play. We're just providing a little strategic planning advice, inspiration, and training, using our "Accelerator" suite of tools for such purposes: Our "Compass" for framing the issues and developing indicators, our "Pyramid" for training and planning, our "Amoeba" for speeding up the change process.

Maybe, after he listens to a three-star Installation Commander talk about the Army's serious commitment to these issues, and the Garrison Commander ask why the goal for reducing fossil fuel use isn't just "0", he'll believe my claims that this process is for real, despite the usual complexities of working for change within any large organization.

Maybe he'll join me in saying things like, "I've always believed that sustainability needed an army of people working for this goal. But I had no idea that a leading part of that army could someday be the actual Army."

And then maybe he'd go back and help me out ... by taking a course in military history.

UPDATE ON THE LAKE BALATON VULNERABILITY AND ADAPTATION PROJECT

László Pintér

At last year's Balaton Group meeting a small group of us assembled for an informal afternoon meeting to discuss the relevance and feasibility of a project dealing with the status and future trajectories of the Lake Balaton system. We felt that due to a series of pressures arising locally, including tourism and agriculture, and regionally/globally, such as climate change, there is a strong possibility our and many millions of others' beloved lake may be entering a new phase of significant stress and uncertainty. The purpose of this project would be to assess and communicate the possibility, direction,

causes and magnitude of the anticipated change, and to help catalyze the recently opened (or) initial dialogue on policy options and adaptation. With regard to process and analytic approach, the project could also point the way for other lakes dealing with similar problems.

Based on our discussions in Csopak, I contacted a series of organizations potentially interested in the initiative, including the Division of Early Warning and Assessment of the United Nations Environment Programme (UNEP) in Geneva. We also started draft-

ing a project proposal. According to the draft plan, the project would be undertaken by a small consortium of partners, including the Balaton Group and possibly UNEP, represented by a small panel of 4-5 BG members with the most relevant expertise and interest. We are also in the process of contacting a series of Hungarian partner institutions. The project would run for around 1.5 years and have the following key attributes:

- Spatial unit of analysis includes Lake Balaton and its watershed, with emphasis on cross-scale linkages, e.g. policy linkages from the regional to the national and EU level; ecological linkages from the sub-basin to the watershed and global level;
- Key variables of interest include, among others, water quality and quantity and associated vulnerability of the human system; building on existing scientific knowledge and stakeholder perspectives, project to identify a concise set of Balaton-specific socio-economic and ecological indicators;
- Specific attention to the possible implications of climate change on lake dynamics;
- Strong multi-stakeholder, participatory element from the start through public fora and science-policy consultations;
- Retrospective description of trends and interactions based on key indicators, in most cases compiled from existing sources, in a few cases involving the generation of new data, e.g. previously unavailable satellite images, both historic and current;
- Construction of integrated model-based outlook, in consultation with stakeholders to identify emerging environmental threats and socio-economic vulnerabilities;
- Identification and ‘flushing out’ of possible adaptation pathways and policy options;
- Strong communication strategy, aimed at reaching audiences both locally and internationally;
- Attention to transferability of methodologies and findings to similar analyses and lake systems elsewhere.

We will continue working on the proposal during the remaining months of the summer, and I am planning to organize a one-day project meeting on September 9 in Csopak where key players may be able to get together and discuss both the proposal in detail and the way forward. Main participants would include interested BG members, representatives of key Hungarian partner institutions and other international participants. Balatoners with interest in the project should write me for the latest version of the proposal.

OUR NEGLECTED WEALTH

Jonathan Rowe

Jonathan Rowe is a fellow at the Tomales Bay Institute, and a former Monitor staff writer. This article appeared in the Christian Science Monitor, from the April 30, 2002 edition. <http://www.csmonitor.com/2002/0430/p11s02-coop.html>

For a preview of the next big turn of the political wheel, we might consider a drama that is unfolding in the realm of computers and the World Wide Web.

For years, tech gurus touted the Web as a new frontier of freedom. Yet something very different has occurred. Fences and toll booths are going up all over. Marketers collect dossiers on us without our knowledge. Ads assault us at every click. The push increasingly is not to liberate information, but rather to contrive new ways to make us pay for it.

At the same time, the main portal of this new computational realm – the Windows operating system – is governed by a secret and proprietary code. Individuals

can't fix their own problems or share improvements with others. All innovation must come down through a corporate hierarchy instead.

