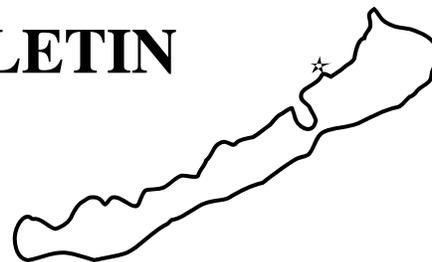


THE BALATON BULLETIN



Newsletter of The Balaton Group

APRIL 2001

SPECIAL MEMORIAL EDITION DONELLA 'DANA' MEADOWS 1941–2001

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EDITORS' INTRODUCTION

Dear Balaton friends and colleagues,

On the 20th of February 2001, Dana Meadows died at the age of 59, after two weeks of severe illness, meningitis. For everybody, this was completely unexpected, and it meant the terrible loss of a loving and inspiring friend and colleague. In the weeks of her illness, she was surrounded by the love and care of many close friends and family members. All Balaton Group colleagues were with her in thought and love.

This Balaton Bulletin is dedicated to Dana Meadows. With this special Bulletin, we respectfully honour Dana as a friend, supporter, and colleague. She has a long and multifaceted history with many of us; she has played many roles in many situations; she has inspired and supported many of us; and she has initiated a great number of important projects. Therefore, we have decided to use this special issue of the Balaton Bulletin to paint a picture of Dana's many activities and qualities as they are remembered by friends and colleagues.

On the weekend before her death, there was a Balaton Steering Committee meeting in Zürich, at Joan Davis' house. No need to say that this was a special meeting. We felt certain that Dana wanted us to conduct the Steering Committee meeting in preparation for the 20th Balaton Group meeting in September 2001, and that Dana wanted us to continue the Balaton Group network. We had no doubts ourselves of the importance of continuing this network that Dana and Dennis Meadows initiated 20 years ago and that has proved its value over all these years. Dana has been a leading personality in this network, with her professional competence, her knowledge of system thinking, her compassion for a sustainable world and especially with her inspiration, her spirit and her love. For many years she was responsible for the Balaton Bulletin and gave every issue her special quality and spirit. She inspired the discussions on the Balaton Listserv by proposing new themes, by informing colleagues about new issues and hot news, and by constructive advice and criticism in relation to contributions from others.

One and a half years ago, she decided to withdraw from the organising core of the Balaton Group and from editing the Balaton Bulletin. She chose to focus her energy on her dreams: the ecovillage and ecofarm Cobb Hill and on the Sustainable Institute she founded three years ago. She had not lost her interest in the Balaton Group, quite the opposite. But she felt it was in good hands. Fortunately, she continued her inspiring role in the Balaton Group. The Balaton Group was an important support for her. It was at the same time her base, the place where she could plant her ideas that could spread out through the world. Not the least, it was the place where she had her soulmates with whom she found comfort and could get feedback on her own ideas and dreams.

The present 'Dana's Balaton Bulletin' starts with contributions written by a number of close friends and colleagues. Though these contributions are very personal, we tried to structure a variety of special themes characterising Dana's role in different situations and for different people. These themes vary from *Limits to Growth*, the Indicators project, her Dartmouth professorship, the founding of the Balaton Group, the ecovillage Cobb Hill, the Sustainability Institute, to our personal relationships and memories of Dana. In addition, there are short personal contributions from friends and colleagues that summarize their special relationship with Dana and let us share in the wide variety of legacies she left each of us.

Regular contributions will be published in the next Bulletin, that you will receive before August.

With this 'Dana Balaton Bulletin' we hope we can offer a modest contribution to the remembrance and celebration of Dana. We thank all of you for your contributions and support, and especially we thank Diana Wright, who — as Dana's friend and editorial assistant for so many years — has put great effort into this special Balaton Bulletin, despite the sad and difficult period she was faced with in losing our beloved Dana.

Warm regards,
Nanda Gildea and Niels Meyer

Balaton Group Website

This Balaton Bulletin will be put on the Balaton Group's new website (www.balatongroup.org) being created by Aromar Revi, Bert de Vries and Alan AtKisson. The site will have two themes: information about the Balaton Group (including Bulletins), and the lives and work of Balaton colleagues, such as Dana Meadows and Wouter Biesiot (including selections of their writings.)



Photo Credit: Medora Hebert, Valley News, Lebanon, NH USA

“Global Citizen” columns in Hungarian

A collection of 82 of Dana's Global Citizen columns is being published in Hungarian on Earth Day, 2001. Included in an appendix will be excerpts of the Balaton Bulletin 1997 Spring issue on Time & Ecology.

Size 12x17 cm, 208 pages, full color cover (see <http://bocs.hu/donella/meadows-finalcut-webedition.jpg>)

Price 880 Hungarian forint (some 3 dollars).

BOCS Foundation is looking for donations to make the book available to libraries, environmental groups, journalists, students and teachers, especially among the millions of Hungarians living as minorities in Ukraine, Romania, Serbia.

For more information, please contact: Gyula Simonyi, BOCS Foundation, H-8003 Szfvar, Pf. 7. On the web: <http://bocs.hu> Email: bocs@c3.hu

Memorials for Dana Meadows

Celebrations of the life and work of Dana Meadows will happen in many different ways. On Earth Day weekend (April 21st and 22nd) ceremonies for Dana will be held in Oklahoma (where Phebe Quist, Dana's mother lives) as well as in Washington DC, Hanover NH, Boston, San Francisco, and in several other cities. The San Francisco celebration will be broadcast live over the web on April 21st at: www.simpleliving.net/DanaMeadowsSFMemorial/webcast.asp

Information on memorial service plans can be found on the Sustainability Institute website (sustainer.org).

The Balaton Group will have a special ceremony for Dana at its annual meeting in Csopak this September. A number of initiatives are underway that will finishing Dana's most important writings, and will secure the future of the Sustainability Institute and Cobb Hill. More information on these will be available on the Balaton and Sustainability Institute websites.



Photo Credit: Sustainability Institute

HOW THE LIMITS TO GROWTH HAPPENED

Excerpted by Dennis Meadows from an unpublished manuscript by Dana Meadows: Twenty Years Closer: A Personal Reflection on Growth, Limits, and a Sustainable Future, © Donella Meadows 1991. All the words are Dana's except for a few clarifying notes by Dennis in parentheses.

The *Limits to Growth* project began for us one winter day in 1963 when Dennis Meadows was browsing in the Carleton College placement office in Northfield, Minnesota. He was looking for an interesting graduate school, preferably near Boston, where I was already studying for a Ph.D. in biophysics at Harvard. Our wedding was scheduled for the day of his graduation.

Dennis picked up a brochure about the MIT Sloan School of Management. The brochure listed Jay Forrester as one of the school's distinguished professors. Dennis found, *Industrial Dynamics*, Forrester's (first) book, fascinating. He applied and was accepted for graduate work with Forrester at MIT.

Six years later, we had two newly minted Ph.D.'s (in management and biophysics). We took off our graduation robes and loaded ourselves and our gear onto a cheap charter flight for England, where we picked up a new Land Rover, fitted for camping in rough places.

Off to Asia

We intended to drive to Sri Lanka (called Ceylon in those days) and back, climbing mountains and kayaking wild rivers along the way. We had no noble motives. We were out for (a year of) adventure and a break from academic work. I was signed up to return to a postdoctoral fellowship on hemoglobin chemistry at Harvard. Dennis intended to work with Forrester on industrial dynamics at MIT.

We drove (from England and Western Europe) through Turkey, Iran, Afghanistan, Pakistan, India, Sri Lanka. We camped in deserts, jungles, mountains, and villages. I started the trip a child of the Sputnik age, a technological optimist, a scientist-in-training. I thought science could solve all problems. We didn't have to drive very far east into Asia to run into problems that my nuclear magnetic resonance spectrometer couldn't solve. For the first time in our lives we were face to face with malnourished children and kids with the open sores of smallpox. We saw beggars, and houses collapsed by earthquakes, and sewage running in open drains alongside streets. In the Indus Valley we saw galloping soil erosion; in Sri Lanka we saw the beginnings of a massive hydro dam that would flood out (hundreds of) square miles of jungle. We also saw dancing and singing, beautiful handcrafts, simple but ingenious native technologies, and ceremonies of deep spirituality.

As we traveled, we got less interested in mountaintops and white water and more interested in how people grew their crops, built their houses, made their living, raised their children. We began to wonder about the causes and consequences of poverty and development, population growth, erosion, deforestation. As the Land Rover bounced painfully across miles of dusty desert, we tried to make sense of what we were seeing.

Since Dennis had just spent five years (studying) with Jay Forrester, it was inevitable that much of our talk was about interrelationships and dynamics. What was the *system* of poverty? What was the *process* of development? What were the *dynamic implications* of populations that were soaring while trying to live upon soils that were washing away to the sea?

We returned in the summer of 1970 to a country that had just put astronauts on the moon, bombed Cambodia secretly, and shot (and killed several of) its own students at Kent State University. We were appalled at the violence and the corrupt and divisive politics. We couldn't imagine why the people in our home towns needed so much *stuff*. Even with all that stuff, even though they didn't have smallpox, and their babies didn't die from hunger, our families and our childhood neighbors seemed to us manifestly dissatisfied. Vastly wealthy by Asian standards, they were not noticeably happier than the villagers with whom we had spent the last year.

We were still reeling with the culture shock when the Club of Rome arrived at MIT.

The Club of Rome

The Club of Rome was an informal group of successful men from industry, science, and government, who were bound together by their determination to bring a global, long-term perspective to the public discourse.

Aurelio Peccei was the Club's founder, heart, and soul. He was silver-haired, urbane, warm and grandfatherly and dignified and demanding. He switched comfortably in international meetings from Italian to Russian to Spanish to French to English. Aurelio was a founder of Alitalia, and an executive of Fiat, Olivetti, and his own international consulting firm, Italconsult. An Italian by birth, an economist by training, Aurelio had lived in China and Argentina and had been a member of the Italian resistance in World War II, caught and

tortured by the Mussolini regime. Somehow he came out of that experience hopeful for humanity. Here is how he puts it:

My 11 months of captivity were one of the most enriching periods of my life, and I consider myself truly fortunate that it all happened. The most vivid lesson in dignity I ever learned was that given in such extreme straits by the humblest and simplest among us, who had no friends outside the prison gate to help them, nothing to rely on but their own convictions and humanity. It is perhaps from the experiences of that period that I began to be convinced that lying latent in man is a great force for good, which awaits liberation; and that modern society has yet to discover the way of liberating it. I had a confirmation that one can remain a free man in jail; that people can be chained, but that ideas cannot.¹

Released from prison long ago, now aging, wealthy, wise, Aurelio Peccei circulated constantly about the world to conduct business and family affairs. He was worried about what he saw. (He summarized his concerns in a prescient book, *The Chasm Ahead* in 1968. That attracted to him many people with similar concerns.) They included Alexander King of England who was scientific director of the OECD, Hugo Thiemann of the Geneva Battelle Institute, and Eduard Pestel of the University of Hannover in Germany (also Chairman of the Board of the Volkswagen Foundation). The loose network they founded was called the Club of Rome. The job they took on was to define what they called the world's problematique.

By 1970 the Club of Rome had expanded to 75 members and had extended the problematique to 66 "Continuous Critical Problems." Poverty, war, pollution, crime, oppression, resource depletion, terrorism, economic instability, racism, drug addiction were on the list. The Club was made up of problem solvers, men of action. They wanted more than a list of problems, they wanted *solutions*. How to tackle this nest of woes? Presumably the problems are interrelated, but *how*? Are there fundamental underlying causes that can be dealt with, without having to take on each problem separately?

Carroll Wilson, a member of the Club of Rome's Executive Committee, suggested that his colleague at MIT, the systems analyst Jay Forrester, might be able to bring some order to the chaos of the 66 Continuous Critical Problems. Therefore Forrester was invited to a Club meeting in Bern, Switzerland, in June, 1970 —

the same month we were selling our Land Rover in Germany in preparation for our flight home.

At the end of the Bern meeting Forrester told the Club's executive committee that (his methods) could integrate and clarify the problematique. He invited them to come to MIT in three weeks' time for a seminar to see how the world's problems could be modeled on a computer. They accepted. On the plane home Forrester sketched out a world model. (Upon his return back in the US, he converted the ideas inherent in his sketches into a set of computer equations, which he could simulate on the IBM computer.) He started his model world running in 1900 and let it work its way through time. It grew until the simulated year 1975 and then collapsed.

After a year away, Dennis walked back into MIT in July, 1970, (just as Forrester returned home, summarized the meeting in Bern, and prepared his group) for the arrival of the Club of Rome. Dennis came home to tell me about the world model — it sounded like a much more sophisticated version of the connections we had been making as we bumped over the potholes and washboards of Asia. In great excitement I postponed my return to a postdoc position at Harvard in order to sit in on the seminar.

(The Club had originally invited Wharton University Professor Hasan Ozbekhan to be the director of their first project. But his proposal was rejected in the spring of 1970 when it was presented to the Volkswagen Foundation by Dr. Pestel. The Foundation's refusal prompted the emergency meeting of the Club in Bern. Ozbekhan, and his colleague, Alexander Christakis, came to MIT with the Club of Rome, eager to protect their prerogatives. But midway through the meeting, we stayed up late one night to develop a memorandum that outlined how to conduct a project for the Club, building on Forrester's model. That memo was approved by the Club's Executive Committee members at a late night meeting. Ozbekhan and Christakis left hurriedly the next morning on an early flight back to Philadelphia. The discussion at MIT then shifted to practical considerations related to carrying out the work.)

As the two-week seminar concluded, the Club of Rome had agreed to start its Project on the Predicament of Mankind with a global computer model. Eduard Pestel offered to approach the Volkswagen Foundation again for funds to improve Forrester's initial model. He was successful; within a few months \$250,000 was granted to support a modeling team for two years. Dennis was made the director of the Club of Rome study.

Fascinated by the opportunity to work on the problems I had just been seeing in Asia, I resigned my Harvard fellowship. To avoid any accusation of nepotism, I joined the project without pay. Well, to be hon-

est, I probably could never have been hired anyway — all I knew of system dynamics was what Dennis had taught me in the Land Rover and what I had picked up from the Club of Rome's seminar.

Dennis quickly put together a team from visiting scientists and students in Forrester's group. Two serendipitous additions turned out to be central contributors and eventually co-authors of *The Limits to Growth*. One was Jørgen Randers from Norway, a graduate student in physics who had wandered into one of Forrester's lectures one day and had stayed around, soaking up systems theory. The other was Bill Behrens, who had just received his undergraduate degree in electrical engineering. The team divided up the five model sectors Forrester had already chosen — population, industry, agriculture, natural resources, and the environment — and started to research the literature and statistics in each area.

The original Forrester model, we called World1. He continued to work on that model independently; its final version was called World2, which was published in 1971 in Forrester's book *World Dynamics*². We called the model we developed World3.

The three models were similar in their five main sectors and their basic dynamics. All were based on Forrester's original insights about key interconnections in the socioeconomic system. All had a pronounced tendency to collapse. As the model progressed from World1 to World2 to World3 it got more detailed and more consistent with established concepts in demography, economics, geology, ecology, and agriculture. Forrester provided the basic model structure; we tested and elaborated that structure and tracked down the best numbers we could find to quantify it.

Eight months into the project, in the spring of 1971, the Club of Rome held a meeting at a grand estate called Montebello near Ottawa, Canada. The Club asked the MIT team for a preliminary presentation of our work. It was at that meeting that *The Limits to Growth* was conceived — or a better word might be provoked.

The Provocation of *Limits*

In the opulent wood-paneled conference room we told the Club about the separate sectors we had been researching. Then Forrester stood up to speak. I had been immersed in the details of the world models. Now, as Forrester spoke, I grasped for the first time the dynamics of the whole interacting system. It was one of those light-bulb-flashing moments. Suddenly I saw the world in a completely new way.

There *is* a primary cause of the Continuous Critical Problems, Forrester said. It is *growth* — exponential growth of the physical economy and population against

the earth's physical limits. That which all the world sees as the solution to its problems is in fact a cause of those problems. Complex systems are often like that — counterintuitive — one of Forrester's favorite words.

He illustrated his point with a graph of food production against land, which we eventually used in *Limits*. Given that growth of population is exponential, said Forrester, demand for food also grows exponentially — faster and faster. Therefore the system will approach the limit of cultivable land with astonishing suddenness. In, say, 1980 there will be what looks like a tremendous excess of land. But just one doubling in food demand — just 20-30 years — will carry the system to the brink of the land limit. A doubling in crop yields can put that point off for one doubling time, only 20-30 more years. A quadrupling in yields will only last another doubling time, if growth in demand continues.

That's only one limit, the land limit, said Forrester. There are other limits, and other growth processes. If the land limit is pushed back, say, by producing food in greater yield, that will require more energy and bring the system to energy limits. If those are overcome, there are limits to the earth's ability to absorb pollution. The human system simply can't allocate capital and technology to all sectors at once and keep pushing back all limits at once. It is the attempt to do so that leaves never enough time or resources to attend to everything at once — hence the Continuous Critical Problems.

The limits to physical expansion of the human economy are flexible, dynamic, and interconnected. Some are being pushed upward by technology, some are being eroded downward by overload and mismanagement and waste. We don't know where they are, but we do know that on a finite planet limits are inevitable. If we evade one and continue growing, we will run into another. We don't have the option to grow forever, said Forrester. We shouldn't even want to, because growth against limits is itself a problem. Our option is to choose our own limits, or let nature choose them for us.

I was stunned by this presentation. The picture of exponential growth against limits became an icon in my mind, a central explanation for what the Club had been calling the Predicament of Mankind. "It's *growth*," I thought. "The problem is how to control and stabilize *growth*, before the system hits the limits." I waited breathlessly for the distinguished members of the Club of Rome to take up this challenge and think through its political and social implications.