This is not what high-tech pioneers had in mind when they designed the basic architecture of the Web. Today, they feel a little the way the American colonists did when, having settled a vast new land, they found themselves still dominated by British government. The result has been a renewed interest in an old economic concept – namely, the commons.

The commons is the part of life that is neither the market nor the state, but rather is the shared property and heritage of us all. It includes the gifts of nature, such as

oceans and atmosphere, wilderness areas, and the quiet of the night. It has a social dimension, too, such as language and culture, the stories and games of childhood, the street life of a city, the accumulated knowledge of humanity. Nobody owns these. The government does not control them. They are open and free to all.

"The commons is not a relic of some pastoral age," writes David Bollier in his new book, "Silent Theft." It is, rather, a "reservoir of valuable resources."

The commons is easy to take for granted, like a parent's care. But we could not exist without it. Consider the shops on a traditional Main Street. They couldn't thrive without a sidewalk to bring customers, a common language through which to transact business, an ambient civility and respect for law, and so on. Or take scientific research. The great breakthroughs have arisen from a commons of shared knowledge and inquiry; the Web itself thrives on this idea. And, of course, no human undertakings can exist without air to breathe and water to drink.

This isn't the government we are talking about here. It is, rather, the mother lode of government and market both. Yet the present obsession with the market has put the commons under siege. The degradation of the natural environment is by now well known, but it is matched in the social environment as well. Shopping malls have displaced the commons of traditional Main Streets, for example, with their spontaneous mix of social, civic, and commercial life. The commons of childhood stories and play have given way to commercial media. Corporations have hijacked the names of cherished local places, as when Boston's hallowed Garden sports center became the Fleet (Bank) Center.

Meanwhile, cellphones and electronic amplifiers have devastated the commons of quiet. The list goes on and on. Americans feel harried, stressed, and under siege; and the erosion of the commons is a major reason why. It is life's basic buffer zone, support system, and safety net; and without it we feel impoverished, even amid market wealth.

If one looks closely, the effort to reclaim the commons is a hidden thread in many of the movements stirring in the country today. One sees it in the resistance to Wal-Marts, which are decimating local Main Streets, for example, and in the way developers are going back to the traditional village model, with its abundant commons of sidewalks and neighborhood shopping. Sports fans are protesting the sale of stadium names to corporations; parents are fighting the assault of advertising in the schools.

Hackers, meanwhile, are taking back their computers through free software they develop themselves through the cyber commons. The new cellphone-free "quiet cars" on Amtrak attest to a growing desire to draw the line and say to the forces that would invade our commons: "Thus far and no farther."

This nascent political movement does not fit the hoary left/right mold. It is not antimarket, because a market needs a commons, just as shops need sidewalks and life needs air. As Mr. Bollier puts it, "protecting the commons is about maintaining a balance, not bashing business."

By the same token, the new commons movement does not seek to expand the role of government in our lives. The state can undermine the commons much as the market can, as the former Soviet Union showed all too well. Instead, this movement invokes government the same way the advocates of the market do, to establish ground rules and boundaries.

Few foresaw that, a decade after the Iron Curtain fell, Americans would be fighting new walls and impositions of their own making. Still less did they expect that an old concept like the commons would reemerge at the cutting edge of techno-economic change. But new problems often lead back to old wisdom. As Wilhelm Ropke, the late conservative economist, once wrote: "The market economy is not everything. It must find its place within a higher order of things."

SUSTAINABLE CONSUMPTION IN CHINA

Vicki Robin

The audacity! With the official stance that the Chinese economy must grow at 7% a year just to keep up with the vast slosh of population growth, how can anything in China be sustainable? Everywhere you go, huge apartment blocks are propagating themselves so fast you'd think they'd mastered asexual reproduction. People say that a generation now in China is 5 years – that's how fast everything is changing and growing.

Then you also have the petty corruption of party official in the hinterlands who work around all dictates from above to maintain their small fiefdoms and income streams. For example, apparently farmers in one area buy 2 bags of pesticide for every bag of seed, even though they don't use it and even though it might be banned. Why? The local party representative's brother ran the old pesticide factory. If the farmer wants his seeds, he seems to need to buy the pesticide. The accession of China into the WTO means that industrial agriculture will soon take over from peasant ag, "releasing" a quarter of a billion peasants (that's the US population!) into the cities. That's a lot of low priced labour, challenging a bit the "equity" part of the sustainability equation. Not only that, it became clear to me that the Chinese value the good of the collective over the good of any one individual. People, as we've heard with horror, are simply more expendable there. Call it cruelty, call it a cultural value we don't understand – it still means that sustainable consumption isn't soon going to look like what Northern Europe has led the world into understanding.

Yet the Global Village of Beijing valiantly and quite elegantly put together an intellectually excellent, well organized conference on Sustainable Consumption right in the centre of power: Beijing.

The GVB itself is unique. Founder Sherry Liao (Liao Xiaoyi) was a philosopher and film maker who'd come to the US to get an advanced degree in Politics and Public Management. While here she discovered the amazing NGO (non profit) sector, a piece of society almost totally absent in China. NGOs in China are for the most part attached to government agencies, or they don't exist. I know, I know, how can they be governmental non governmental organizations, but... don't ask. Sherry returned to China on fire. She saw a complementary role for NGOs as educators of citizens on environmental issues and on personal responsibility for change. She formed her own organization AND is helping to build the whole NGO sector out of little citizen action groups and NGIs (non governmental individuals – a new term I learned). She's got a knack for getting people to devote themselves to the cause for pennies (RMB's, actually). She knows how to work the media and has gotten herself photographed

with many national and international leaders. She has friends in high places but isn't controlled by them. She isn't adversarial, yet she's fearless in naming what's wrong. For all this, she won the prestigious Sophie Prize in 2000 for environmental leadership.

The Heinrich Boell Foundation of Germany generously funded the conference and the China Consumers' Association and the China National Committee for Pacific Economic Co-operation Council co-sponsored it. I mention this simply as more evidence that GVB can pull in significant partners. The logistics were impeccable, the speakers, mostly Chinese but a few from International agencies, were highly credentialed and intellectually sophisticated. There was spirited debate from the participants, mostly from citizen environmental groups. Yet each evening, dead tired, I'd return to my hotel room and English language Chinese TV extolling growth and progress, military operations, border protection, trade agreements and global economic integration. Ancient arts were extolled – this is who China says it is. Yet modernity was extolled – this is how China will enter – and prove itself to – the world community.

During the day we'd talk about post industrial China where we link to traditions and start from ourselves, where the power of the individual and the power of the deep past inform a good future. We talked about how in the age of globalization, the state cannot manage, that community is the ideal social organization, that the empowered, informed consumer is the key. We talked about conscience, love, wisdom and rationality. We talked about the Chinese values that will make it a leader in sustainable consumption:

1. They value savings
2. They value resources and know they are not infinite
3. They value virtues; moral culture – making efforts every day – is the 5000 year old wisdom of China
4. They value future generations
5. They value harmony — with nature and man

During the day we heard about progress in indicators of sustainable consumption, about social marketing of organic food in Germany as a model of changing consumer behaviour, about the progress in the UN agencies since the Earth Summit in 1992 declared sustainable con-

sumption and production a global priority. Emphasis was given to the Ecological Footprint (www.rprogress.org), with a delightful presentation by a Hong Kong activist who had a 100 foot (or so) ticker tape showing the footprint calculation of a Big Mac unfurl from a huge hamburger and ring the conference hall. "Never again," one would think seeing that demonstration – and school children all over Hong Kong HAVE seen it.

My own message was simple. There is a hidden cost to the American Way of life. Between 15% - 20% of the American public is making efforts to simplify in the face of massive encouragement to spend and hurry. ***Your Money or Your Life*** is a popular tool people use to analyze for themselves the trade-off between time on the job and the high cost of high living. China has ancient, embedded values that can help it make a better choice - to take the best and leave the rest. But they need to choose. People really loved it.

But at night the TV beat the drum of modernity and outside the hotel the bulldozers continued to "metabolize" old Beijing and transform it into highrises. And outside on the streets McDonalds, KFC and Starbucks continued to peddle the American way through their brilliant capacity for reproduction of their models of quick, small luxuries.

The Official Story

I'd like to quote directly from GVB's opening statement about "sustainable consumption", since it is already eloquent.