The Club members listened politely, spoke kind words, and then went back to their discussion of the world's problems as if each was unrelated to all the others, and as if there were no limits. As they took up each problem, they called upon growth to solve it. Energy

shortages: we need more oil discoveries, more nuclear power. Poverty: more economic growth. Hunger: more food production. Urban slums: more housing. Pollution: more economic growth so countries can afford pollution control. The only Club member who squarely addressed Forrester's point was Robert Lattes (director general of SEMA International in Paris), who told a story of a lily pond, which we later incorporated into *The Limits to Growth*.

Back at MIT the day after the Montebello meeting, our frustrated team met. "They didn't get it," we said. "We have to make it more *clear*. We have to write a paper with example after example of exponential growth against limits." I was assigned to do the writing, while the others went on working on the computer model.

The short essay I originally produced was intended as a report to the Club of Rome. We envisioned it as a staple-in-the-upper-corner white paper to send to the Club's members. In our innocence, we thought that clarity and perhaps some repetition and some convincing data were all that would be needed. We didn't understand that what we had witnessed at Montebello was a small example of what we were about to encounter all over the world — the inability of people to hear a message that questions one of their deepest assumptions. Even the concerned, sophisticated members of the Club of Rome could not accommodate in their conceptual framework the idea that growth might be a problem as well as a solution. Clear presentation was not our problem.

Clear presentation was what I worked on, however. At the same time World3 was coming together and we were understanding more deeply the structural reasons why economic and population growth could not bring the simulated world to a smooth accommodation to its

limits. By the summer of 1971 my paper, about 50 pages long, was circulating to the members of the Club of Rome. It simply made Forrester's point about exponential growth and limits. It did not mention feedback loops or show computer runs. We called it the "general report" to distinguish it from the "technical report" that would be our documentation of the computer model³.

The responses that came back were again a foreshadowing of what the world's reaction would be. Some members of the Club were elated by the general report. Some were horrified. Nearly all assumed that the report was not to *them* but to the *world*. They began to visualize how the world would react, when it was released with their imprimatur. On my desk their comments piled up, and I frantically tried to respond to them in further drafts.

The most important comment came from Aurelio Peccei. Our contract with the Club of Rome called for a book based on our model. We had assumed that it would be the technical report, documenting every equation in the meticulous format that Jay Forrester drummed into his students. We were hard at work on that book. But Aurelio said, in one of his urgent phone calls from Rome or New York or Buenos Aires, that the general report was the book he wanted. He wanted 5000 copies *quickly*. He wanted it to say more about the computer. This book, as far as he was concerned, was the report the Club of Rome had asked for.

From that moment on, he called, cajoled, arranged, suggested, pushed, persuaded, organized publications, translations, and presentations, until, six months later, after seven more drafts, with a great deal more in it about the computer, *The Limits to Growth* was published in the glare of international attention.



Photo Credit: Betty Miller

¹ Peccei, Aurelio, *The Human Quality*, Oxford, Pergamon Press, 1977.

² Forrester, Jay W., *World Dynamics*, Pegasus Communications, Waltham, MA, USA, 1971.

³ The technical reports were published in two volumes: Meadows, Dennis L. et. al. *Toward Global Equilibrium* in 1973, and Meadows, Dennis L. et. al. *Dynamics of Growth in a Finite World* in 1974. Both are now available from Pegasus Communications, Waltham, MA, USA.

CLOSE FRIENDS — DISTANT LIVES

by Joan Davis

It's almost thirty years ago that I met Dana. And almost as long in sharing a friendship with her. A friendship, that is still such a strong part of my life, that using the past tense to describe it, or even to write about Dana herself, doesn't feel appropriate. Another factor adds to my difficulty in using the past tense in reference to her: Dana was not — physically — part of my everyday life. So there's been no 'visible' change in that respect. And the many 'invisible' facets of the friendship remain strongly present.

In these weeks since Dana's death, knowing I wanted to share some thoughts with others about our friendship, I tried to understand more about what it was that we shared — out of two very different, and distant lives. But I soon realized that trying to understand took more 'head' work, than feelings were up to at the moment. A look into the past only underscored what I already knew: Dana was my closest friend during these many years. And the friendship with her, including that which grew out of it via mutual/Balaton friends, was a source of the major influences on my life, on my professional commitment during these years.

The following 'mosaic stones' — observations, reflections, incidents — attempt to create a somewhat recognizable, understandable picture of this friendship over time and distance.

Transitions...

The first meeting with Dana was at the Kolle-Kolle conference on *Limits*, which had been organized by Niels Meyer in summer of '73. Only the year before, the book *Limits*, and Dennis' lecture on it in Zürich, had drastically altered my life, which up to then had been that of a scientific technocrat, having essentially no understanding, appreciation or concern for environmental issues.

The transition that took place via the book had been 'logically' triggered, mainly by realizing the critical issues of environment and equity in the face of exponential growth. The transition that happened at Kolle-Kolle came about via a different level: by being deeply moved by the personal insights, values, concerns and commitment of those who had written the book.

The exchanges I had with Dana during the conference revealed communalities in interests, motivation and commitment, though of course vast differences in knowledge of the issues, and experience with them. The next crossing of paths wasn't until the Mitchell Meeting on Sustainability in '75. Intense discussions there, in particular on agriculture and global food issues, led to mail and telephone exchanges on this, and a growing list of topics of common concern.

Electronic friendship support

During the coming years, we remained in contact, and paths crossed at occasional meetings. With the start of the Balaton Group communication strongly increased. But the really intense exchanges started with email-correspondence. There were strings of months when the exchanges were almost daily. Often only a few lines — but nonetheless, a way of sharing about the daily life: both 'head work', be it projects, and what we were working on with our students, or 'hand work' — about farms and gardens.

All that sounds so 'matter of fact'. And in many ways it was. But the exchange had another level: during the years there had developed a deep, supportive friendship over the distance. The daily exchange on the 'up front' level was a mutual reminder of the support behind the scene. And as the friendship continued, simply knowing support was there, established itself as having been even more important than actually drawing upon it.

In retrospect I recognize the importance of this even more than during the actual course of some taxing developments (such as when we each were dealing with life-threatening diseases): in being so far apart, there wasn't any way to be able to physically help each other, or even have a good long talk. So although we didn't really hide difficulties (we generally knew what was of concern to each other, but little about details), we seldom discussed them. Rather, we looked for, and exchanged about, the positive side of whatever was going on, regardless how difficult the situation was.

Many aspects of her daily difficulties I thus only realized via her monthly 'Dear Folks' letters. These letters repeatedly surprised me, in revealing the extent and the depth of problems, or at least of challenges that were part of her every day. Problems, which were seldom reflected in the exchange we had. The same was true from my side.

Perhaps — even if only subconsciously so — the attempt to have 'positive islands' was in the sense of creating self-fulfilling prophecies: helping the desired, the longed-for, to really happen. And for the most part, this was indeed what happened — the positive won over illnesses, personal difficulties, and many daily hurdles (such as Dana had faced in her goal to make Cobb Hill possible).

Common travels, extended family

Dana's endeavors to establish regional groups within the Balaton Group led to several regional meetings. Participation in these gave me the long-desired opportunity

to experience the different worlds of Balaton members. The meetings opened doors to Chirapol's world, and that of Carlos and Gerado, and added new dimensions for understanding problems of the areas, and their relation to global issues.

On the personal level, these travels, and meetings increased the common experience basis with Dana... and gave the chance to compare our different reactions and interpretations to encounters in different cultures. And also to more clearly recognize what was common in how we looked at things, in what we really saw and how we reacted — or what in fact was more complementary than overlapping, as well as what was contrary.

Out of this we also recognized what topics/reactions were perhaps best left aside... which isn't to say we were always successful on that. In looking back, I suspect that re-approaching difficult topics was a way of checking if the other person had changed in position: closer? still differences. Regardless... the friendship, the mutual support, was more important than the few issues that fell into this category.

In any case, we both felt that recognizing and accepting differences, while at the same time mainly staying in the positive range of common territory, was like two sisters dealing with deep bonds — and differences.

In this connection, during the later part of the eighties, Dana brought her mother, Phebe Quist, over for a short vacation at my old farm house outside of Zürich, and for some additional traveling through Switzerland. After a day or two of exploring the local world, and having multi-level exchanges over meals, Dana announced "Mom and I would like to 'adopt' you". With this we celebrated the mutual roles of 'sisterly support', and as of then Phebe was 'Mom' for me. How I welcomed having this wise, strong and gentle woman as part of my 'extended family'. In the intervening years, we have had many a deep-going telephone conversation. During these recent weeks, even more so.

Laughter and tears...

Even in the midst of difficult times for one or the other of us, telephone exchanges usually brought us to laughter — the result of trying to see things so very differently than one was being forced to, by whatever was happening in the 'real world'. This was even the case during Dana's long treatments for cancer. She continuously found ways to turn around her anger about the 'med.docs', and to initiate processes, which could help patients to be better informed as to decisions and treatments facing them.

In this respect our reactions were often quite similar: we shared an innate need to learn from events and processes — and to use our learnings to help others to

avoid the same problems, or at least be able to deal with them better.

And laughter often characterized the common 'room time' during Balaton Meetings. Though we usually had completely different time-schedules, the laughter during the overlappings late at night sometimes sounded like a teenage slumber party was going on.

As in any deep friendship, what was of concern or sadness for one, was understood by the other. And there where it came to common sadness, I learned much both about Dana, and from her. In particular, during our attempts to accompany, albeit from far away, our friend Wouter Biesiot during his long illness, I found myself learning like a young apprentice from Dana's ability to support someone terminally ill, and the family as well, at deeply meaningful, loving, spiritual levels.

"Back to back"

Parts of my past Dana found of special interest. She occasionally mentioned her intention of writing about them, about me — that is, when she would manage to finish all the other books she was working on. And in a similar vein, I had long wanted to write, or at least cooperate on, a book about Dana — but also knew, that wasn't on the agenda in the immediate future. But the discussion about a book continued, and it wasn't long before we came upon the idea of writing a joint book — each having her own part, each writing about the other: starting from opposite ends of the book, which would thus have two front covers, each being upside-down to the other. The biographies would end, and meet, in the middle of the book, back to back.

The symbolism of the friendship was mirrored in the proposed book structure and title, 'Back to Back': During the years, we each had had the privilege of feeling, of knowing, there was support behind us, for what ever it was we were dealing with.

Present tense...

In such ways, Dana's presence has long been an integral part of my everyday life. And even at times when there weren't frequent emails, the thoughts would accumulate for the next mail, the next exchange: what was there to up-date about, to find out about. What was there new to share... about what friends were doing, about current projects, about distant goals.

And beyond all the information-loaded emails that were exchanged, there would be every now and then a mail from one to another, 'only' to say thank you. 'Only' to express appreciation to the other person, for being there, so far away, yet very close.

The past tense indeed doesn't apply; Dana is still 'there' — far away, yet very close.

“LOVE, DANA”

by Alan AtKisson

One day you open your eyes and realize that it is other people who make us. This is especially true for people like us, people who want to improve the world, who offer themselves in service to the world. We bring certain abilities, preferences, passions. Then the world, disguised as our friends and mentors, students and colleagues, decides what we are to be.

While Dana Meadows might not have said it this way, I learned this from her.

When you look at your life closely — at the ideas that fascinate you, the work you do, the things you believe to be important, the way you dedicate your time — you will find that an enormous portion of what you call “your life” has come not from you, but from love: from the people in your life who have loved you, and whom you have loved. Those other people, that love, introduced you to those ideas, that work, those important things.

And if you look very closely, you will discover that just a very few of those people are responsible for giving you, or for helping you to discover, a very large part “your life.”

Dana Meadows was, for me as for so many, one of those very few people.

I cannot even imagine what “my life” would be, who “I” would be, without her influence. From *The Limits to Growth* (which I read in college) to our last email exchanges just before her death, over a period of more than 20 years, Dana’s words constantly guided me, prodded me, shaped me, or helped me to shape myself.

For the first nine of those years, 1980-88, she was a distant authority, an author and scientist whom I admired. Over the next four years, 1989-1992, she was a colleague, fellow editor, mentor, and luckily for me, a trusted advisor. Then, after the 1992 Balaton meeting, while she continued to be all of those other things to me, Dana became one of my dearest friends.

We wrote things together, planned meetings together, hatched ideas together. We travelled (with Joan Davis) in Germany together. When our mutual friend Wouter Biesiot was dying of cancer, we prayed for him together; when he wanted to write a book, we supported him together; and when he died, we cried on the phone

together. We shared stories of our last visits with him, and ultimately wrote something about him together.

Earlier on, during my first visit with her in 1990, Dana stopped me from going to graduate school: when I worried that I lacked academic “credentials”, she said that was baloney, that I should just keep “doing the work.” Later, she started me on traveling and studying the real world, with a 1992 Balaton invite and a 1994 Noyes grant. She helped me get more deeply involved with indicator work, and helped spread the word about what I and my colleagues were doing. Throughout the 1990s, she encouraged me to do more music, and commissioned new songs from me. Then she asked me to write a book, found the money, found the publisher, shared her research and some of Diana’s time, and reviewed the manuscript — the last piece of which was written at Foundation Farm, at her kitchen table, by candlelight.

I didn’t always do what she wanted. She often hoped out loud that I would join her ecovillage community, Cobb Hill, but I just as often explained that I, like much of humanity, preferred city living. She hoped that I would take over her central role in the Balaton Group when she started focusing on Sustainability Institute, but I felt no one person could take over that role (and that the Group also needed to grow beyond the model of “one person at the center”). She hoped that I would become more public as a “personality” for sustainability, something she was unwilling to do; but she understood that I, like her, also wanted a balanced private life.

She didn’t always do what I wanted, either. Despite my many strong nudges and a few offers to help, she didn’t finish *Beyond the Limits II*, having gotten tired of re-writing the book that made her famous in 1972. She claimed that *Believing Cassandra* had taken care of that need (I strongly disagreed). She didn’t finish her systems textbook; instead, she gave away more of her money and time and energy than I thought she should. She rarely took my advice about such things. She could be very stubborn.

But she was most stubborn about one thing: loving. This is what I will miss most about my friend, Dana Meadows. I will miss the love in her eyes as she looked around the room, addressing a meeting — any meeting, no matter how formal. I will miss her loving smile. I will miss her efforts to choose love even when angry with someone. I will miss the way she signed every letter with “Love, Dana.”

And I will miss writing her back the same way.

THE BRIGHTEST STAR IN THE SKY

by Alan AtKisson

This was originally given as a keynote speech for “The Festival of Faith” at the First Presbyterian Church, Morehead City, North Carolina, USA, on 25 February, 2001

My purpose today is to introduce you to an idea, and the task is not a simple one. This idea has to do with how we relate past, present, and future. It has to do with preserving what we treasure, and transforming what we know to be damaging. It has to do with linking together the workings of nature, the economy, our social systems of support, and the well-being of every individual human being, so that all are uplifted and kept whole. It has to do with the lessons of science, and the inspirations of the spirit. It has to do, fundamentally, with what we believe to be our purpose here on Earth, and with how we rise to what has become our responsibility. And it has to do, ultimately, with a dream: the dream of building a world made more beautiful, more intelligent, and more delightful, a world that can be a far better testament to our Creator, a far better home for our children and grandchildren and all living creatures.

But before I introduce you to this idea, this vision, I'd like to introduce you to one of its most influential visionaries — someone who, in her too-short life, did so much to articulate the shape of this idea, to make the case for its necessity, and to inspire others to share it. I'd like to introduce you to Dana Meadows.

*

Donella H. Meadows, known as “Dana” to her friends, died on February 20 of this year at the age of 59. She succumbed to a brief but intense fight with cerebral meningitis. In an ironic twist of fate, Dana, a recipient of the well-known MacArthur “genius” grant and several other intellectual honors for her work on global environmental and economic systems, was killed by a bacterial infection of the brain.

But the disease that overwhelmed her body's defenses could never touch her mind, her heart, or her spirit, for these will live on in her written works, the minds and hearts of those who knew her, and in some mysterious way, the fabric of creation itself.

Dana and I had a special relationship. She was at various times my teacher, mentor, colleague, collaborator, debate partner, and cheerleader. She was a pillar to me, a beacon, a guiding star. But I hasten to add that I am by no means unique in this. There are literally hundreds of people who would describe their relationship with Dana in a similarly special way. One of Dana's many great gifts was her skill at the art of friendship. She leaves behind an extraordinary network of friends,

from her current college students to senior scientists and decision makers. My guess is that this network, this enormous web of human relationships, will prove to be her most powerful legacy.

If you didn't know Dana, I want somehow, through these words, to bring you into the wide circle of her friends. I want first to reassure you that she was not a saint: she could sometimes be, as she herself was first to admit, stubborn and critical. She did not like to suffer fools gladly, and she could be very impatient with those who did not try to overcome their own selfish interests. She was known to use the word “dumb” to describe a bad idea or a misguided politician. And she was an unrepentant lover of life, enjoying opera, and wicked jokes, and the occasional cold beer.

But she also, throughout the dozen years I was privileged to know her, demonstrated an astonishing compassion for other people — even the people who drove her crazy. While she enjoyed her moments in the limelight, she went out of her way to share that limelight with others — or to just give it away completely. And she spent much of her both her money, and her brilliance — whole-heartedly, and big-heartedly — on helping other people to become as bright and passionate in their work for a better world as she tried to be in hers.

The impact of her devotion to uplifting others and linking them together is difficult to quantify, except that it is enormous. As the coordinator of an international network of leading researchers known as the Balaton Group, as a participant in dozens of scientific committees and think-tank groups and boards of directors, as a teacher and farmer and community member, as the founder of the Sustainability Institute and an ecological village known as Cobb Hill, and as a scientific writer and newspaper columnist, Dana Meadows touched and inspired thousands of people directly, and millions indirectly.

She touched them through her extraordinary intelligence, and her equally extraordinary love of common things. She touched them through her insightful analyses, and her infectious laugh, and her tendency to tear up when moved by a beautiful song. She adopted people by the dozens, and encouraged them to follow their best skills and greatest passions. She introduced people to each other who would then start pioneering projects together, write papers together, build communities together, or even fall in love. Trained in chemistry, she

lived the intellectual life of a catalyst; but in her social life, she was more of an alchemist, able to turn people and ideas, groups and institutions, into pure gold.