"'Sustainable Consumption' is a challenge against the old non-sustainable consumption pattern of industrial culture that relentlessly pursues material satisfaction at the expenses of its own homeland, culture heritage and human spirit. The old system turns the human being into a production and consumption machine.... 'sustainable consumption' is a new life style based on energy efficient building, public transportation, food safety, waste recycle and green labels. It emphasizes quality of life in lieu of materialism... it is echoed in our daily life when we buy, use and discard a consumer item. It minimizes negative environmental impact through the practice of the 5-Rs; reduce, re-evaluating, reuse, recycle and rescue wildlife (from poachers serving markets for meat and medicinals).... (It) enriches

social harmony and condemns greedy desire of materialism. Human happiness cannot be gained from materials alone. It comes from harmony between man and nature and from inside the human spirit... It embraces individual consumption behaviour into the national economic policy. (It) is everybody's business... (It) is a new lifestyle, anew fashion... a new kind of wisdom for living.... China, in its decisive role for the global economy, has a heritage of 'caring of nature,' 'loving the young' and 'conserving resources.' With its five thousand years of culture and civilization converged around nature harmony, China is uniquely qualified to stand up and promote 'sustainable consumption.' We want to make this generation the 'Generation of Green Life Movement' to influence the world and make a difference for our future."

Stirring rhetoric – and representative of the pluck and intelligence throughout the meeting (to read more, go to:

<http://www.gvbchina.org/English/englishintro.html>

Meanwhile, elsewhere in China, people were being summarily executed for corruption, for mismanagement of party funds, for murder. Meanwhile, somewhere in China some of the 100,000 yearly uprisings over food and lost wages were underway. Meanwhile, most of the devoted development workers I spoke with admitted that deep down they believe that in the race between sustainability and collapse, the latter is winning by many miles. Yet that doesn't keep them from working diligently for change... and it didn't keep Sheri and I from cooking up some creative schemes for partnership towards a sustainable future.

Sheri sees herself promoting Green Life (in a country that is gladly welcoming all the dirty manufacturing from the rest of the world) and me the Simple Life (in a country that worships speed, wealth, excess and short-term gratification). Together the Green/Simple practices and values make a whole. Together, a Chinese woman and American woman might make a difference in a way neither can alone. Together we might write articles, make statements to the press, make videos, organize delegations to one another's conferences and use our strong hearts and wills to attract people away from the cataclysm we both see coming. It is appealing – very appealing. At very least, she'd love to have more US simplicity leaders at next year's China Sustainable Consumption Forum.

SYSTEMS THINKING SECTION

Compiled by Jeel Ezzine

Introduction to System Dynamics (V 1.0)

<http://www.albany.edu/cpr/sds/DL-IntroSysDyn/>

This resource is a great help to those in search for an introductory free-online-text to System Dynamics (SD) and Systems Thinking (ST) with Energy as its main concern. This online Book will also be of great appeal to those preparing for our coming Balaton meeting. Indeed, this online book uses SD and ST to introduce the important issues of energy dynamics as well as energy policy without ignoring the important question of the "Oil Peak" and its history.

Here are few words from the cover page:

"Energy policy is well suited for a "systems approach" because those who study, design, and implement national energy policy must not only understand the complexities of our nation's energy sector, but how energy issues influence and "connect" with national policy concerns such as economic growth, technology development, national security, international trade, and environmental conservation, just to name a few."

Special Issue of the *System Dynamics Review* Honoring Dana, from John Sterman

A special issue of the System Dynamics Review honoring Dana will be published this summer (volume 18, number 2). Edited by John Sterman, the issue includes papers by a few of Dana's close colleagues and former students, including Dennis Meadows, Gerald Barney, Drew Jones and Don Seville, Tom Fiddaman, and Krystyna Stave (the table of contents follows). One of Dana's "Global Citizen" columns is reprinted between each article. The issue also includes a section from Dana's book (with Jenny Robinson), *The Electronic Oracle*, discussing implementation and the transformation of modeling practice Dana believed is needed for systems thinking and modeling to fulfill its potential to catalyze effective action for the long-term benefit of the planet and all its inhabitants.

If you aren't a member of the system dynamics society, now is a good time to join, so you can receive a copy of the special issue. See the System Dynamics Society page at <http://www.albany.edu/cpr/sds/> for information on becoming a member.

I also want to thank John Wiley & Sons, the editors of the Review, Diana Wright and the entire staff of the Sustainability Institute, IIASA, and all the authors for their help with the special issue.

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LEAD & Sustainability Institute systems thinking course, from Drew Jones

Gillian Martin Mehers of LEAD is working with Phil Rice and Drew Jones of Sustainability Institute, with Dennis Meadows of UNH as an advisor, to develop a short course on systems thinking for international people working on sustainable development. The course will be taught by international LEAD staff who have participated in a "train the trainers session."

There are two particularly challenging goals for the course. The first is to create curriculum that could be taught effectively by someone with two to four days' training in systems thinking. The second is to avoid the reaction we have seen to the courses some of us have taught that survey the key concepts and insights of the field and provide suggestions for application to real world issues – participants sometimes say 'Interesting. Great way to think. Now what am I supposed to DO

with it?' Therefore, we are helping participants apply core concepts of the field – reinforcing and balancing feedback, for example – to the challenge of designing and supporting projects that will lead sustainable development in their countries. For example, we'll explore how it can help to find ways for results to build on themselves or avoid secondary side-effects that thwart the results you intend.

Dennis hosted the pilot test for the first day of the course on June 25, at his center in the U.S., and he will host the first LEAD training session during the week of August 12. SI and LEAD will then create facilitator's manuals, participant's manuals, and other support materials.

For more information, contact LEAD or Drew Jones at Sustainability Institute – apjones@sustainer.org.

ANNOUNCEMENTS

Climate Change Website, by David Ballard

You may be interested to have a look at the climate change website that my wife Sue and I have been building at Oxford University in the UK.
www.changingclimate.org

I have finally realised that it will never be absolutely finished and that I need to overcome my nervousness at asking people to give feedback or to participate. We have just told the search engines of its existence and would expect usage to build over the next few weeks.

The site is very flexible and can easily support a series of papers from - for example - a conference or a seminar - where interactivity is seen as a good thing, particularly where cross-boundary communication is welcomed. If anyone is interested, let them contact me and I will explain.

The emphasis is very much on participation and on linking research with action and with initiatives. It does embody a partial view of how the web might support

larger scale change. For instance, we are trying to support within-group connectivity and to promote cross-group connectivity.

Sue and I remain on this project until September when it will be taken over by the host institution.

We see the project as only just having begun and aim to spend the next few months learning how to encourage the interaction and to help information to flow 'in new ways, to new recipients, carrying new content, and suggesting new rules and goals' (Dana's words in *Beyond the Limits*). We may then try again in the light of experience on this project.

We would very much welcome contributions from you or from students, colleagues, friends, etc. There are still links we haven't made yet and many articles still in progress but we hope that others can help us to fill the gaps. It is rather too UK oriented at present but that needn't remain - we would welcome notice of events outside the UK, articles, etc.

Tracking the ecological overshoot of the human economy, by Mathis Wackernagel

We are excited about our paper "Tracking the ecological overshoot of the human economy" being published in the Proceedings of the National Academy of Sciences (PNAS). This study (to which 10 researchers from 6 nations contributed) documents that in 1999 we

were using the planet 20 percent faster than it can regenerate.

I believe this is the first quantitative global overshoot story in a "respected science journal."

Even better: we are getting lots of press interest. This is particularly exciting, since it is the first time the footprint idea has received mainstream media coverage within the United States.

We've created a web page with more information about the paper and links to a selection of the press reaction: http://www.redefiningprogress.org/programs/sustainability/ef/pnas_0602.html.

These outlets covered the topic pretty well. I was positively surprised.

Copies of the article can be downloaded from the www.pnas.org web site for 5 dollars. You can use the page above to find a direct link to the PNAS web site.

We should also get a few hardcopies that we can send out on a limited basis. If you are part of an academic institution, they should have (electronic) copies for you available through your library system.

Following is our press release.

REDEFINING PROGRESS MEDIA RELEASE

HUMANITY'S RESOURCE DEMAND EXCEEDS THE EARTH'S CAPACITY PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES PAPER PUBLISHED ON-LINE TODAY

OAKLAND, Calif.-Humanity's use of natural resources, or Ecological Footprint, has exceeded the regenerative capacity of the Earth since the 1980s. The finding is outlined in a paper published on-line today for the journal Proceedings of the National Academy of Sciences (PNAS).

Redefining Progress Sustainability Program Director Mathis Wackernagel is the lead author of the paper, "Tracking the ecological overshoot of the human economy." He and his colleagues reached their conclusion by comparing humanity's demand on the environment to the earth's supply of bioproductive areas over the past 40 years.

People may purchase and download the paper from the PNAS web site at <http://www.pnas.org/cgi/content/abstract/142033699v1>.

"Sustainability requires living with the regenerative capacity of the biosphere," write Wackernagel and his colleagues. "In an attempt to measure the extent to which humanity satisfies this requirement, we use existing data to translate human demand on the environment into the area required for the production of food and other goods, together with the absorption of wastes."