*

Future generations will largely come to know Dana through the written work that made her famous. In 1972, she was the lead author of a book called *The Limits to Growth*. The book reported on the results of the first computer model of the entire world, a model built at Massachusetts Institute of Technology by an interdisciplinary team of scientists, of which Dana was one. She had a degree in chemistry, a Ph.D. in biophysics from Harvard, and training in the emerging science of system dynamics. More importantly, she had a journalist's knack for explaining difficult things clearly.

Even before it was published, *Limits*, as it became known for short, began to make headlines. A leaked manuscript was summarized in *Time* magazine. The published version was ultimately translated into 28 languages, selling over 9 million copies. Most often, in the press as well as in the academic literature that arose to critique it, *The Limits to Growth* was summarized this way: "Civilization is doomed."

While this made for good headlines, great publicity, and an easy target, this was not, unfortunately, what the book actually said.

What the book actually said was that humanity was on a collision course with the laws of physics, mathematics, and biology. Our present trajectory was unsustainable. Something in the system would have to give. If we kept expanding our numbers, our consumption of resources, and our dumping of various kinds of trash into nature, we would, within about a hundred years, exceed nature's or society's limits and run off the proverbial cliff, just as did the civilizations of Rome and Easter Island.

But the most important word in the previous sentence is "if." Dana did not believe in an inevitable collapse of civilization, nor did *The Limits to Growth* predict it. Dana believed that humanity was capable of waking up to our dilemma, and taking action to avoid catastrophe. She was, in the classical sense, a prophet — and when the signs and portents warn of future doom, prophets prefer to be wrong. The best prophets issue their warnings because they *hope* to be proven wrong.

Unfortunately, Dana and her co-authors from 1972 have not yet been proven wrong, despite their own efforts to create awareness and motivate change, and despite decades of other people's efforts to deny, disprove, and discredit their work. Even her published obituaries in the *New York Times* and the Associated Press, which

imply that the book had been proven wrong, are infected by the negative propaganda campaign launched against *Limits* in 1972. Instead, evidence in support of the *Limits* team's disturbing analyses and core conclusions is growing. True, there is some good news: population growth is slowing down, thanks largely to the education and empowerment of women (just as Dana and company hoped would happen). We have not yet run out of any critical fuels or raw materials (Dana herself said that she was surprised by how much more efficient technology had become than was imagined in 1972). But fresh water is fast becoming a source of conflict in the planet's driest and most crowded areas. Food production is slowing. We are continuing to lose biological treasures like the cloud forests of Costa Rica. And we have decidedly, and irrefutably, begun to run out of places to throw things away.

Our greatest worry in this regard is not litter or old newspapers. The garbage causing the greatest difficulty, both for nature and humanity, is our *molecular* garbage, the stuff we make that we can't see. We've made too much, and we're still making it, and tossing it heedlessly into the land, water, and global atmosphere. This is the most dangerous limit that we, in our fundamental ignorance of how nature works, have now passed. This is our greatest industrial error, which we must now scramble to correct.

The Limits to Growth was one of a very few early books to raise the specter of climate change as one possible outcome of the unchecked expansion of humanity's business as usual. There are several molecules involved in global warming, but carbon dioxide — which acts as a heat-trapping blanket around the planet — is the most important. In just a few generations of oil, gas, and coal combustion, we are raising CO₂ to a level higher than the planet has seen in over 400,000 years. As a result, we are already witnessing the melting of the polar ice caps, the intensification of storms, the movement northward of tropical diseases, the rapid disappearance of glaciers and permafrost and even the snows of Mount Kilimanjaro. These conclusions are no longer seriously disputed; even the CEOs of major oil and car companies acknowledge that climate change is real. Insurance companies are worried that they could go bankrupt from its impact. The Dutch are quietly making plans to raise their famous dikes.

While combustion is changing our climate, other kinds of chemistry are changing our biology. Recent research has demonstrated that amazingly tiny amounts of certain common chemicals have the power to disrupt an animal's fetal or sexual development — including the human animal. Bioengineered pollen recently drifted across the country and killed migrating Monarch butterflies by the thousands, and genetically engineered corn meant for animal feedlots got into human taco shells, causing allergic reactions and other health problems.

As Dana might have said in the “Global Citizen,” the weekly column she wrote for a network of 20 newspapers: while we’re very *clever* at building engines, doing chemistry, and engineering new life forms, we’re still not very *good* at it.

In her writing and teaching, Dana Meadows helped thousands of people to understand how, and why, we’re not very good at it. She helped us to understand *systems* — how one thing links to another, how driving your car links to stronger hurricanes in the Atlantic, how the food you eat links to oil from the Middle East and U.S. defense policy, how declining investment in schools links to a generation of diminished opportunity and capacity, hampering precisely the innovation we need to fix the other problems we’ve created.

But while she helped us understand global problems, Dana was herself a practitioner of local solutions. She lived for many years on an organic farm, living simply, saving energy, practicing what she believed must be preached. Worried about climate change, she restricted her own travel, only going where she felt she could do the most good. When the revolutionary new hybrid gas/electric cars became available, she immediately bought one, and wrote about how important it was to choose such relatively easy steps forward in our personal lives.

While she was worried, deeply worried, about the future of human civilization and the worsening ecological crisis, Dana was inherently an optimist. She believed in the possibility of transformation. She believed in a higher spiritual power. And she believed, especially, in the inherent goodness of human nature, and in our ability to rise up together, to care for one another, to overcome adversity, to reinvent the world.

*

In 1992, twenty years after *The Limits to Growth* had stirred such controversy, Dana and her team of co-authors, including her former husband Dennis Meadows and Norwegian banker Jørgen Randers, updated their study. This time, they titled it *Beyond the Limits*, because trends like greenhouse gas emissions had gone, they concluded, too far already. “Much has happened in twenty years,” they wrote, “to bring about technologies, concepts, and institutions that can create a sustainable future. And much has happened to perpetuate the desperate poverty, the waste of resources, the accumulation of toxins, and the destruction of nature that are tearing down the support capacity of the earth.”

They were not so surprised by the disturbing results of their research. “In a way,” they wrote, “we had known it all along. We had seen for ourselves the leveled forests, the gullies in the croplands, the rivers brown with silt. We knew the chemistry of the ozone layer and the

greenhouse effect. The media had chronicled the statistics of global fisheries, groundwater drawdowns, and the extinction of species. We discovered, as we began to talk to colleagues about the world being ‘beyond the limits,’ that they did not question that conclusion.”

In addition to updating the statistics and computer models and the graphs of rocketing pollutants and plummeting biological capacity, Dana and her colleagues also updated their three major conclusions from 1972:

1. Human use of many essential resources and generation of many kinds of pollutants have already surpassed rates that are physically sustainable. Without significant reductions in material and energy flows, there will be in the coming decades an uncontrolled decline in per capita food output, energy use, and industrial production.

2. This decline is not inevitable. To avoid it two changes are necessary. The first is a comprehensive revision of policies and practices that perpetuate growth in material consumption and in population. The second is a rapid, drastic increase in the efficiency with which materials and energy are used.

3. A sustainable society is still technically and economically possible. It could be much more desirable than a society that tries to solve its problems by constant expansion. The transition to a sustainable society requires a careful balance between long-term and short-term goals and an emphasis on sufficiency, equity, and quality of life rather than on quantity of output. It requires more than productivity and more than technology; it also requires maturity, compassion, and wisdom.

“These conclusions,” they clarified, “constitute a conditional warning, not a dire prediction.”

Dana believed that ultimately the world would choose maturity, compassion, and wisdom over mindless growth, consumption, and pollution. You might even say that she predicted it. Her whole life was dedicated to making *that* prediction, that hope, come true, and not the “conditional warning” of *Beyond the Limits*. She felt so strongly about the human side of the equation, in addition to the necessary economic and technological changes we must make, that the final chapter of *Beyond the Limits* is practically a scientific ode to the expansion of human capacity, and to the power of love itself.

“One is not allowed in the modern culture to speak about love,” she wrote, with the support of her co-authors, “except in the most romantic and trivial sense of the word. Anyone who calls upon the capacity of people to practice brotherly and sisterly love is more likely to be ridiculed than to be taken seriously. The deepest dif-

ference between optimists and pessimists is their position in the debate about whether human beings are able to operate collectively from a basis of love. In a society that systematically develops in people their individualism, their competitiveness, and their cynicism, the pessimists are the vast majority.

“That pessimism is the single greatest problem of the current social system ... and the deepest cause of unsustainability. A culture that cannot believe in, discuss, and develop the best human qualities is one that suffers from a tragic distortion of information. [...]

“It is difficult to speak of or to practice love, friendship, generosity, understanding, or solidarity within a system whose rules, goals, and information streams are geared for lesser human qualities. But we try, and we urge you to try. Be patient with yourself and others as you and they confront the difficulty of a changing world. Understand and empathize with inevitable resistance; there is some resistance, some clinging to the ways of unsustainability, within each of us. Include everyone in the new world. Everyone will be needed. Seek out and trust in the best human instincts in yourself and in everyone. Listen to the cynicism around you and pity those who believe it, but don't believe it yourself.”

*

And so we come to the great idea to which I wanted to introduce you, the idea that was first introduced to me over twenty years ago, when, as a college student, I first read *The Limits to Growth* — the idea of sustainability.

In *Beyond the Limits*, Dana and her colleagues defined a sustainable society as “one that is far-seeing enough, flexible enough, and wise enough not to undermine either its physical or its social systems of support.” In one sentence, they linked together the physical requirements for enduring over generations, and the human ideals and aspirations that make such endurance possible.

More than anyone I have ever known, Donella Meadows embodied that idea, and the action that makes it come to life. She embodied it in her willingness to take a hard, scientific look at the facts, and to seek understanding of both the trends shaping the world, and the systems that drive those trends. She embodied it in her efforts to change those systems, and to show other people how to change them. She embodied it in her passion for teaching younger people, and engaging as many colleagues as possible in what she saw as the greatest challenge facing humanity at this time. She embodied it in her willingness to change her own life to model, as best she could, the quality of sustainable living within the context of a world that needs

to be changed. And she embodied it in her passion to bring together, as lovingly and intelligently as she could, her friends, her colleagues, and her readers; and to unite the great aspirations of the human world with the great beauty of nature.

For Dana, the idea of sustainability was not just a call to transform our economic, industrial, and agricultural systems so that they were fairer, smarter, and gentler to the Earth. It was not just an imperative to radically overhaul our energy systems, to reinvent our manufacturing technologies, to replace *quantity of stuff* with *quality of life* — though it was all these things. For Dana, the idea of sustainability was fundamentally about embracing a vision of a better world, and a vision of ourselves as better people.

“The ideas of limits, sustainability, sufficiency, equity, and efficiency are not barriers, not obstacles, not threats” say Dana and her co-authors in *Beyond the Limits*. “They are guides to a new world. Sustainability, not better weapons or struggles for power or material accumulation, is the ultimate challenge to the energy and creativity of the human race.”

Dana Meadows, who always preferred to call herself simply “a farmer and a writer,” who loved tending her garden as much as she loved designing scientific projects or writing newspaper columns, has left us too early. For those who knew her, her absence leaves an acute ache in the heart.

But as a great gardener of sustainability, Dana planted many, many seeds. She will live on in the ideas she promoted and wrote about so eloquently, the institutions she founded or assisted or advised, the people she cultivated and nurtured and brought together. She will live on in the intelligence, and passion, and wisdom that we all bring to our pursuit of the sustainability vision.

A dear friend of Dana's (and mine) in India, Aromar Revi, has a daughter named Kaholie, seven years old. Kaholie never met Dana personally, but they had a close bond, connecting by email, phone, and presents ferried between Kaholie and Dana by her father, Aro. Several years ago, at the age of four, Kaholie announced to Aro that when people die, they become stars. Kaholie is very sad now, writes Aro, and she is worried that Dana, having never actually seen Kaholie, may have trouble recognizing her from her new vantage point in the cosmos.

To Kaholie, and to all of us who knew Dana or wished we did, I offer this consoling advice. Find the brightest star in the sky, and wave.

LETTER TO DANA

by Aromar Revi

Dear Dana,

You've unexpectedly placed us in a very challenging situation. Taking on the world almost alone, is nothing new to you. We've seen you do it year after year, with such clarity of purpose, grace and charm that it seemed utterly simple. No longer. We walk the path in leaden shoes and with a heavy heart.

In all these years of knowing and trying to learn from you, some of your love of the earth and all her children, your burning aspiration for truth and justice and your egalitarian compassion and respect for diversity has taken root among us — your extended family.

But it is going to take all of our conscious faculties, inspiration and commitment to try and work in concert to bring (y)our dream of a healed earth and a realised future for our grandchildren into being. In this life, in this century.

Few have expressed the challenge and opportunities of our troubled times as well as you, in your writing and teaching. But those who have been able to share time with you in nineteen years of Balaton, are truly lucky.

The news that you were being taken off the hospital ventilator came during the Steering Committee meeting at Zürich when we were planning the 20th Balaton anniversary meeting: of friends of Dana (and Dennis) Meadows.

Your timing was impeccable as usual, but as Wouter would say this time the ratio of response to respite time reached out to infinity. This was one limit, which we forgot we needed to cross...

I'm really grateful for the weekend I got to spend with you at Cobb Hill last September. I especially cherish the long walk we took across the farm and the co-housing site, through the forest with the maple lines and ski trails to the lookout site high on the hill overlooking the valley.

You showed me Vermont through your eyes: the blaze of changing colours of fall; the continental 'divide' between the Americas and Europe across the river; the rich farmland abused by suburban development; dairy farmers struggling to stay solvent amidst rich stockbrokers who rear exotic livestock on weekend retreats and spiritual communities from far away lands and times. In your inimitable way, you painted a motion picture of a dynamic landscape over a few hundred years: old-growth forest giving way to farm and then

bald pastureland with oak trees and sheep and then in your vision back again to forest, part farm and wholly sustainable community.

The conversation on that bright almost-autumn day slipped easily back and forth between: the challenge of feeding China and its impact on climate change; the hardness of the bedrock below the co-housing site and the 'injury' caused by blasting; the complications of modelling global commodity cycles; the cussedness of snowmobiles; the future of the Balaton Group; how to distinguish poisonous mushrooms from good ones; the renegade potential of the WTO; the qualities of llama dung as a fertiliser; the challenges of building real consensus among communities and the refreshing quality of pond water on the Hunt Farm where you drench yourself after a hot summer day of work in the garden. In short, an unforgettable ordinary day in your full life.

But what I still can't understand is how one of the most brilliant teachers and practitioners of systems science, could fall for such a simple trap as you did? Refusing to go to the doctor in time for a chronic (minor) ailment, because of overbearing pressure to 'do' leading to a catastrophic systemic failure of 'being'.

Isn't that what un-sustainability is all about? Isn't that a classic case of 'constraining negative feedback' a cardinal sin in your classic paper 'Ten Ways to Change the System'? Remember your wicked jokes, about Balaton people being the most unsustainable on the planet, always living on negative time.

Unflinching stubbornness to get to the bottom of things is one of your great qualities, but I think that this time you've tested the system outside its operational range. Its one thing to play with the implications of the Second Law in the abstract, and another to be confronted with it in reality so early. Too early. Do you remember our discussion (while digging and storing a dozen sacks of potatoes in your cellar) on the need to go to work on a Third and Fourth Law linking information and inspiration with the unchanging.

I'm still mad at you today for leaving so many conversations unfinished, in half stride...

Many of us tried rather hard to bring you to India for the millennium. I thought it would be a fitting closure and an inspiration for the writing of *Beyond the Limits II* — 30 years on from your last trip that had such a strong influence on your experience.

India's now officially over a billion strong. And if you sum the population of South Asia, it is more than China. The good news is that literacy is up to 65 percent, and the male-female differential has declined by a whisker. The (female literacy-driven expectation and improvement in PQL) virtuous mechanism from *Limits* is starting to kick-in for South India, but its now too late to restrain the existing population momentum from crossing a bound of 1.5 billion plus.

Limits did change the direction of my life in the late 1970s. It provided a rational explanation for what was already apparent: a perverted ultrastable mechanism of growth-battling-growth tearing competitively away at human societies and ecosystems in a flash of geological time.

But more than that, what really has changed my living has been your presence and the remarkable family that you helped create from the four corners of the globe. Balaton is a unique human engagement, that is so much a part of what you are and stand for.

I think (and hope) that we are able to carry it forward, in its new incarnation but within the spirit of selfless offering that you taught so well by example.

Balaton has received the full measure of your love and attention for (almost) twenty years and it shows. Meanwhile, I know and have come to cherish your other 'children': Cobb Hill and the Sustainability Institute. I hope that these later additions to your family grow and are nurtured by all of us, as well you did with your own hands.

Last year, I tried to get Hartmut and you to take your earlier theoretical work on sustainability (that is so close) forward. You turned the request around so well with a blunt refusal and the suggestion that I do it — since I suggested it in the first place — Dana's poetic justice! Yes, I still do think this is a very important task and like *Limits* this integration could change the discipline and practice of 'sustainability'. Now that you have made it amply clear that you won't do it — I guess that I'll finally have to sit down and (with some help) write that book for you.

We're all going to miss you terribly, now that you are (even) out of e-mail and listserv range. It is so much more difficult to listen quietly for your voice in the silence.

Love, as always,
Aro

4th April 2001
New Delhi, India

PS: I hope you saw Kaholie today, she waved to the 'brightest star in the sky' as we were walking this evening.



Photo Credit: Sustainability Institute

DANA MEADOWS: THE SECOND-TO-LAST CHAPTER

by Hal Hamilton

The last chapter of Dana's life and career is being lived by us now. During her second-to-last chapter she founded the Sustainability Institute and joined with a small group to buy two farms and found the Cobb Hill community.

I write this brief description of those past few years from within the experience. Susie and I moved from Kentucky to join Cobb Hill, work at the institute, and learn from Dana. We miss her dreadfully.

It's now spring here. Sugar-filled sap is flowing from the Maple trees up on the ridge down through small pipes into a building where it is boiled to one-fortieth of its original volume and put into maple syrup jugs for sale. In the greenhouse, with snow shoveled away from the entrance, new vegetable sprouts begin to stretch toward their summer home out in the field.

Dana will miss this year, what would have been her sixtieth year. Twenty-three households at Cobb Hill and about ten colleagues in the institute will build on our dreams that include hers, and commit ourselves to trying to "walk our talk." We in the Institute will continue to search for high leverage solutions to the most intractable problems facing our planet.

But this article is about Dana. During these last few years she poured herself into the new landed community and its sister intellectual center, the Sustainability Institute.

Dana visioned these communities, helped create them, and now she has left them to a grateful group of friends and colleagues. Back in 1993 she wrote the following vision for herself:

I could see myself with fully gray hair, looking vibrantly healthy. I was speaking in public. I was a constant presence in public discourse. I was calm and quiet, not flashy, not charismatic. My purpose was to insert into the discussion as much perspective, as broad a space horizon, as ethical a position as I could. My goal was to be clear, loving and wise.

I had no particular position or power, other than my willingness to show up and to speak truth. But — and here was the surprising and wonderful part — I was speaking from and for a community. This was a community in which I lived day to day. It was composed of people more clear, more loving, more wise, more spiritual than me. Together we studied and spoke about all the issues in public discourse and tried to work toward the clearest, most insightful position we could find. And then I was sent out (I was not the only one) to speak that position in public. The community prepared me for these appearances and critiqued them

to help me do better next time. When I lost my way, when I got knocked off center, when I got scared or discouraged or angry, the community lovingly helped me find myself again.

I couldn't see where I lived, on this farm [Foundation Farm in New Hampshire] or any farm, though it was clear to me that the community lived by the wisdom it preached. I did not see myself writing, only speaking. (That was weird. Maybe it was a recognition that hardly anyone reads any more.) As with every vision, I arched into the future without any concern about how to get there from here, so I have no idea whether I created this community, or found it somewhere and went to join it.

What I conclude is that I must find or create a group of people to live with who are dedicated to a just, peaceful and sustainable world, both in the way they live and in the way they reach out to impact the public discourse, the language, the context, the frame, the mindset of the larger community.

Well, who knows what will happen? I have a new vision now to work toward. Meanwhile, if there's one more nice day outdoors I have raspberries to prune. If there isn't, I have a basement to clean.

Dana did create a community, a professional and a living community entwined. We have more raspberries to plant, and we have not yet risen to the level of wisdom and impact she envisioned. But here we are, Cobb Hill and the Sustainability Institute.

Cobb Hill is now the name of a place within a larger place. Our little cluster of 22 housing units nestles into a hillside over the farmyard, and past that the village of Hartland Four Corners. From the southeast the spire of the local church rises up from among the village trees. Next to the church is Skunk Hollow Tavern. In the other direction, up the northeasterly valley, our farm stretches through fertile bottoms, along hillside pastures, and up to the sugar bush of Maples and stands of Hemlock and Pine.

The Cobb Hill houses are very efficient, heated by a common wood fired boiler, with a gravity fed water system from our own well, flowing out of the houses as gray water because the only toilets are composting ones. On the way to the barnyard lies our "common house," with large spaces for eating and meeting, and three apartments in one wing.

In one corner of the basement of the common house is our cheese cave, home for Ascutney Mountain Cheese, made from the milk of our small herd of Jersey cows. The farm shop will sell not only this cheese but also or-

ganic vegetables, eggs and maple syrup from the farm. Eventually we'll also be displaying the products of the Art Barn at the other end of the farm. This lumbering old dairy barn will soon be remodeled into art studio space. It sits across from our sugarhouse, where the maple syrup is produced.

That's a brief description of the place, but just as I haven't described the stream flowing down from the woods through the middle of the fields, I also haven't described the spirit of the community that flows among the people, giving this whole project its life. Dana helped nurture that spirit, although it is much greater than any one person.

Dana also founded the Sustainability Institute (SI), to be housed at Cobb Hill, and recruited a team of colleagues to work with her. She created SI to accomplish work, but more importantly she created SI as part of her vision of a fully effective community: *"Together we studied and spoke about all the issues in public discourse and tried to work toward the clearest, most insightful position we could find."*

The first major project of SI, begun in 1997, was about commodities. So far corn, forestry and shrimp have been modeled. We are learning from these examples general lessons that we can apply to other commodities, and to global trading rules. Agriculture, fishing, forestry, and mining are all activities by which society directly engages with nature, and where the growth dynamic of industrialization has its most destructive impacts on natural and human ecology. Our assumption is that if we could change the underlying mental and institutional structure of this relationship, we could reorient our society's growth drive toward a sustainable future.

Dana wrote, "The purpose of the commodity project is to understand why, systemically, places with rich natural resources are so often on both the ecological and economic edge of survival, and how commodity systems can be transformed so they are stable, sustainable, and equitable. We want more than understanding — we want to build that understanding with and for the stakeholders in commodity systems, so they understand where leverage points for change may be, and so they can summon the political will to make those changes."

After three years of research and review by actors in the relevant systems, our commodity models are not complete — no model is ever complete. We will keep incorporating feedback and improving ours. But they are credible, full of lessons about where leverage points are (and are not), and ready for presentation to strategically chosen larger communities. Dana envisioned and led the commodity project. Now it, and many other research and educational projects, continue to grow with the leadership of the team she recruited.

These projects, along with teaching and her prolific writing, constituted Dana's professional life, but there was no separating Dana's life into compartments. She would write her weekly columns after coming by for supper. We would talk about fund raising for the institute in the same conversation that might include energy systems for Cobb Hill, which part of the barn most needed repairing, a new project with European colleagues, and either the depth of the mud or the glory of the sunset.

Last fall as winter was about to descend, Dana could be seen in her flowers every weekend, tilling, fertilizing, digging. She also planted dozens of fruit trees and a large garden right behind the farmhouse which is soon to be the office building for the Sustainability Institute.

Every Sunday, including the one before she fell ill on a Monday, she baked bread while an opera blared out of her stereo, filling the whole house with arias and aromas. Every morning and evening she would feed her chickens, stopping to speak to the calves, horses, and whatever people were doing tasks—Stephen and Kerry milking the cows, Marsha working in the cheeseroom. During the summer Dana would always entertain the dozens of vegetable customers stopping by to pick up their baskets of green abundance.

During long monthly meetings Dana would knit socks in between reports on complicated financial and legal arrangements. Her presence was never out of proportion. She was one of the hardest workers for the community, but her opinions and perspectives were sometimes minority ones. When people describe Cobb Hill as "Dana's community" or "Dana's farm," those of us who shared this dream with her rarely bothered to correct this description because Dana herself never acted like this. She suffered, at times, when her suggestions were unsuccessful, as do the rest of us. As in most of the circles of her life, she was the most prolific writer of community documents, and among the most deeply committed, but many others wrote, were committed and did as much as Dana of the dozens of other tasks needing to be done.

The impacts of Dana's death on Cobb Hill and the Sustainability Institute are many. The Institute depended on her intellectual gifts. The early projects to model commodities were Dana's projects for which she hired researchers. More lately, however, and stunningly after her death, Dana's colleagues in the Institute have stepped forward with passion, vision, and pragmatic determination. Cobb Hill is strong with widely shared leadership.

Both of her dreams of the second-to-last chapter are flourishing. The great tree has fallen. We miss its magnificence, but now there's an opening above, letting new light shine through to the understory.

NUMBER HUNTING FOR DANA MEADOWS

by Diana Wright

For twelve years I was the numbers person in our office — digging out time series data that would show graphically the trends Dana was describing in her writing. The challenge from Dana — “*someone* must have measured that” — would come after a discussion about why the commonly cited numbers didn’t show what was really going on in the system. Total fish catch was continuing to go up, not revealing the crashing down of each species as it was overfished. Lumber harvest was continuing to increase, masking the declining quality of the lumber we all saw at the local hardware stores. Those numbers didn’t tell the full story, and it was my job to find the data that did.

Graphs could really move Dana. Often they were the exponential growth or growth-then-crash curves that became so familiar. But one time it was a flat graph stopped her in her tracks. We were working on *Beyond the Limits*. I was updating a series of food production charts for different regions of the world. Food production per person had grown from 1960 to the present in Europe and North America, and to a lesser extent in Latin America and Asia. Then Dana flipped to the chart for Africa — and groaned. The graph showed a slow decline over 30 years. For all the technological changes in the second half of the 20th century, the green revolution, the years of international aid, Africans were no better off. That picture really hit Dana hard. Behind the numbers she saw real people — caught in a trap and starving.

Dana had her own traps that she tried hard to avoid. She did all her writing on a computer and most of her correspondence over the internet. She was not afraid of change when it was useful. But, she saw no point in upgrading to a faster computer or newer software just for the sake of change. “I don’t want to upgrade my system! It does everything I want it to do,” she would say when a colleague sent a document she couldn’t open because it had been written in a newer program. But eventually she would be pushed by the need to work with others into the trap of “technology creep” — a feedback loop she knew well from seeing “capacity creep” in the Sustainability Institute’s commodity models of corn, shrimp and forest systems. In spite of her reluctance, she would eventually buy the new computer or upgrade the software. But she stubbornly held onto simplicity in other aspects of work around the office. She insisted that papers and newsletters be formatted in large simple type — reminding me that there would be some old eyes reading our publications. The Institute’s website needed to be simple and fast enough so that people from around the globe could access it with old computers and slow internet connections. Resources, whether paper from trees or time on the internet, should be used mindfully.

Dana was a master un-puzzler. She could draw deep lessons from complex systems, but it wasn’t always easy. As she worked at pulling apart particularly hard interlocking problems, she would find other things to do — rewriting book chapters, chatting with colleagues, having tea, playing with office babies — saying the answer hadn’t gone “clunk” yet. But all that time she was mentally tugging at the parts of the puzzle until the pieces finally did separate and reveal the underlying pattern. Then she would ask “why?” Why did the system develop the way it did? Who benefited? One year her students gave her a rubber stamp with the word “Why?” because she wrote it on their papers so much. She enjoyed asking the deep questions of the systems she studied — and she celebrated that same care and craftsmanship in others, whether it was in research or plumbing.

And Dana was brave. She would speak her mind — a trait I think she learned from her mother, Phebe. Speaking her mind gave her work an edge. Her opinions were bold and clear. She was unforgiving of politicians who didn’t hold to principles. And she had the courage to tell scientists and engineers that love is a resource we need to tap in creating a sustainable world.

Part way through writing this piece, my older daughter found me.

”Mommy, what are you doing?”

”Writing about Dana.”

”Is it sad?”

”Yes — and hard. I don’t know how to write what I am trying to say.”

How does a fish describe the water? So much of what I think about every day has been shaped by working with Dana.

Twelve years ago — when I started working for Dana — I had just finished a Master’s degree in forest ecology. I had spent the previous three years studying soil and plant chemistry. I had other disparate interests — ecological restoration, peace, justice, bioremediation, architecture, ecological design. Working with Dana, first on the *Environmental Systems* textbook and later on *Beyond the Limits*, gave me a framework that held all those interests and more. She encouraged me to become engaged in other subjects. I credit Dana with being the only person who could ever get me interested in economics. Because she showed how economics and ecology both fit within a larger system, I now see that I cannot care about ecology without also caring about economics.

Both my daughters came with me to work in our offices as infants, tucked into a cozy spot on my desk or asleep on the floor, while Dana and I discussed data sources or a better way to illustrate a point. Dana's support of the non-work aspects of life came from her appreciation of whole systems, recognizing that people too are complex systems. She let me keep a very flexible part-time schedule to accommodate taking care of my kids. She passed along chicks from one of her broody hens so that we could start our own flock of layers. We would call each other on particularly good gardening days in the spring — agreeing it was too fine a day to

be in the office. She asked for my best work, but not all of my time. She often said "time is our most precious non-renewable resource," and that included time for enjoying music, gardening and relearning birdsongs each spring.

I have a wish for my children — for all children — that they may have a more beautiful, more just, more sustainable world.

I now add that I hope they may be lucky enough to have as good a mentor as I had — as I still have — in Dana.

LOOKING BACK ... AND FORWARD

by Betty Miller

Although I had a professional and personal relationship with Dana Meadows for over twenty years, I've been struck by the impact Dana had on those who never met her. Maybe it's because I've heard from a number of them in recent weeks, maybe it's because I can relate to the feeling that with Dana gone, many feel even more compelled to do their part to make this world better. I'm not surprised to hear this from the people who knew Dana; I am impressed at how this seems to be a common theme among folks who merely knew her through her writing. This in itself is a beautiful tribute to Dana and all those newspaper columns she wrote. More scholarly people read her books; common citizens were addicted to her newspaper columns. People indeed were listening. And now more than ever, they're motivated to do more than listen. Dana not only touched hearts and minds and lives, she transformed them.

Dana spoke for many of us. We looked forward to hearing week after week, year after year her interpretation of large and small events, the consequences of our actions, about current trends and indicators. She reminded us that what we do as individuals, really does add up. Through her own actions, she inspired readers to follow. Some of her best-received articles were on the simple things in life, but even in the more complex ones, she never gave up hope. She kept giving her readers ideas and optimism and encouragement. Their consciousness has been raised, now many are ready to take on some of those challenges themselves. Dana uncovered the truth; many now feel empowered to step out of their safe, comfortable surroundings and really live the truth they've come to know.

My own relationship with Dana had a foundation of trust. She was the visionary, the leader, the dreamer. She didn't want to deal with the logistics, the little things necessary to carry out those dreams. Like most bookkeepers and some administrators, I tend to be meticulous and enjoy the details. I get satisfaction from qui-

etly helping visionaries fulfill their dreams. As we got to know each other better over the years, and certainly after my office moved from down the hall to an adjacent town, our actual contact decreased. But the depth of our mutual understanding increased. Dana gave me little supervision; for the most part we agreed what my role was and I just did it. Most of my work, particularly the financial side of things, was pretty routine anyway.

Periodically I'd prepare a document for Dana's signature. While handing it to her, I'd briefly start to explain what it was. She'd sign it and hand it back. Sometimes I'd ask her if she didn't want to read it. "Nah," she'd say, "I trust you." Then we'd compare notes on how that really wasn't such a good idea. She told me about people she knew whose bookkeepers cheated them, and I told her that it happened to my brothers. But in the end, she still didn't want to know the details of the tax return or whatever document she'd just signed. I honored the trust she had in me.

We planned a lot of Balaton Group meetings together; Dana pulling together the substance, me dealing with logistics. I don't know how many times she'd call me up and say something like, "you're going to kill me, but I've invited another person to the meeting ... and I promised we'd pay the costs." This used to drive me crazy, at least in the beginning, because usually when she did this, we already had more participants lined up than we could accommodate and we didn't have the funds in hand to support what we'd already committed. But somehow it always worked out. A few participants would cancel and Dana would usually be the one to find the money, or it would somehow appear.

Back in the early days of the Balaton Group, we received a series of grants from the Jessie Smith Noyes Foundation to support exchange programs within the group. We, in turn, granted the money in small amounts usually to support the travel expenses of one member

to visit the center of another member in order to work on a joint project or in some way learn from each other. During the first year, 1986, Dana and I organized a two-week organic agriculture tour in the US, from coast to coast, for six Hungarian scientists. In the midst of the planning, Dana surprised me by saying she'd like me to go on the tour. She said she needed help being tour guide. That was hardly the case; by the time the Hungarians arrived in New York, all the logistics had been worked out. It was clear to me that Dana did not need my help moving this group from place to place nor in the simple act of paying for hotel bills and such. This was her heart coming into play. She knew that I was an avid organic gardener and would just love the opportunity to be a part of the wonderful event I had helped organize. To this day I treasure that experience.

Beyond the technical knowledge we all gained during the tour are such memories as exploring a roof top garden in Manhattan with Bill Moody of the Rockefeller Brothers Fund, having dinner and intriguing conversation at Bob Rodale's house, and visiting Lundberg Farms in its early stages of going organic in rice production. The two plus weeks were jam-packed with visits to small and large organic farms, research centers and experiment stations, and ended in California with an international conference on the organic agriculture movement.

As best as I could arrange the flights, we still had a three or four hour layover in Denver so my dear cousin picked the eight of us up from the airport and whisked us to her nearby house where we had a delicious and relaxing meal. My cousin and I still share a chuckle over that day. She had planned a chicken barbecue but had no idea how to light the gas grill. Neither did I.

After we figured it out and put the chicken on the grill, she gave me a tour of her house only to come back to find enormous flames consuming the chicken, which was then burnt to a crisp. Although there was more chicken to cook and lots of salads and other food, one of the Hungarians kept saying that the black chicken was the best he had ever eaten: crisp on the outside and moist on the inside. (He even repeated this when I saw him a month later in Hungary!) Back at the airport after I hugged my cousin good bye, Dana thanked me for filling that time with a personal, family element.

I guess one thing I'm left with was the fact that I sometimes took Dana for granted. I was close enough to her to forget about her greatness. She was just, well, Dana. Always at the other end of the phone for me (or anyone else). Always finding ways to help others in need. She had old-fashioned virtues like humility and integrity. She had the courage to speak up about things that really count. She lived her principles. And of course she had the gift to communicate complex issues ever so clearly. During the first few days of her illness, when she was unconscious and we were struck with the very real possibility that she wouldn't recover, I had a real hard time understanding why it might be her time to leave this world. She still had so much to give, we still needed her, the world needed her. But by the time she died, I realized that this was just being selfish. She had already done so much more for this earth than most people even dream of accomplishing. And she'd already taken it a step further — she'd empowered people to carry on her good work.

I owe it to Dana to stretch myself to spread her knowledge and love and pay attention in new ways to the realities she spoke about. This is her gift to all of us.