The researchers assessed the total area globally available for growing crops, grazing animals, harvesting timber, accommodating infrastructure, marine fishing, and absorbing carbon dioxide produced by burning fossil fuels. They then calculated how much area would be required to sustainably meet human demand for these various activities.

According to this analysis, human demand (or Ecological Footprint) in 1961 was about 70 percent of the Earth's regenerative capacity. By the 1980s demand had risen to match total global supply, and by 1999 demand exceeded supply by at least twenty percent. It takes the biosphere, therefore, at least a year and three months to renew what humanity uses in a single year.

Other authors of the paper include: Niels B. Schulz of the Institute of Interdisciplinary Studies of Austrian Universities; Diana Deumling and Chad Monfreda of Redefining Progress; Alejandro Callejas Linares of the Centro de Estudios para la Sustentabilidad; Martin Jenkins and Valerie Kapos of the World Conservation Monitoring Centre; Jonathan Loh of WWF International; Norman Myers of Green College, Oxford University; Richard Norgaard of the Energy and Resources Group, University of California, Berkeley; and Jørgen Randers of the Norwegian School of Management.

Redefining Progress is a non-partisan public policy organization that creates policies and tools to encourage accurate market prices, preserve our common assets, and foster social and economic sustainability.

NEWS FROM THE MEMBERS

From **Valdis Bisters**:

I have been elected as Chairman of the Baltic 21 for 2 years starting with July 2002. Agenda 21 for the Baltic Sea Region, Baltic 21, is a concrete example of regional partnerships focused on eight sectors: Industry, Energy, Transport, Tourism, Forests, Agriculture, Fisheries and Education as well as on Spatial Planning. The work comprises eleven countries around the Baltic Sea, Iceland and the European Commission. International Governmental Organizations as well as environmental, scientific and industrial NGO's contribute to the implementation of the program. The Baltic 21-process has some unique features that make this process interesting also for other regions in the world:

The format with an Agenda 21-process among a smaller group of heterogeneous countries sharing long-term goals for the region and working with mutually agreed specific targets and indicators.

The basic idea of clear sector responsibility for sustainable development and the specific form of lead-country responsibility with two governments in charge of each sector, leading to knowledge sharing and establishment of contacts.

Education on sustainable development that will be implemented in all levels of education, formal as well as non-formal.

* * *

Alan AtKisson writes from Stockholm, Sweden:

Work is fun, but parenthood is wonderful. Our daughter Saga, 11 weeks old as I write this, gives us a whole new appreciation of the word "development".

The fun of work recently included our first "Change Agent Intensive," a 2-1/2 day workshop for professionals seeking to deepen their understanding of sustainability and systems change. 20 people from seven countries came to Sweden for the event, including two Balaton members (Aromar Revi and David Berry; both were also presenters).

After a dinner in Stockholm at an old palace, we bussed out to Ekotopia, a new environmental training center (solar energy, local sustainable wood, etc.) built by the small Swedish township of Aneby. The facility was both lovely and effective, facilitating both the intellectual work of using our Accelerator tools, and a strong team-building bond. (That means, we had a good party afterwards.)

In addition to intensive work with tools like the Compass, Amoeba and Pyramid — all of which were helped along in their development by Balaton meetings and processes — David Berry told the amazing story of creating the "Inter-Agency Working Group on Sustainable Development Indicators" and getting it special White House approval. He reminded us that all social systems are "made up," which means we can remake them. Aro stunned the group with an interpretation of Dana's paper on "9 Ways to Intervene in Systems". As usual, many minds were expanded, a few were left panting. We were especially pleased to welcome two colleagues from Thailand who are using our training tools with Asian environmental leaders on one of the rice-barge programs that Chirapol Sintunawa has described to us.

We hope to offer these Intensives once in a while, around the world, in addition to our regular training and indicator programs, which we continue to present to clients like the U.S. Army or the New Orleans region. Here in Sweden, we're continuing our cooperation with the Natural Step, working with Swedish cities.

Finally, to my gratitude and embarrassment, the State of Queensland, Australia, decided to produce a 2 CD-Rom set of my presentations there. It allows the user to just click around from topic to topic, and hear me spout off for 2-4 minutes each on a variety of topics, from sustainability indicators to systems thinking. And watch me sing a few songs (again, Balaton-inspired). Saves me from traveling to some extent — it already helped our Thai colleagues prepare to teach from our materials. Let me know if you want a copy; we're still figuring out how to distribute it outside of Australia.