Photo Credit: Sustainability Institute

DONELLA IN MEMORIUM

by Bert de Vries

Every day since Dana passed away I have been saying farewell in one way or another. Sometimes because someone asks for the Sustainable Development Indicators book, sometimes because I encounter one of Dana's emails in my mailbox, but mostly in confrontation with my disbelief that she is no longer with us. None of these days I have been in the mood or able to give words to it. Since 1987 every year I retreat for three-days in a zen meditation in an abbey near the Belgian border. These za-zen sesshins are a treasure to me. I decided to dedicate this one to Dana. In a way it is the best I can offer.

Some 20 monks are living in this monastery, much less than fifty years ago, but on the rise again. The abbot started zen-meditation in the 1970s in an attempt to bridge religions. The small chapel in which we have the sesshin – the zendo — has become a sacred place, a home to me. I had my fiercest battles here and I know the figures in the wooden planking better than anything in my own house. For three days each of us is a member of a group of 25 people, silently sitting for five hours a day. Gradually, we enter the here-and-now, a space which always exists and yet has to be found in an arduous process nicely summarized by “flee, be silent and rest”. Life gradually gets an immediateness of experiences: a bird singing, someone coughing, a radiator ticking, pain in a back muscle, steps on the stairs. The more difficult part are the never-stopping thoughts which make up huge chains with fascinating patterns, the inner chatterbox. Right: don't fight, just watch.

There is another reason why this place is sacred to me. The monks provide most of their food on their own farm, next to the abbey. As long as I come here, food is vegetarian, healthy and frugal; all waste flows are recycled; heating and lighting are modest but sufficient; water-saving showerheads have been introduced long ago. Building this abbey was once a vision, too – the word sustainability was unknown. The motivation was the search for God, in contemplation and selfless service to the poor and the ignorant.

The buildings are surrounded by patches of forest and by large, industrialized farms which are one of the hallmarks of industrialization. I used to walk between the rows of beeches, ever changing with the seasons and majestically rising like a gate to heaven. Once again it becomes painfully clear that this monastery is an oasis: the forests are now closed by the Ministry of Agriculture to minimize the risk of animals getting the mouth- and claw-disease which is deeply disturbing the European food system.

Obviously, in this way 16 million people cannot be

fed – but it is vitally important that these traces of the past are sustained as experiments in an unsettling present and for an unknown future. One lesson I learnt here: these places are everywhere and yet they cannot be copied, imitated, globalized. They are what they are because of the people: unique, diverse, honest in their intentions. And during the last 4-5 years Balaton Group members, foremost Dana, have become more and more interested in this kind of experiments. But I'll come back to that.

When asked to write a few words in commemoration of Dana, I thought this might be the right place. Is it? Well, no and yes. If you enter the here-and-now, there is past nor future anymore. So the answer is no. Thoughts start to swerve around nervously, without coherence. Emotions rise and fall like the eternal tide. But later on, it starts to settle down, slowly, and memories start surfacing. Memories get a different quality; they no longer have to be recollected, they present themselves, sometimes with great immediacy and less coloured by choice, judgment, expectation. They may differ quite a lot from what the conscious mind remembers or wishes to remember. So the answer is yes.

Every night at 20.00 h, the last service of the day starts. The bells ring, the monks start singing. At the end of these Day Closure services, all lights are switched off except one which lights a statue of Mother Maria high up in front of the church. The monks sing a beautiful song of devotion to her. Then, one of the monks will ring the bells, three times three. I remember Dana, standing in the doorway of her room in Foundation Farm, telling me with great enthusiasm how she started to learn bell-ringing and how much she loved it – a great surprise for me to hear. Bell ringing – it seemed only the physical manifestation of something she had been doing for over 30 years: ringing the bells for those who ignore so many of the signs telling us that we mistreat the earth and her inhabitants.

Dana had chosen not to be a biological mother but surely a mother she was for many of us in the Balaton Group and, undoubtedly, for many others as well. When Malcolm Slessor first introduced me to the Balaton Group, I was surprised and charmed by Dana's radiant, compassionate and motherly commitment to a better world. I remember the rational and scientific part in me saying no, it's pathetic, it's irrational, it's futile, it's american and the like – and yet I would feel immersed, healed, cleansed, inspired, supported by it year after year. I always felt that this is the true expression of what Pisces have to offer the world: a vision of a better world which

grows out of compassion with those beings who suffer.

At the same time she had a joyous curiosity and a willingness to doubt and reconsider. She would make any topic interesting by turning it around like a diamond, and with a childlike happiness discover new facets, new ways to look at it – which invariably led to penetrating and new insights and vistas for those involved. To me, these qualities of Dana were a large part of what made each Annual Meeting of the Balaton Group a special event.

In April 1996 we organized a workshop in the Netherlands, about Indicators for Sustainable Development. It was a topic which had the interest of many Balaton Group members. Alan AtKisson did a project on it; Hartmut Bossel was writing a book about it. RIVM was willing to host the workshop and it became a very lively, creative, productive three days. However, the ‘enduring’ and tangible result of it was Dana’s Report to the Balaton Group entitled *Indicators and Information Systems for Sustainable Development*. Published in September 1998, after lots of discussions, by The Sustainability Institute, Vermont. I still consider it one of the best texts on the subject. It is not about integration, it is integration. She managed to present the full richness of the concept and of the discussions in a most readable and transparent way. The mix of well-chosen examples, the mentioning of different viewpoints, the disciplined yet daring lines of thought, the sustained effort to keep all sides in – they are all evidence of her exceptional talent to deal with the full richness of reality in an intelligent, inspiring way. It is also what made the Balaton Bulletin so enjoyable to read.

The workshop was very much Balaton-spirited. I remember quite well that Alan sang his GDP-song for the first time, having composed it on the way from his high-GDP-hotel to RIVM. We all enjoyed it enormously. And I still tell on occasion the example of the quality-of-life indicators. Whereas the rich westerners suggested the number of policemen per 1000 inhabitants – the higher the better, our participant from Africa agreed with the indicator but with a reverse sign: the lower the better. Just the other day I read that in Nigeria five policemen were sentenced to death after having been found guilty of setting fire to a minibus with six people inside four of whom were killed.

Of course, not everyone liked Dana’s style, views, convictions: there was much emotional appeal to it, much personal truth in it. Her speech given at the presentation of the dutch translation of *Beyond the Limits*, in 1992 at RIVM, not only reflected the authors’ fears but also her hopes and visions of what was implied in the subtitle: *Confronting Global Collapse*. To her, the essence of the book was in the last chapter which emphasized the need for sustainability-oriented networks,

for speaking the truth, for a willingness to learn, and for love. I was surprised and shocked to hear after Dana’s presentation that quite a few people — mostly old[er], white males, I can add — had not enjoyed her presentation at all. At the thought of this, I happen to read in the Bhagavad Gita Krishna reply to Arjuna’s question “what are the forces that bind us to selfish deeds?”: desire, fear and anger. I may be particularly sensitive to this because I lost a few times in my life the precarious balance between emotional commitment and intelligent enquiry on the one hand, and indifference and cynicism on the other. “You? You’re not even an economist!” I hear myself say in a jest.

I enormously enjoyed and benefited from Dana’s insights in systems functioning. I learned a lot from her way of teaching those insights – and discovered that I had to do it my way. As I see it, the food chain project Dana and her colleagues did – and do — at the Sustainability Institute is among the finest applied systems dynamics I can think of. It is a synthesis of systems thinking and participation of people with real-world motives and values and considerations – again synthesis, such an important quality of Dana’s work. I imagine it will be this kind of research that enlarges our understanding of the relation between money and materials, and I hope the Institute will continue it with Dana’s inspiration as a guide.

In February 1998 I visited Dana at the Foundation Farm near Dartmouth. We had a great time as I had a chance to have students play the climate game Susclime and take beautiful walks. And I understood what she meant when she introduced herself as “I’m a farmer” – having known her for so long as a gifted journalist by training and an inquisitive scientist by nature. One morning we drove to Hartland Four Corners – I remember crossing a river – and Dana showed me the valley she and a couple of friends had just bought. Here her dream would come true: create a community of people who would live the life we talked about so often. She was so confident, enthusiastic.

In the monastery where I am now, the rules during the zen-sesshins are simple. You are silent, also during the meals; you join in doing the dishes and preparing the table (but the food is prepared by the monks); upon leaving you clean your room; and you follow the general rules of the abbey and the program. These simple ‘adult’ rules work here, with minor adaptations in the last 10-15 years. But each community has to experiment itself with what works and what does not work, whether and when change is needed or not.

Since 1996 we have had discussions in the Balaton Group about which way to go — for the first time explicitly during a Steering Committee meeting in autumn 1997 in Joan Davis’ house. I remember I hadn’t had so

much fun for a long time, as we worked out the various possibilities: the 20th Anniversary Fade-Out (still an option), Keep On Truckin', and also The Balaton Sustainable Living Centers Network being "communities in several parts of the world that are working to build and live sustainably, each coupled with a small research/activist/education center, all coupled in networks of personnel exchange", in Dana's words in the Balaton Bulletin of Winter 1998. The discussion reached a climax with Aromar Revi's memorable list of 10 options (Balaton Bulletin Fall 1999) including such beautiful ones as Rich Old Geesers and its sister variant Rich Old Ladies; the Second Foundation Chateau not unlike the previous ones but with premium space for old geezers and discounted options for young geezers; Freddie Fungus and its B2-antipode Small is Beautiful; Sustainable Transformation Consulting Network; and finally the Systems (Hermit) Ecologists totem with the post-modern name Creative Destruction & Self-Organisation.

By this time it had become clear that Dana was searching for ways to live what we were talking about: a sustainable, equitable and efficient present, not just a future. Dana – and I – felt much attracted to the option of a Balaton Sustainable Living Centers Network. 'Dana's community', as it was known in the Balaton Group, at Cobb Hill is becoming such a place, growing its own, unique kind of sustainable living. I imagined a visit to the Cobb Hill community and learning from the experiences, the rules and principles. I much enjoyed the very down-to-earth discussions about where to buy hyper-refrigerators and -cars and pvc-free waterpipes. Her determination in this direction has encouraged me in exploring similar pathways. It hurts to realize that she has only experienced the beginning and that she will not see similar initiatives flower elsewhere. And I still dream of visiting Cobb Hill, but we'll miss Dana enormously.

What matters most to me has not been said, cannot be said. It was, for instance, and I remember it vividly, about good and evil. In a better world, will evil forces be destroyed? Part of the answer had to do with systems; another part with the essence of being human individuals. Teaching systems dynamics can clarify problems and help the rational mind to make more comprehensive decisions. But the growth of each individual being through the forests of unconscious youth into an attitude of humbleness, respectfulness, love is a never-ending story, starting again with every birth. Detachment and a life without preferences – would it bring these qualities to the surface, unavoidably?

It is February 19, 2001. I make a few notes. Beloved Dana, at this very moment, you are somewhere in the twilight between life and death. An unknown territory of which only Tibetan lamas speak as if they know it well. An uncharted territory of which we are ignorant – a conviction itself may testify to a deeper ignorance, a deeper sleep. The everyday noise faded away as I heard about you, slipping away from those who love and need you. Now, amidst this silence, I hear myself talking to you. Asking whether you think it unfair that you cannot reply. Wondering how you are experiencing these hours. Grateful that I have met you, some 17 years ago, and that we have walked along as friends, knowing we were each on our own path yet going in the same direction. I'll miss you. A lot.

Dear Balaton friends. All of a sudden everything has changed, again. We discussed it often, in the abstract – as resilience of systems – and in the concrete – in reflecting upon Wouter's death, in trying to trace our course ahead. Let's move on, united in what we've created and celebrated together with Dana amongst us.

... AND SHE IS STILL UP!

by Wim Hafkamp

Dana stood up. She walked over towards the overhead projector in the small meeting room, arranged her presentation material on the table, and made one step back into the room. She planted her feet firmly on the ground, straightened her back, and looked up. Actually, it seemed like she was looking at a point above us, on the opposite wall. She was concentrating, focusing, finding her opening sentence. And then she started to speak, looking at us, addressing us, each and every one of us in person. She spoke to us with a directness that I had never experienced before. No filters, no static, no difficult grammar and vocabulary. And it just didn't matter at all that many of us were not native English speakers. Dana spoke with mind & heart, body & soul. That is my first recollection of Dana in Balaton Group Meeting.

"There is enough, there is plenty! Water, Food, Energy,if only we were able to use it more wisely, and more equitably". It was my first Balaton Group Meeting. Until then I had not been aware that Meadows were two. I had read *Limits to Growth* some 10 years before, in the mid seventies. And here I was, 1984, in Hotel Petrol (an irony yet to be written up) in Csopak, Hungary. I had been to many conferences, workshops and meetings, whether academic, policy, activist or other. Also, I had heard good speakers, and seen effective presentations. Yet Dana was different. Sure, the content of her presentation was good. It was on carrying capacity, sustainable yield, and sustainable development. The mind was excellent. With it came her heart. There were a joy and warmth in her voice that I had never heard in conferences and workshops. It wasn't

just heart & mind. Especially now, almost 17 years later, I have this striking recollection of the first time I met Dana. She brought more: body & soul. Her composure, the way she moved, when addressing us, when engaging us in a dialogue, they were inspirational. In a literal meaning of the word, Dana inspired us. Not just at meetings of the Balaton Group, outside meetings as well, and not just in 1984, but also before and after.

There are many special qualities to Dana, and I resist the urge to enumerate and give examples. Her presence in dialogue, with all of her heart & mind, and all of her body & soul were phenomenal. And that is how she would interact with us during entire Balaton Group Meetings (and between). Often on a one-to-one basis, or in smaller groups. Dana would have at least a dozen conversations over breakfast, at various tables, in the hallway, or out on the lawn. Essences, bear hugs, observations, jokes, references, debates, some in miniatures, some in episodes, others in songs. Networking would be an inappropriate term here, because it implies that Dana would be working on an agenda of self-interest. While in fact she was trying to understand our agendas, and help us most often. Will we be eager and willing to help each other in the same way that Dana helped us? If so, Dana will still be up, and around.



Photo Credit: Betty Miller

DANA MEADOWS AT DARTMOUTH COLLEGE

By James F. Hornig

I first met Dana in 1972, when her husband Dennis was being interviewed for a possible teaching position in the Engineering School at Dartmouth. I was Dean of the Science Faculty, and had been told that “Mrs. Meadows” (how times have changed!) was also interested in a position at Dartmouth. I agreed to meet with her, and noted my reactions to colleagues in a letter I wrote to several departments:

Dr. Meadows is interested in a teaching position at Dartmouth. I bring her to your attention since her background does not readily suggest that any single department would be a logical place for her to seek a position. I met Mrs. Meadows for about an hour, and would say that I was very favorably impressed by her potential as a teacher. Would you contact me if you feel that there is any likelihood that your department would be interested in exploring Mrs. Meadow’s qualifications and interests in more detail?

Fortunately I made the right decision and we created a position for Dana in the brand new program in Environmental Studies that I had helped start. This was probably the best decision I ever made as dean. Within a matter of weeks, as her presence became known, four or five different departments expressed strong interest in inviting her to teach for them.

And thus began a twenty nine year association with Dana which was never dull and which enriched my life in countless ways.

At this earliest stage of our association, I found Dana’s work interesting, but I was a chemist doing a temporary turn of duty as an administrator, so matters of the environment and sustainability had limited meaning for me. Earth Day was a recent happening, and *Limits to Growth* was just being published, so I was certainly not alone in my ignorance. Four years later, when my cycle as an administrator was finished, my perspective had changed greatly. As I prepared to return to full time faculty status, I had read *Limits*, and had gotten to know Dana and her work much better, with the result that casting my lot with the fledgling Environmental Studies Pro-

gram appeared much more attractive than returning to the Chemistry Department. My education in matters of sustainability then began in earnest.

I had one more memorable administrative encounter with Dana after I became chair of the Environmental Studies Program. Dana had, in due course, been promoted to a tenured faculty position (an event which seemed to impress her not at all) but after a few years she walked into my office and announced that she was going to resign her tenure status, while continuing to teach as an untenured adjunct member of the faculty. I had no previous experience dealing with that sort of request, so I asked her to tell me more. Her logic was that she never wanted to take on what she felt were the obligations of a tenured position. In particular she never wanted to take her turn as chair of the department or serve on uninteresting committees, and she wanted freedom to adjust her teaching responsibilities from time to time when other activities attracted her attention. I explained that though unusual, such considerations were not necessarily incompatible with tenure. Moreover, I explained, Dartmouth had relatively recently begun admitting women undergraduate students and her position as one of only a few tenured woman faculty members was important as a role model for the students. We argued, and I asked her to think about it for a few days before making a final decision. Predictably, she did not change her mind, and her request was duly processed through the very skeptical administrative channels, and granted. Contrary to my apprehensions, though, her action did not damage the emerging image of professional women faculty at Dartmouth one bit; quite the contrary, it was recognized and widely admired as a self-confident assertion of independence. This was another in the long series of lessons I learned from Dana.

I chaired the Environmental Studies department for about a dozen years, and had the pleasure of watching and learning from Dana's immediate and continuing success as a teacher, while marveling at her evolving interests in journalism and international networking. As a teacher, she had a remarkable skill of being able to establish almost instant rapport with audiences of all sizes and interests. Her lecture notes, if any, were sparse, but she quickly communicated an intense and contagious interest in her subject to the audience. She never talked down to students, always communicating a sense of mutual intellectual challenge and involvement, and students invariably rose to the challenge of trying to perform at a level beyond their own expectations. For Dana, teaching was not an abstract process — it involved intense engagement with the world. Two examples:

Dana helped design a project course that was to serve as a culminating experience for students before graduation. The class of 15 or 20 students was assigned a real-life local environmental issue and asked to analyze the

situation, identify policy options, and make a recommendation. For her first offering of the course Dana chose a controversial regional issue. A large paper company had indicated an interest in identifying a small community in our area where it could build a new paper mill. Dana asked the class to analyze the impact of a new paper mill on a typical small community like Hanover. Under Dana's guidance, the class was led to approach the problem in the role of a professional consulting group serving a typical community being approached by the company. They quickly understood that this was not a sterile class exercise when she informed them that at the end of the course, they would report their conclusions at a well-publicized public presentation, as well as in a written report. They investigated the company's past performance, visited a mill the company had constructed recently, and examined everything from sustainable employment prospects to impacts on roads and schools. The resulting written report was distributed widely to communities in the area, and the oral presentation was televised and viewed throughout the state. (The paper mill eventually went elsewhere.) This typified the style of her teaching — she was never satisfied to teach *about* something, she wanted students to be ready to get involved and make something happen. Some years later she instituted a course called "Environmental Journalism" and again demonstrated her focus on *doing* by insisting on the unique requirement that before receiving credit for completing the course, students had to submit evidence that one of their written journalistic exercises had been accepted somewhere for publication, or that they had received five rejection slips!

Probably it was because of Dana's passion for changing the world that Dartmouth never fully lived up to her aspirations. Shortly after she and Dennis arrived at Dartmouth, Dennis, with Dana's assistance, initiated a new research and master's level teaching program at the Engineering School called the Resource Policy Center. The program, which focused on applied systems analysis produced a remarkable group of well-trained and highly successful graduates, but despite its success, it was eventually abandoned by the Engineering School as faculty and administrative priorities changed. This was a great disappointment to both Dana and Dennis. Even more frustrating for Dana was that the fact that over the same period she was instrumental in cooperating with some social scientists in designing an interdisciplinary Policy Studies program for undergraduates. Despite its success with students, and through no fault of Dana's, that program, too, was discontinued, largely because of the difficulty of generating long-term cooperation among departments. Academia can be very conservative, and these disappointments must have led Dana to question the commitment of the institution to the new ideas of systems thinking and sustainability she championed so passionately. But perhaps it was too much for her to hope that more than one new interdisciplinary program — the

Environmental Studies Program — could take root simultaneously at Dartmouth.

The fledgling Environmental Studies has thrived, and its success owes a great debt to Dana's influence on students, faculty, and curriculum. Students flocked to her courses. As her non-Dartmouth commitments gradually reduced her teaching activities to one course a year — usually either Environmental Journalism or Environmental Ethics — students planned their schedules carefully and scrambled to be selected into that one limited-enrollment opportunity. She was a demanding teacher, stingy with high grades, and always inspiring students to stretch themselves to the utmost. Graduates frequently tell me that such an interaction with Dana changed their personal lives and careers. Dana's students, both the undergraduates from Environmental Studies, and the graduate students from the Resource Policy Center, and the things they are accomplishing in their lives, constitutes a powerful legacy of Dana's life at Dartmouth.

Perhaps an even bigger challenge to Dana was getting department colleagues to stretch their horizons to the same degree as the students. But she did succeed — though of course never as fully as she hoped. She never nagged, but patiently urged us to be more venturesome in curricular design and to keep in mind the big issues of sustainability. In her earliest years on the faculty, during the 1970's, she emphasized the dominant themes of systems thinking and population issues — clearly a continuation of her work on *Limits*. As her international involvement with the Balaton Group developed, and as her role as public advocate and public conscience developed through her weekly newspaper column, *The Global Citizen*, and through other writings, more of her attention was directed toward problems on a human scale, particularly food and hunger. Then, possibly as a result of her own bout with cancer, she also became increasingly concerned with the consequences of synthetic chemicals in the environment. Increasingly, Dana's activities focused less on the abstract, and more

on examples of attempts of sustainable living, both in her own life and in the lives of others. This led her to simplify her own life by, for example, reducing her international travel, and to assuming her central role in founding the innovative Cobb Hill community in Hartland, Vermont. These subtle shifts in her own priorities were always reflected in her teaching and had an effect on her colleagues in the department. The introduction of her popular course, *Environmental Ethics*, is a good example. Although Dana knew a great deal about formal theories of ethics, the thrust of the course was always to challenge students to ponder the dilemmas of individual responsibility in a world awash in complex problems. In dealing with students, she was stingy with advocacy, but long on challenges.

There was one more important role that Dana filled for me and, I suspect, for many of her faculty colleagues. She was willing — even anxious — to be a visible public advocate of issues relating to sustainability and the environment. Her weekly newspaper column, of course, was the most visible but not the only example of this role. Although the very core of an environmental studies program is to be interdisciplinary and to be addressing the current pressing societal issues of (non)sustainability, most of us on the faculty are trained in a discipline and are uncomfortable about speaking out publicly on matters too far from the comfort zone of our disciplinary expertise. We had the luxury of having Dana speak out for us. She spoke eloquently and she spoke honestly. Her early scientific training, coupled with a life in the public policy arena, and her profound intuitive understanding of the dynamics of complex systems, gave her positions a balanced credibility rare in the literature of environmental advocacy. We didn't always agree with all of her positions, but we never had to apologize for errors of logic or fact. We were always honored to see that her publications had the footnote: *Adjunct Professor of Environmental Studies at Dartmouth College*.

DANA THE TEACHER — UNEARTHING OUR VISIONS AND DRIVING US NUTS by Drew Jones

Several years into my first job after college, I found myself feeling lost amidst the challenges of environmental work. Around that time, Dana came to visit our organization to deliver her *Beyond the Limits* talk. I had been a student of Dana's at Dartmouth, so she pulled me aside several hours before the address, put her arm around my shoulder, and asked about my career and life.

On hearing of my confusion, she sat me down on a bench in our garden, told me to close my eyes, and then asked me to imagine myself in ten years. She continued, saying, "imagine that you are doing work that you would love. Not what you *ought* to be doing or are *likely* to be doing, but imagine yourself truly feeling — *this* is why I'm here on Earth."

How many people in the Balaton Group have had a similar experience with Dana? How many workshop participants, Dartmouth people, Sustainability Institute colleagues, Cobb Hill members? How many of Dana's readers felt themselves looking deeper into their hearts and souls to see new possibilities?

Before we nominate Dana for sainthood, let's remember what could happen if you *didn't* answer her questions and chart out a plan for yourself: she'd chart one for you. Build that model, construct that chicken house, write that book, buy that farm, fight that policy, take that job. Has anyone else ever had the feeling of being aboard the Dana-mobile, and you weren't steering?

That said, Dana's ability to bring out the best in others was one of her most wonderful gifts.

In the classroom, as in many other forums, she brought out our best not just through gentle, dreamy questions, but also through tough, probing ones. Listen to her talking about her latest crop of environmental ethics students, in her final newsletter:

I mistreat them badly. I never tell them what I think, and I constantly poke them to explore to the core not only

what they think, but why they do. Why do they believe the assumptions they believe? Why do they value what they value? I drive them nuts....

Usually somewhere about the middle of the term, they realize they haven't any idea why — nor does anyone else, including the people they most strongly disagree with. That's the point where we have the opportunity for real transformation.

Such fun!

There's Dana the teacher — having fun by driving people nuts towards transformation. She is talking about her classroom, but what she said also applies to her life's work. She truly had fun driving all of humankind nuts towards the greater goals of transformation to sustainability.

Back on that bench in the garden, I told Dana about the images that came to mind — in one I was leading a team of people, I think. Over the years, this visioning process helped, as did Dana's pushing on my assumptions and world-view. But now, as I look back, I'm struck by a deeper message that Dana the teacher was sending: she *believed* in me. She believed that if I dedicated my life to *my* vision, not necessarily hers, the world would be better for it. Belief — what an incredible gift of a teacher to a student!

In the same way, Dana believed in you. She dedicated herself — her time, her attention, her resources — to the support of you, her many colleagues around the world, because of her deeply held faith that whatever springs from your hearts and minds will make the world a better place.

Today, Dana is gone. She can't sit us down and ask us to explore our visions. She can't drive us nuts pressing on our assumptions. But let us remind ourselves that her belief in us, and in all humanity, lives on.

MAKING SENSE OF THE DEATH OF DANA MEADOWS

By Vicki Robin

In the process of losing Dana Meadows I have moved through many spaces. While she struggled to live I lived in the space of fierce prayer for her total recovery. I also entered the space of indignation that this could happen to her, to me, to all of us. In those days I wrote:

IN US ALL THINGS POSSIBLE

The you-in-me and the me-in-you

The two of us in the "we" of the world

In this alone in my simple heart

All has been possible, all will be healed.

And you-and-me in the "us" of our friends

Bright lights of hope all the world wide

This family of grit, of smarts and of heart

It's this "we" that will mend what's now come apart.

After the news of her death I spent several days in the helpless sadness of a motherless child. That has passed, and I now find myself in a space of metaphor and meaning making. Some people wring their hands. I write. So here is what I find myself thinking about. . .

The Systemic Crashes Dana Spent 30 Years Warning Us About

Dana was strong in body and will. She'd staved off the Dartmouth winter flu until a little relaxation allowed the whole dump to descend on her body. But she had papers to grade and an institute to run and spring to plan for and... It was all too much to do yet all too central to who she was to let go of. Besides, she loved it all and wasn't about to stop. So an unsustainable state built up in her body, and she didn't intervene. Then one small thing went wrong. Something no one ever suspects will happen. None of us think a flu will infect our Eustachian tubes and the infection will go into our brains. Once the meningitis — the brain infection — was underway, a cascade of effects happened with terrifying speed. She went into a coma. From baking bread and slurping cream, she was suddenly tubed and doped up at a hospital she hated.

Two of the most powerful interventions known to men and women were marshaled — antibiotics and prayer. She couldn't have had better treatments on either level. But the system had gone too far towards crashing, and she could not live. If she had been hit by a truck or died of a cancer known to have environmental causes — well, we would have a single villain to blame. But she died of the tipping of complex and completely natural systemic forces — the same thing she had been saying we were doing to the living mantle of this earth. The earlier we intervene in such a process, the lighter the touch can be and the more successful the outcome.

In calling us for 30 years to pay attention to the indicators of impending system crash, she never lost faith that we could and would intervene. She believed fully in natural goodness and possibility.

There is no one to blame for her passing. Not the bacteria, who are, after all, our allies in sustaining the world. Not Dana for inattention to her health. Not us for failing to love or appreciate her — the circle of sadness that now mourns around the world knew they had a treasure in Dana. Not the institutions for failing to listen to her — indeed, the medical institution did its very best, and everyone was grateful for that efficient system that it seemed might save her.

There is no blame, only profound lessons to be learned. One is this tragic demonstration of how small — indeed microscopic — changes in a system can bring the whole thing to its knees. We need to be humble in contemplation of this truth of our world. We never know what small step unleashes horror — or healing. We must be awake. We must hold life, every moment and minutiae of it, as precious. Dana did not live a cautious life. She risked, big time. The lesson is not to contract. But if our stride outstrips our awareness, we are cautioned that we might tip some balance towards cataclysm. By the same token, if our awareness outstrips our stride, we might be miraculous forces for turning the tide toward ultimate health.

The other lesson I am living with is that if a thriving, flourishing, joyful, sustainable way of life is to emerge on this earth, and if I am committed to it emerging through me, then I need to take care of myself. I am a vital part of the community of life. To ignore my own well-being in service to the well-being of the whole is, ultimately, no service to anyone. I want the entire leadership of this big, bosomy, bright movement towards healthy ways of living on earth to be around for many decades. In contemplating Dana leaving us, I tried listing people like her. There were none. Each leader is unique and essential. We need to take care of ourselves and to feed our life energy to the next generation while we do our work in the now.

The Nurse Log

Years ago a friend took several of us to the rain forest for a guided walk. He asked us to be silent while we were hiking and to notice what we saw in the absence of thought or chatter. I saw death — and it was good and necessary. I saw that the living forest was rooted in and depended on the sacrifice of generations of ancestor life. It lived off rotting carcasses of trunks and roots

and leaves and even animals. The very exchange of minerals at the tiny root hairs depended on the dissolution of former living beings. Instead of a forest, I saw the cycle of matter through living and dying. Let me tell you, it was not an easy share when we circled up in our clearing to talk!

I have walked many times in the rain forest here in the Northwest. One of my constant joys is coming upon colonnades of cedars — their straight lines defying the random patterns of nature. Once mature, there is no evidence of the “hand” that planted them in a perfect row. But the young ones still sit atop their mothers’ backs tell the story. When a great tree falls, its decomposing trunk becomes home first to fungi, the great decomposers. Those break down the taut flesh of the tree, making space for roots to lodge and liberating nutrients for them to feed. Soon a line of saplings are growing, sending larger roots around the trunk to suckle from the soil itself. As the mother log disintegrates, the young trees are often left standing on long legs of roots. These eventually thicken into trunk itself, and all that’s left of the sacrificial act of the mother releasing her body to the next generation is the way her young line up forever at her grave. Dana’s physical body, which held together her other body — the body of intelligence, inspiration, integrity and love — has been toppled by the winds of change. We who loved her — whether or not we knew her — will flourish as we sink ourselves even deeper into the body of work she left behind. May we grow tall and straight. May the sunlight that’s entered the forest through her falling call us to unimaginable heights. May future generations, walking in the healthy, fertile land we will leave behind, marvel at how true we have been to our mother — without ever needing to know her name.

Novas

Our sun, and consequently all life on earth, was seeded by a previous star maturing to a point of heat where nuclear fusion reactions began. This process, in the largest stars, led to cascading effects resulting in eventual collapse and an explosion called a “supernova.” It is a awe-ful event, and the release of energy creates, momentarily, the brightest star in the heavens. Some of the heavier elements produced near the end of the star’s life are liberated back into the gas in the galaxy and provide some of the raw material for the next generation of stars. The intensity of shock and grief at Dana’s passing, together with the intensity of what she had in motion when death shattered her teeming world, is seeding the living with a will and inspiration for creating worlds worthy of her visions. We are her starseed. We are her children. And our children and their children are hers as well. Our living earth will be nourished, will thrive, by the elements she released into our very cells.

How Buddhists Honor Their Teachers

True spiritual teachers, even now in this money-mediated, commodified world, shun charging for their teaching. They know that the Truth belongs to no one and every one and thus cannot be sold. They know that whatever enlightenment their students may experience comes from their own diligence, their own hard work. This tradition is well expressed in the Buddhist meditation community. Students come for retreat and pay a fixed amount for room and board but are free to offer whatever donation to the teacher they see fit. This offering is called, amazingly, “dana” (pronounced like Donna). This “dana” is the heartfelt gift to a teacher who has opened the mind in insight, aroused the heart of compassion and demonstrated what a fuller spiritual life might be like. The community of people who loved Dana Meadows, in this moment, seems to be spontaneously called to ask what their “dana” to this great teacher might be. Some know full well what their path and contribution is, and they are about this journey with a lighter, yet more determined, step. They are finishing unfinished manuscripts, rearranging lectures, planting luscious gardens, meditating with greater purpose and much, much more. People in her co-housing community and her institute are bearing down on birthing her vision. Others have been inspired more generally by her to dedicate their lives to fishing humanity out of the swamp of co-stupidity we’re brewing. These folks are finding themselves more directed toward specific areas of work. This seems to be our “dana.” It would certainly please Dana to no end if her death inspired thousands to reinvigorate their vows and millions more to take up the causes she cared about. She would not want to be deified, but she would love seeing the garden of sustainability in full bloom. What is your “dana”? How much, and of what, will you give to this special teacher who opened your heart and mind and touched your soul? Our gift to her is the gift of us to the world.

The Power of the Net

Dana believed in the power of the net. By this I do mean the Internet, but there’s more. She believed in the living network of devoted and intelligent earth movers (and shakers) who’d sat in a Balaton (or other) circle with her over many decades. The spontaneous connections made in such meetings birthed projects and reports and insights and hope and even marriages and babies. She also believed, though she might not have used this term, in the Jewel Net of Indra from the Mahayana Buddhist tradition. Imagine a net stretching across all dimensions, endlessly through space and time. Brilliant jewels lie at each connecting point or “knot” of the net, reflecting in their infinite facets every other jewel in the net. This net, seen by the mystics, is for us a mere metaphor for the interconnectedness of all things.

Each jewel is a living being. Each jewel is part of the ecological web of life, from the infinitesimally small to the integrated oneness of the Universe itself. Another name for this net is love. Dana believed in love. She also believed in the grounded possibility that this love that infuses life as surely as do hydrogen and helium could be the “long-enough-lever” that Archimedes said would change the world.

When Dana fell into a coma, I fell into the net in all three senses. I beat the keys of my computer with the same crazed expectancy that a trained rat has as he beats a button in search of an intermittent reward. News via email was my only sense of control in an out-of-control circumstance. Although I live in a small, loving community of people who all knew her and shared my stunned vigil, I also belonged to the second net — the global community of sustainability workers bound together in part by Dana’s love. I knew that if we were in a village, we’d be baking hot-dishes and congregating in homes and churches. We’d be hugging and holding each other. News would come on the phone and on foot as people circulated with the latest word. But Dana was global as well as local, and all my concern focused on hourly visits to my email account. Dana did not like the ironic fact that someone in this clan of hers was probably airborne at any moment of any day — flying somewhere to speak about a sustainable future. She didn’t like “a-locality” — which is partly why she so firmly rooted herself in the green hills of Vermont and New Hampshire. But she loved this network and its power to move the world.

I also find myself in the Jewel Net of Indra as I try — as people always do — to understand the meaning of death. Where did Dana go? Is there continuity? What proof do I need? As surely as I turn to nature for solace that life itself goes on, I turn to this Jewel Net to remind myself that in this one Universe of ours there is no such place as away. Dana died out of our lives but into the very heart of this web of love and intelligence that holds the whole shebang together. I can’t call her ever again on the phone. I will never again get a “Dear Folks” letter. I have no belief that she now watches over us and is working with us from “the other side.” But Dana has not left the net.