Hope to see more of you in my adopted part of the world sometime ...

* * *

News from **Carlos Quesada**:

My regards to everybody. I am looking forward to this year's meeting as we enter the second decade of the foundation of the Balaton Group. It is also rewarding that a rejuvenation of the group will be happening, as younger people of a new generation will join the older core group, as Donella Meadows Fellows. We hope that these newcomers carry on very high, and with pride, the name of a key founder, our beloved Dana.

Regarding our Center CIEDES (Research Center on Sustainable Development), I am proud to announce that a few weeks ago, I got the news from Mr. Jack Dangermond, President of ESRI, that we will be receiv-

ing the Special Achievement Award in GIS (Geographic Information Systems) at the Environmental System Research Institute (ESRI) users conference in San Diego, California. ESRI is the producer of the GIS software commercialized as Arc Info and Arc View. (See copy of the Email letter at the end of this Email.)

Mr. Dangermond came last April to our University of Costa Rica to deliver the Inaugural Lecture in celebration of the 60th anniversary of the creation of the college of Engineering. Among other things, he had the chance to visit our Center, and became very impressed with the level, innovation and diversity of applications of GIS technology to engineering and bio informatics. I did not have any idea we could get a prize like that, I did not even know it existed.

Since the topic of this year conference is GIS for sustainable development, ESRI wants to make a showcase for the work of CIEDES and it will be providing a special place in the posters display, where we will be presenting about a dozen posters summarizing applied research in our work. We are now very busy with the translation job. The users conference in San Diego, is expecting to surpass twelve thousands participants this year.

Along with this prize, come other commitments, since ESRI will be providing new software licenses and more co-operation opportunities. Among other things, they want to summarize and translate into English most of our research work using GIS, and publish it in a book which they will be funding, and which it will give me an opportunity to hire Ingrid Rodriguez to do the first English translation and lay out, while ESRI does the final editing.

Two of my immediate family are presently attending short training sessions in Germany. My wife Alicia will be at the University of Kassel for two and one half months (May to mid July), attending some lectures and working mainly in an Education research project. My daughter Tania was invited for two months (early June to early August), to do cellular and molecular biology research work in the Institute for Plant Virology, Microbiology and Biosafety, in Braunschweig, near Hannover.

The country has a new government since may 8th, and we are wondering what will be happening since it is lead by a very unconventional president Dr. Abel Pacheco, a psychiatrist and clever communicator, which has promised to take environment very serious. However, he is backed by an ideological collage of political positions and individuals, from committed Christian Socialist to hard line neo liberals. In his party you will find the extremes in terms of social classes, from the poorest of the poor to the very wealthy. What will happen no body knows, especially with the expected economic adjustments.

I have been very busy in a variety of projects and trying to get funding for our self sustained research center. I still keep quite active coordinating the environmental commission of the Citizen Action Party, which in just one year from his formation got 25% of the seats in congress. Our main work is focused in supporting the new elected congresspersons to help them make a difference in our environmental, ethical, social and economic policies.

Regarding the award given to CIEDES, the following is an abridged version of Mr. Dangermond communication:

Dear Dr. Carlos A. Quesada-Mateo,

It is my distinct pleasure to inform you that CIEDES - Universidad de Costa Rica has been selected to receive a "Special Achievement in GIS" award at the Twenty-Second International ESRI Annual User Conference. This award is being given to user sites around the world in recognition of their outstanding work in the GIS field. Your organization was selected to receive this award from over 100,000 sites worldwide. It is quite an honor.

Congratulations for achieving this special honor. I commend you and your coworkers on a job well done and look forward to meeting you at the ceremony.

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Mathis Wackernagel is still enjoying life at Redefining Progress-and even more so beyond RP with his son André who is now over a year old (one day older than Gillian's Atticus). At Redefining Progress, we are struggling with the economic situation, a challenge we share with many NGOs in the US after 9/11. But the interest in our footprint work is strong. For instance for the Johannesburg summit, we are supporting WWF International with another Living Planet Report, featuring our most detailed ever ecological footprint accounts. This 2002 report will be launched on the 17th of July. This year, we added a section on peaking into the future, using World3 (with the help of Jorgen Randers and Dennis Meadows).

To accommodate us, Jorgen and Dennis created two new output variables for the World3 model: a simplified ecological footprint and a simplified human welfare index (imitating the one of UNDP).