The Beginning for the Rest of Us

Death punctuates a life for she who dies and an era for those who live on. Into the void rush sorrow and grief, insight and grit, inspiration and grace. Everyone who remains is changed according to their own life trajectory. Though gone in body, the DNA-imprint of the departed soul lingers. It continues to transform. It goes deeper into the living souls, like the reverberations of a bell which, while fading, sinks meditators into deeper states of awareness. In dying, the beloved also liberates energy that was bound too tightly into a pattern. It makes space for nascent leaders to step up to new responsibilities. It calls to task everyone who depended on that now-passed life for any form of sustenance and guidance — time now to walk straight without that crutch.

Written for Dana the Day She Died

*As death uncoils her life from her legend
Guanine, adenine, cytosine, and thymine
As flesh-friend dissolves and history invades
The tight-wound language of her now finished days
Like milkweed she’s opened to scatter her seed
Thistles and oaks and fishes and reed
Life is now weeping and life will go on.*

*Murrelets and owls and salmon and moles
Coiling, uncoiling, now life-forms now groves,
Is it here that our Dana’s legend will lie
Will the root people know and the winged ones cry?
And we, who’ve abandoned rich soil for rugs
Will we speak her truth for her, will we shirk, will we shrug?
Yes life is now weeping and what life will go on?*

*Guanine, adenine, cytosine and thymine
Birthing all life in the flow of their stream
And we, as we coil our lives round her gifts
We remember our friend and with loyal souls commit
To sprout like saplings rooted deep in the heart
Of the tree that in falling is now never apart.
And Life is now weeping and Life will go on.*

*There is no where in nature that Dana is not
No person she touched whose pain is not hot
In their chests and we cry, how could it be
That bacteria, our ancestors, took one like she
Who tended gardens and milk cows and spring’s baby sheep
And mittens and puppies and students — we weep!
With all life that keeps living and with us will go on.*

February 20, 2001

REMEMBERING DANA

by Csaba Csaki

Csaba Csaki is Professor of Agricultural Economics at Budapest University of Economics and Senior Advisor for Strategy and Policy at The World Bank.

I was shocked to hear the news of Donella's death. Her early and unexpected passing is a terrible blow. In thinking about her, I recall many memories of working with her, and of her lively mind and spirit, and the joys she found in the intellectual exchange of ideas.

I first met Dana twenty-five years ago in Laxenburg, near Vienna. Though it was the height of the Cold War, an international institute, the International Institute of Applied Systems Analysis, was founded in Laxenburg to allow scientists from both sides of the Iron Curtain to work together on some of the major problems facing mankind. At that time, in the mid-1970's, this was the only place where scholars from both the East and the West could work side by side without significant political constraints and outside influence.

Both Donella and Dennis were considered "stars" of the Institute – enjoying the popularity and the worldwide success of their book, the famous *Limits to Growth*. One of the major programs at the Institute was related to global food problems and relied on the system approach and simulations. Donella and I were involved in this project under the leadership of Ferenc Rabar, who is very well known among the members of the Balaton Group. Donella was the spiritual center of the project, and paid great attention to poverty and the plight of the poor. She played a very instrumental role in extending the focus of the project toward addressing poverty issues. Initially, we started to develop a global food and agricultural model system to study the impacts of trade liberalization on international agricultural markets and food prices. Donella worked hard to convince all of us that our modeling system must be used to investigate

the phenomena of malnutrition and hunger as well, and also to study the potential impacts of various scenarios in development aid to the developing world.

Though none of us stayed at the Institute when the project was completed, the food and agriculture model system developed at IIASA became a great success and is still quoted as the first successful attempt to model the global agricultural system. The conclusions drawn on the determinants and dynamics of malnutrition and hunger, which to a large degree reflect Donella's views and contributions, are still valid today. The lessons I have learned from our debates over poverty and hunger have had an everlasting impact on my views and later career. Her humanity and idealism were a significant new experience, not only for me, but for all of us who came to IIASA from a more materialistic and cruder world.

It is difficult for me to remember Donella without remembering Ferenc Rabar, who also recently passed away. Donella and Ferenc shared a common idealistic vision of the world as it could and should be, which they tried to impart to others. Their special friendship endured after all of us left IIASA, and inspired both of them in new ventures and challenges.

Though my contact with Donella over the years was sporadic, and was always an occasion for further encouragement, I will always remember her as I first knew her in the early days when we met in Laxenburg. I remember her for the debates we had in the "kitchen wing" of Schloss Laxenburg, for the walks that we took in the park, and especially, for her generosity of spirit and brilliant mind and love of life and all mankind. I will miss her greatly.



Photo Credit: Sustainability Institute

DONELLA MEADOWS: A PERSONAL TRIBUTE

by Seth J. Itzkan

Seth Itzkan is a futurist and the Co-director of the Boston Chapter of the World Future Society.

Yesterday we all lost a friend. Arguably the world's greatest futurist and most responsible citizen, Donella "Dana" Meadows, lead author of the seminal work *The Limits to Growth* and the world's greatest champion of systems thinking and sustainable development passed on at the untimely age of only 59. Next to Rachael Carlson's *Silent Spring*, *The Limits to Growth* was the most influential and clarion call to modern environmentalism, as well as being a landmark achievement in systems modeling and computational future studies. The result of MIT's prestigious Systems Dynamics Group, the publication of *The Limits to Growth* in 1972 sent shock waves around the world and became a media phenomena, selling 9 million copies in 29 languages. Headlines read, "Computers look into the future and shudder", "Study sees disaster by the year 2100", "Scientists warn of global catastrophe". The book unleashed a global debate that is still in force. Its popularity helped spur and proliferate the field of systems modeling and its sundry concepts, such as resource "sinks" and "sources", positive and negative "feedback loops", "carrying capacity", and "systems behavior". Today these concepts are central to environmental science and are cornerstones of the Kyoto accords on carbon dioxide reduction.

Countering the Contrarians

Since its publication, however, an army of pro-growth factions have tried to debunk the book's credibility. John Naisbitt, author of *Megatrends 2000*, wrote in his introduction, that *The Limits to Growth* was proven wrong "before the ink was dry". Others commonly equated the work with Malthus and thus attempted to reduce it to nothing more than antiquated philosophy that was unappreciative of technology and free market forces. Such rhetoric was not unusual for capitalist who didn't understand or didn't want to understand the concepts of systems behavior nor the underlying realities of the global environment. Nor did such contrarians, it appears, ever care to read the works by Meadow et al, which specifically addressed the contested points. In most cases, the attackers focused on specific, and insignificant, instances where a resource stock had not been depleted at the rate forecast or where the price of a commodity had decreased instead of increased. Such anomalies were cited in an attempt to derail the whole science of long range global systems modeling. As if to say, a cool day in Kansas is a blow against the theory of global warming, and the preponderance of evidence which supports it.

Other captains of the contrarian movement included Julian Simon, author of *The Ultimate Resource*, and Herman Kahn, author of *The Year 2000* and *The Next 200 Years*. A recent recruit to this now defunct army is futurist Jerome Glenn. During a 1999 Millennial episode of the McLaughlin Group, Glenn predicted that the Club of Rome (sponsor of *The Limits to Growth* study) would be proved to be the "Club of Wrong". McLaughlin, true to his form, replied that he could do better than that, and predicted that all environmentalism would finally end. Unfortunately, however, for Glenn, McLaughlin, and their ilk, the future thus far has not been cooperative (nature can sometimes be that way). Instead it brought us the "dot com" bubble burst and even more incontrovertible evidence of global environmental distress. The 20th century closed as the warmest century of the millennium, with the 1990s the warmest decade of the century, and 1998, the warmest year of record. In addition to the unprecedented fires that circled our planet at this millennial transition, we also saw massive thinning of Arctic ice and shrinkage of glaciers. If such ice were only an adornment to our planet, like rocks in a martini, it probably wouldn't matter, but, as it turns out, the Arctic ice, in addition to keeping current sea levels in check, is also the foundation of an ecosystem which drives the oceanic food chain, starting with the microbacteria, plankton, and krill which live and feed in the nutrient rich waters just beneath it. Melt the Arctic ice and you not only flood all coastal areas where a majority of humanity lives, you also remove the food supply for marine life, from cod to shrimp to whales. Not good. The year 2000 also saw the publication of Scientific American's cover story, "Global Warming: The Hidden Health Risk" which documented the world wide expansion of vector born diseases, such as malaria, dengue fever, hantavirus, and cholera. The article forecast that by the year 2100, due to increased warming, the zone of potential malaria transmission would have expanded to an area inclusive of 60 percent of humanity. And I thought technology was supposed to rid us of these problems.

In hindsight, contrarian arguments are just hot air and obfuscation. We now know that the earth is warming at an accelerating rate and is doing in no small part from anthropomorphic influences. This is no longer just a team of computer geeks at MIT making such prognostications, but the collective conclusion of thousands of the world's leading scientists. The Intergovernmental Panel on Climate Change (IPCC), though attempting to use cautious language, is becoming increasing

ardent in its messages. Their plausible scenarios being offered for the next 50 years are startling. Given contemporary information, *The Limits to Growth* was not only accurate, it was conservative. The real situation is getting worse, faster.

Poetic Justice — Vindication of *The Limits to Growth*

Perhaps, there is a fitting irony in that in the week of Donella's unfortunate passing, the IPCC published the summary findings of their third assessment report (TAR) which, in its totality, fully vindicates *The Limits to Growth* and confirms many of its findings and arguments almost to the letter. They state:

“Projected climate changes during the 21st century have the potential to lead to future large-scale and possibly irreversible changes in Earth systems resulting in impacts at continental and global scales...Examples include significant slowing of the ocean circulation that transports warm water to the North Atlantic, large reductions in the Greenland and West Antarctic Ice Sheets, accelerated global warming due to carbon cycle feedback in the terrestrial biosphere, and releases of terrestrial carbon from permafrost regions and methane from hydrates in the coastal sediments”.

Other IPCC projected impacts, which could be lifted right out of *The Limits to Growth*, include: “reduction in potential crop yields”, “decreased water availability”, “increase in the number of people exposed to vector-borne diseases”, “widespread increase in the risk of flooding”, and “increased energy demand for space cooling”.

Along the economic front, the IPCC report states: “The costs of ordinary and extreme weather events have increased rapidly in recent decades. Global economic losses from catastrophic events increased 10.3 fold...(between the 1950s and 1990s in 1999 US\$)”. Stating further, such continued trends would

“...trigger increased insurance costs, slow the expansion of financial services into developing countries, reduce the availability of insurance for spreading risk, and increase the demand for government-funding compensation following natural disasters”.

Almost 30 years ago, Meadows et al came under fire for stated exactly such environmental and economic scenarios. The costs of environmental loss would inevitably cut into capital flows and investments. Its all there in the systems models which the contrarians refused to look at. Their continued reticence, even today, is like the Spanish Inquisition's refusal to look through Galileo's telescope. At stake is a paradigm. Science be damned.

Perhaps, however, the most fitting tribute to the legacy of Donella Meadows in the IPCC report is in

their description for how to lessen the potential impacts of climate change.

“Policies that lessen pressures on resources, improve management of environmental risks, and increase the welfare of the poorest members of society can simultaneously advance sustainable development and equity, enhance adaptive capacity, and reduce vulnerability to climate and other stresses”.

Exactly the measures which Meadows has been preaching for over quarter of a century. And exactly what big government, pro-growth, and World Bank friendly forces do not want to hear.

Consummate Global Citizen

For the majority of the years since *The Limit to Growth*, Donella focused her energies on promoting a positive vision of the future, through such avenues as sustainable development and her weekly column “The Global Citizen”. The philosophy and practice of sustainable development, which has now taken hold worldwide, is largely due to her. Its tenets are first outlined in *The Limits to Growth*, but under slightly different terminology. Defining appropriate “feedback mechanisms” for a sustainable state, she expounds on several ideas, such that,

“...the total costs of pollution and resource depletion be included in the price of a product, or that every user of river water be required to place his intake pipe downstream from his effluent pipe”.

Those ideas are now at the heart of “ecological economics” and central to modern pillars of the sustainability movement, such as Ray Anderson's “Mid Course Correction” and Bill McDonough's “Eco-effective” design principles. Countering the argument that such a state of limited growth is akin to death, as her detractors often huffed, Donella states,

“Population and capital are the only quantities that need be constant...Any human activity that does not require a large flow of irreplaceable resources or produce severe environmental degradation might continue to grow indefinitely. In particular, those pursuits that many people would list as the most desirable and satisfying...”

Continuing,

“...global equilibrium need not mean an end to progress or human development. The possibilities within an equilibrium state are almost endless. ...It is possible that new freedoms might also arise — universal and unlimited education, leisure for creativity and inventiveness, and, most important of all, the freedom from hunger and poverty enjoyed by such a small fraction of the world's people today”.

Dana's most recent creation, The Sustainability Institute in Hartland Four Corners, Vermont, is a premier "think-do tank" for sustainable development — a nexus for innovation in resource use, economics, and community. Dana is regularly cited by today's great industrial and environmental luminaries as being instrumental to their thinking, including, for example, Amory Lovins, John Todd, Ray Anderson, and so forth.

In my eyes, she and Rachael Carlson are sisters. They are the heroines of the new millennium, which, if we survive, will have their works and voices recorded for posterity long after we've forgotten their naysayers. Their philosophy, science, and sensibility is the cornerstone of a sustainable humanity.

To my friend Jim Laurie, one of the few "futurists" who actually understands and uses systems modeling, Dana was a modern day Thoreau. She intentionally chose life on a small New England farm where nature cradles knowledge and wisdom like precious children. When Thoreau didn't have an answer to one of society's many problems he would go into the woods for insight. He trusted nature's tutelage and did not conceal his own ignorance. As Thoreau writes,

"The highest that we can obtain is not Knowledge, but sympathy with Intelligence...there are more things in heaven and earth than are dreamed of in our philosophy".

Personal Friendship

Dana became my friend 18 years ago. She taught me to spin wool from sheep she had raised on her farm in Plainfield New Hampshire. I used to visit her often. We joked about creating a game called "Non Trivial Pursuits".



Photo Credit: Sustainability Institute

As a student at Tufts University, I invited her to debate Anthony Wiener who co-wrote *The Year 2000* with Herman Kahn and was a member of the Hudson Institute, intellectual apologists for the World Bank. Dana arrived haggard because she had been up all the previous night helping one of her ewe to deliver. I think there were 4 or 5 babies lambs in all. She mentioned this fact during the debate and Anthony made a snide remark about it. Later I heard him say that he tried to start a fight with her but she wouldn't bite. He seemed proud of himself and wore what today we may call the "Dubya Smirk" — like when the former governor gloated about his Texas death penalty record. In thinking about Mr. Wiener's comments, and Dubya's, I am reminded of the great Shakespearean passage from King Henry the Fifth, "His jest will savor but of shallow wit, when thousands more weep, more than did laugh at it".

Years later, as a graduate student at the University of Houston-Clear Lake Master of Science Program in Studies of the Future, I informed her that her book, *The Limits to Growth*, was required reading, but that the book was considered "negative extrapolism" and she a "negative extrapolist" and that this was the official classification in the curriculum. She wrote back a retort saying that anyone who understood anything about "nonlinear systems modeling" knew that it was not extrapolism.

Just two summers ago I wrote her a letter from Crows Pass Cabin outside of Girdwood Alaska. It was late August and a blizzard was already in progress. I went there with the specific intention to write letters to those I love, she being one.

Her passing hit me like a blow to the chest. She is one of the principal reasons I call myself a futurist. I have been thinking of her quite a bit lately, and was looking forward to visiting with her soon. I wanted once again to sit by her side, on her porch, and spin wool.

Goodbye Dana. There is no limit to your influence, or our love of it.

THE CREATION OF THE BALATON GROUP

by Dennis Meadows

Central Concerns

The essential elements of the Balaton Group and its meetings today were already in place from the beginning. The October 1982 Balaton Bulletin described our first meeting.

“In September 1982 thirty scientists and managers met in Hungary to review the state of the art of natural resources modeling and to identify ways we could advance the theory and the practice of regional resource management. Those attending the meeting wanted to identify ways of supporting each other in the design and implementation of policies that:

- greatly raise the productivity of each region’s natural resource endowment and
- maintain or increase its overall fertility.”

Jane King attended that meeting, and the Bulletin mentioned her work:

“We were inspired by a statement written by Jane King that expresses the general viewpoint we all share:

“Any nation has at a given time a range of potential futures, some acceptable, others not, depending on the combination of its resource endowments, demographic circumstances, the skills and socio-cultural attributes of its population, available technologies, and trading opportunities with the outside world. The problem is to find a means of defining that future which is in the best interests of a country; and in this the concept of carrying capacity can provide a helpful point of departure.”

Dana was already fascinated by the role of paradigms in scientific advance and social change. She wrote in the Bulletin:

“Any scientific field can be defined by its ‘warranted queries’ the questions that are sanctioned for investigation by the field’s practitioners and that are accessible to its methods. The Balaton meeting identified several general questions that will serve as the framework for our efforts.

1. What is the current maximum sustainable use of the resource base: nationally, regionally, globally?
2. How could the sustainable output be increased?

3. What is the cost of exceeding the sustainable level? What is the cost of not exceeding the sustainable level?
4. What are the ways of facilitating the transition to more extensive reliance on renewable resources?
5. What are the likely future consequences of unequal distribution of the world’s resources?
6. How may the carrying capacity be affected by social and economic development?
7. How can our understanding of the answers to any of these questions be most effectively communicated to other scientists and to decisions makers.”

Those seven questions remain at the heart of our members’ concerns.

It is no accident that the goals, the meeting design, and even many of the participants from those early meetings still serve us well today. It is no coincidence either that the Group members have produced an enormous collection of useful research, reports, books, conferences; they have even engineered the creation of new institutes, university curricula, and philanthropic programs. And it is not surprising that many Balaton Group members have been boosted to positions of national and international influence through their participation in our sessions.

It was our intention from the first to accomplish precisely those outcomes. The Balaton Group emerged from a deliberate and extended discussion between Dana and me, with many suggestions from our friends, about the best way we could stimulate world wide research, teaching, and policy on the problems identified by our work for the Club of Rome.