Here a little preview of the findings. Based on the UN, IPCC, and FAO reference scenarios, which assume slowed population growth, steady economic development, and more resource-efficient technologies, the world 's ecological footprint will continue to grow be-

tween 2000 and 2050 from a level 20 per cent above the Earth 's biological capacity to a level between 80 and 120 per cent above it. In these scenarios, 9 billion people in 2050 would require between 1.8 and 2.2 Earth-sized planets in order to sustain their consumption of crops, meat, fish, and wood, and to hold CO2 levels constant in the atmosphere.

Here, the World3 computer model comes handy, since it was developed to explore what may happen when the human footprint exceeds global capacity. We ran two World3 scenarios: a standard run, which assumes no policy changes over the next 50 years; and an accelerated technology scenario, which assumes significant improvements in resource efficiency. In the standard scenario, the HEF grows and peaks around 2040 at about 150 per cent above the Earth's biological capacity while the HWI climbs to around 20 per cent above the 2000 level in 2030 but then falls away rapidly, as the Earth's productive ecosystems are no longer able to sustain high levels of human consumption. In the accelerated technology scenario the HEF reaches a maximum of 60 per cent above biological capacity in 2020 and then declines back to the 2000 level by 2050, as more resource-efficient technologies reduce the footprint, while the HWI climbs and remains at almost 20 per cent above 2000 levels.

I hope humanity will have the wisdom to choose the more comfortable path. Also, if you cannot wait for the Living Planet Report, visit our calculator to figure out how many planets it would take if everybody in the world followed your (lifestyle) example:
www.MyFootprint.org

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In a message to Dennis Meadows, **Pavla Polechova** writes:

I am involved in an analysis of the whole Czech educational system and have some access to international research data. My focus is really equal opportunities - using diversity as an asset. At the school level, I am exploring the potential for co-operative learning. I also already have had several opportunities to contribute to materials being developed for governmental-level use (namely, the Ministry of Education). I feel that I am doing good things for people that deserve non-standard opportunities. Within my projects, I managed just THIS year to help finance international travel for 18 people, mostly teachers. In June I am taking 5 teachers to a Co-operative Learning Conference in Manchester, UK, and have organized side visits of two schools and a meeting with a recognized expert on Inclusion in education.

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Some news about the activities of **John de Graaf**:

John de Graaf is currently working on three major television documentary projects: **HALF FULL**, a look at the unfinished campaign against hunger (he was filming in early June at the World Food Summit in Rome); **A WIN-WIN WORLD**, an examination of product labeling—focusing on certified wood and fair trade/shade grown coffee—as a response to economic globalization; and, **GETTING THERE**, a series on the future of transportation. The paperback version of his book, **AFFLUENZA: THE ALL-CONSUMING EPIDEMIC** is coming out in July. He is also currently working with Balaton member Vicki Robin on The Simplicity Forum, especially on building **TAKE BACK YOUR TIME DAY**, a US national event planned for October 24, 2003. The event will feature teach ins at American colleges and universities—30 are already signed on, Free Time Fairs in many cities, March of Time protests, and lobbying efforts for shorter worktime. The goal is to bring US annual work hours in line with western European norms—which now average 9 weeks less work than in the US. This is an essential campaign to counter the epidemic of overwork which now threatens American health, family and community life and the environment. John will be editing a handbook for **TAKE BACK YOUR TIME DAY** (agreement with a publisher is near). He would greatly appreciate your ideas and help on this enormous project.

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Marina Fischer-Kowalski writes:

The last months saw me so incredibly busy (seeing my very school-averse son through his final exams, on top of everything else) that I hardly responded to the Balaton mailings. I am very grateful though for this access to information that would never be passed on to me through the public media. I highly value this chance of participating in some kind of "Gegenoeffentlichkeit" (to use the Habermas/Negt terminology). I will not be able to come to this year's meeting because I start my sabbatical at Yale University in September, and will spend the months Dec-Feb at the Federal University of Rio de Janeiro. Any contacts there someone might suggest would be very welcome! One of the tasks that kept me very busy lately was the design of a "Geoscope"-project for the EU-RP6 that seems to me to link nicely with the MAPPAE MUNDI efforts (beautiful book!) of Bert de Vries and Johan Goudsbloom (see <http://www.PIK-Potsdam.de/~wlucht/gS/contacts/index.html>). This should be developed fully during the next months - suggestions welcome! I very much hope to be able to join you at the meeting in 2003!