My objective here is to describe briefly the origins of the Group and some of its distinguishing features. My focus is on the institutional history and on Dana’s role in the early years. I will not trace the intellectual development, professional accomplishments, and changing themes of our assemblies. That story is told already in the 2000 accumulated pages of the Balaton Bulletin. Some day it will be useful to condense that narrative into a succinct summary. I leave that to another time.

The Balaton Group embodies several important innovations in its operation; and it has been unusually long-lived and productive. How did all this come about?

Kapolyi's Invitation

In 1979 Dana Meadows received an invitation to participate in a UNESCO conference to be held in Budapest. During that period she refused most speaking invitations, but we both had positive impressions of the city and several friends there. So Dana accepted. The meeting was held at a lovely hotel on Margit's Island in the Danube. After her speech, Dana was approached by a distinguished Hungarian, Dr. Laszlo Kapolyi. He invited her to lunch and then used that meeting to discuss with her opportunities for collaboration.

At that time Dr. Kapolyi was the senior government official responsible for the energy sector in Hungary. He had two earned doctorates — in economics and in engineering, and he was enthusiastic about the potential for using mathematical modeling to enhance policy making in Hungary.

Although Hungary had always been the most open and free of the countries under Soviet sway, nevertheless, in the 70s it was still a society in which travel and information were under fairly tight, government control. Kapolyi understood the costs of isolating Hungary's best minds from their counterparts abroad, and he hoped to increase their opportunities for collaboration. To Dana he expressed a general interest in supporting some sort of East-West scientific cooperation related to modeling of energy, resources, and development.

Dana promised to think about it. She returned home, and we discussed the offer at length. Shortly thereafter, she and I organized a second and then a third visit to Kapolyi in Budapest to discuss further his interests and his offer. Kapolyi's interests were non political and his resources were significant. So we took it as an important opportunity. But how to respond?

Main Influences

Looking back two decades, I can identify four important influences on the design of the conference that Dana and I conceived as a response to Dr. Kapolyi's invitation.

First of all was the worldwide collection of friends and colleagues that we met through our association with the *Limits to Growth* project and book. Dana preferred to stay home and write. So, in those days, I mainly took responsibility for dealing with speaking invitations and the other requests for collaboration that came from people around the world who were excited about our analysis and eager to learn more or do more about it. In the 1970s

I visited over 25 nations to speak, consult, and teach about the limits to global growth. From those trips I gained a good impression for the state of the art related to resource modeling and to sustainable development. I also accumulated a massive address book of talented analysts and teachers. That list was the starting point for discussions about who should come to the first meeting.

Second was the winter that Dana and I spent as Research Fellows at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria, just south of Vienna. From January to March 1976 Dana joined the Food Group, and I worked with the Energy Group. That visit gave the opportunity for our first visit to Hungary, and it introduced us to several Hungarians who played a central role in the early days of the Balaton Group. At IIASA we met Ferenc Rabar, Csaba Csaki, and Istvan Lang who became eventually Minister of Finance, President of the Karl Marx University, and President of the Academy of Sciences respectively.

Third, was the set of two-week workshops on system dynamics and natural resources that I organized with Jørgen Randers. He and I twice applied for grants from the NATO Science Committee for financial support of an Advance Study Institute. The first was in Hannover, Germany, in 1972. Niels Meyer was a participant. With Niels' help, Jørgen and I organized the second workshop in Kollo Kollo, Denmark in 1973. Eventually there was a third workshop in Denmark several years later. Malcolm Slesser, Chirapol Sintunawa, Joan Davis, and several other core Balaton Group members learned their first system dynamics at these meetings and formed the personal and professional relationships that eventually drew them into the Balaton Group meetings.

Fourth was the Gordon Conference series. During her days as a biophysicist at Harvard, Dana had participated several times in the annual Gordon Conference on nuclear magnetic resonance spectroscopy applied to enzymes. Dozens of these meetings are organized every summer, each on a narrow topic in the physical or biological sciences. They involve a relatively small number of elite scientists, who attend by invitation. Organizers and participants tend to remain the same, year after year. The sessions typically take place on the campuses of small private schools in northern New England. So costs are low, and there are few distractions. The goal is to bring together the leaders in a field under conditions that permit frank and constructive discussions about the key research issues. I believe it is generally the practice to schedule formal speeches each morning and leave the afternoons available for informal, but technical discussions. The Gordon Conferences have been an enormous impetus to advancing research in the areas they address, and we consciously took over some of their features in order to create a workshop that would advance understanding of sustainability.

I am sure there were other influences as well. But suddenly, one day, our plan crystalized. I still remember the definitive conversation in our study at Foundation Farm. Dana and I agreed, "Let's bring together our best friends, who are systems analysts involved in environment and energy, and organize a meeting with their counterparts in Hungary!"

Kapolyi was receptive to that idea, and we worked with him to arrange the first meeting in the fall of 1982.

First Meeting

Those were exciting times! Kapolyi was rising up through the ranks of the Hungarian bureaucracy. Eventually he would become Minister of Industry. He already had enormous power within his country, a talented young staff, and inspirational goals. Dana and I had just passed our 40th birthdays. The institute I had founded at Dartmouth had grown to about 50 people all engaged generally in policy modeling. Our special interest lay in energy systems, and we had contacts around the world in this area. So it was easy to identify the first set of participants in our meeting.

In August 1982 we were met by limousines at the Budapest airport, passed through the VIP lounge, and ferried off to the best hotel in town, all expenses paid. There was a private dinner in Budapest. Then buses carried us down to the Bishop's castle in Veszprém. We had a reception and a concert and welcoming speeches. Then on to Csopak, a sleepy village on the shores of Lake Balaton. There we stayed at a small hotel, the property of the OKGT, Hungary's oil and gas monopoly. The rest house was used intensively over the summer to give subsidized holidays to employees in the energy trust, but it was available to us in early September. It took several years for the facility to adopt the name Hotel Petrol, but it adopted us immediately. It has been the site for every one of our annual meetings.

Thirty-two participants were involved in the first session, 30 scientists and 2 administrative support staff. Included were me and Dana Meadows, Jane King, Laszlo Kapolyi, Betty Miller, Hartmut Bossel, Csaba Csaki, Leif Ervik, John Richardson, and Malcolm Slessor. It was a very successful meeting, and we decided to organize a successor the following year. The series has continued every since.

Getting Organized

We soon incorporated the group in the United States as INRIC, The International Network of Resource Information Centers. But our popular name remained the Balaton Group. Immediately we started the practice of publishing the Balaton Bulletin four times a year, as a

means of sharing professional and personal information among the members of our Group.

It was obvious from the beginning that our program would only succeed, if we could make ourselves into a real network — if we could enhance the quality, the quantity, and the speed of information exchanged among our members. The Bulletin was useful, but slow. It had to be supplemented. Initially we worked hard to ensure that members could send and receive telex messages. Soon personal computers began to find widespread use, and we helped our members to gain access to that technology — buying them a PC when that was required. Now e-mail is in widespread use. All our members have personal computers, and the internet has had an enormously constructive impact on work.

Dana and I made all the important decisions for the first few years. Then the Group elected a six member Steering Committee. It meets once a year to plan the next meeting and discuss invitations. Joan Davis has always provided exceptional hospitality for these meetings at her house near Zürich.

Membership

Total attendance in the first 19 meetings of our group was 871. The sessions have involved 342 different participants from more than 40 nations. The first meeting was our smallest. Participation was greatest in 1987 when 58 people journeyed to Csopak for our meeting. We decided that was too many for informal discussions. Since then we have let the capacity of the hotel limit our attendance to under 50. But despite the diversity in participants, it is the continuity, the persistence, and the dedication of its central members which have defined the group and made it so productive. When we come together next fall, nearly one third of the attendees will have been to more than half of the 20 meetings. A partial list of the stalwarts, in addition to Dana, is given below with the number of times they joined the sessions between 1981 and 2000.

Joe Alcamo	12	Hartmut Bossel	10
Gerardo Budowski	11	Joan Davis	18
Wim Hafkamp	12	Tamas Fleischer	10
Jane King	10	Zoltan Lontay	13
Dennis Meadows	19	Niels Meyer	16
Betty Miller	17	Jørgen Norgard	16
Carlos Quesada	13	Aromar Revi	12
Chirapol Sintunawa	17	Bert de Vries	16
Robert Wilkinson	10		

The annual meeting was always one of the most important commitments on Dana's calendar. She never missed a session, and, of course, she made crucial contributions to every one. It is terribly sad that she will be present next September only in our hearts.

Budget

Initially the Hungarians paid all our costs inside their country. We had to cover travel and administrative expenses. Then in the late 1980s there were major changes in Hungary's government as there were across all of Eastern Europe. Kapolyi lost the capacity to secure resources that would pay for our meetings. The Balaton Group took over full responsibility for all the meeting costs. Dana played a key role in securing major, multi-year grants from the Rockefeller Brothers Fund and the Noyes Foundation to help us make the transition to financial independence. Later she contributed her personal funds when outside donations would not suffice.

The Balaton Group has been a very cost effective enterprise. The total budget raised outside Hungary by INRIC for its meetings, administration, and special projects has been about \$1 million — approximately \$50,000/year. Our major expenses are travel and lodging for the annual meeting and payment for part-time administrative support. In addition contributions totaling much more than one million dollars have been raised by individual members to support implementation of the conferences, research, books, student exchanges, and other projects of their collaboration. For example, the Sasakawa Peace Foundation provided a grant to me of almost \$350,000 to support Balaton Group members in their efforts to develop and disseminate an innovative new curriculum on the creation of teams for sustainable development. Bert de Vries arranged for the Dutch National Institute on Environment (RIVM) to fund a set of Balaton Group seminars on indicators of sustainable development. These two grants and many dozens of others are not included in the above total.

In a shift that illustrates much about the Hungarian economy, the 2001 meeting, our twentieth, will again be sponsored by Kapolyi. But this time he is paying from funds earned by his company.



Photo Credit: Betty Miller

Administration

The Balaton Group has been a virtual organization. Initially it was run out of my institute at Dartmouth. But since 1988, we have had no physical office, no office equipment, no full time staff, not even a separate postal address. Betty Miller was my administrative assistant at the Dartmouth College Resource Policy Center in the early 1980s. So we asked her to help organize the first meeting. Her assistance was invaluable, and she has provided administrative support ever since. Initially the costs of her time were paid by my institute. Now she works as an independent consultant. She maintains our central financial records and helps with the logistics of each meeting.

Everything else has been carried out by volunteers. In the early years Dana and I together authored the Balaton Bulletin. She took over sole responsibility for it around 1990. A year ago it was taken over by Nanda Gilden and Niels Meyer.

The Future

We have periodically considered whether we should disband the Balaton Group and end its annual meetings. The question arose again at the Steering Committee meeting in Zürich last February. Once again we concluded that the costs are so low, the benefits so high, and the meetings so much fun, it is important to sustain the Group.

I know that the mission, the procedures, and the membership of the Group will need to change gradually over the next few years to reflect all the changes in us and in the world since we received Kapolyi's invitation in 1979. But the wisdom and the dedication of the current members will make that possible.

Dana's intellect, enthusiasms, optimistic visions, and dedication to the welfare of others were a major influence on the evolution of the Balaton Group over the first twenty years. Now it is necessary for others to pick up the torch.

MESSAGES FROM FRIENDS AND COLLEAGUES AROUND THE WORLD

Pew Fellows Program

Dear Ms. Miller and INRIC Colleagues,

It was with great shock and sadness that the staff of the Pew Fellows Program and members of our international network learned of the death of your friend and colleague, Dana Meadows. She was a much respected and loved member of our second cohort of Pew Scholars and one of the true stars of our program. Please accept from the PFP staff and Advisory Committee our sincere sympathies offered to all of the Balaton Group members.

The world is significantly less rich and full without Dana among us. This is a heartbreaking loss for family, friends, and colleagues. It is also a terrible misfortune for the larger conservation community. Dana was such a steadfast champion of applying the principals of systems thinking and sustainability to improve the quality of life for people around the world while conserving our global environment. She was also a true role model

to individuals of all ages. Dana spoke and wrote so eloquently and with such great integrity about a holistic approach to conservation. This perspective was exemplified in her interdisciplinary work and her willingness to reach out to many different stakeholders to effect positive change. She led by example, as the best role models and teachers do.

We are proud to count Dana Meadows among those who have received Pew Fellowships. She distinguished the Pew Fellows Program with her exemplary contributions to promote sustainable social, economic, and ecological practices that support a more equitable and healthy world. Her dedication to improving understanding of the principles of sustainability, her words and action, her outstanding leadership, and her integrity serve as inspiration to our on-going efforts.

I send wishes for strength of heart and peace of mind at this sad time.

Yours sincerely,

Cynthia R. Robinson
Associate Director
Pew Fellows Program

* * *

The International Institute for Sustainable Development (IISD)

To Phoebe Quist, Don Hager and other Members of the Family of Donella Meadows

Like so many others around the world, those of us in IISD mourn the loss of this bright star of sustainability. Donella has enlightened us for so long that it is hard to believe the star has dimmed. Indeed, we hope it will not be so, for she leaves a legacy of students and followers, of publications and ideas, and inspiration of many sorts that will continue to make her presence felt for many years.

Aboriginal people talk of sustainability in terms of the Seventh Generation — that generation we cannot reach out to directly. Surely it is that Seventh Generation that Donella was speaking for in many of her publications. For she was very clear about the need for this long-term perspective. Indeed, of the many words on the Internet mourning her passing, the phrase describing her

marvelous “scientific prescience” is compelling. For she taught us all not to be complacent about the future.

Those of us in IISD who had personal contact with her, Peter Hardi, László Pintér, Konrad Von Moltke, and Art Hanson, mourn a friend and colleague who will be sadly missed. But all of us feel a sense of loss and want to extend our sincerest sympathy to family and to her colleagues at Dartmouth College, the Balaton Group, the Sustainability Institute, and other communities in which she was active.

May her spirit live on within all of us concerned about sustainability of life on this planet.

Sincerely,

David Runnalls
President, IISD

Dana — the test pilot, by Hartmut Bossel

Test pilot?

Donella Meadows, the woman who loved kittens and lambs, flowers and butterflies, forests and snow, you and me, Beethoven, books and baking, the earth and all her beings — also a fearless pilot of unproven machines?

Yes, I remember her for the tenderness and enthusiasm she showed for everything in the world around her, but I also have the image of her as a tough and demanding test pilot. I have taken many of my books, articles, and simulation models to her for flight testing, anxious to have her check whether the argumentation would ‘fly’, the model structure would hold up to her rigorous tests, the writing would be precise and interesting to readers. I knew she didn’t suffer fools gladly, that she was a tough and demanding teacher, so I did my very best with my ‘machines’ before I would dare to ask her for her test flight and test report. She never turned me down, despite her many other commitments. She did not mind sharing her immense knowledge and wisdom of dynamic systems. Her support was given wholeheartedly and graciously. She took my ‘machines’ and with

calm, purposeful and undistracted concentration put them through their paces — the standard flight tests and several other, much stricter tests that were uniquely hers, that she had developed in her wide-ranging work covering systems research, the natural and social sciences, philosophy and journalism. After her test flight, she would come back with that particular grin, and a manuscript full of notes: Look, the thing barely flies. You can do much better. Reinforce the structure here, cut out all that unnecessary flabby weight there, improve the controls in this part, increase passenger comfort in another. I went back to the shop and followed her many suggestions. I knew I could trust her judgment — she probably understood systems better than anybody else, and she was one of the best writers and editors in the field. My ‘machines’ always flew better after I had rebuilt them according to her suggestions.

I know I am just one of many who have similarly profited from her generously given advice. We owe some of our better work to her, and we can only hope that it will contribute to the goals that were so important to Dana: sustainable development of all beings on this earth in peace and dignity.

* * *

Shooting Star and Guiding Light, by Fred Meyerson

When facing a difficult decision, I find myself asking, “What would Dana do now?” Dana Meadows lays her hand on my shoulder every day. She was the reason I went to Dartmouth College 25 years ago and that I now teach and write about population and environment.

Dana captured us in the early 1970s with a little book of computer projections, *The Limits to Growth*, which sold nine million copies globally. It changed forever the way we think about the world, and perhaps just in time. The book shrank our beautiful planet to the size of a baby, one that suffers from our success and excess and needs to be cradled carefully in our arms.

At the 1994 Cairo population conference, I saw Dana stand up in an assembly of crusty U.N. diplomats and say, “we need love to move forward on population and family planning.” As always, she spoke with quiet bravery and wisdom, especially when others were afraid to speak the simple truth.

Dana was a MacArthur Genius Grant winner and recipient of countless awards, honors and accolades, but it never went to her head. It all went to her heart. She walked away from tenure at Dartmouth because she felt she could best serve what she believed by writing, nurturing and participating in global networks of environmentalists, and

by creating a co-housing community, Cobb Hill.

Dana flowed through scales and across time so smoothly that I’m sure her transition out of life was graceful and peaceful. But the world has lost one of its great heroes and leaders — she died of bacterial meningitis at the age of 59 in February in Hanover, New Hampshire.

A lot of us stuck a “Think Globally, Act Locally” sticker on our bumper — and kept driving. Dana lived it. She walked her talk better than anyone I have ever known — she was as conscientious about the soil she worked on her organic farm as her path-breaking global computer projections and thoughtful newspaper columns.

When I last saw Dana this fall on a blustery northern New England day, she was driving a hybrid gas-electric car, living by example as always. She is the reason why my family owns only one car.

I sit here on a snowy Saturday morning with my beautiful two-year-old son, writing this and trying to explain to him who Dana was to me. The truth is that when my son is my age, in the middle of this century, if the world is still a healthy place, with a stable climate and most of its species still alive, he will have Dana Meadows to thank, and the millions of people she changed for good.

* * *

Club of Rome, Prince El Hassan bin Talal

It is with great sadness that we have learnt of the passing of Donella Meadows whose incredible contribution influenced the future of students, policy makers and peoples throughout the world. She will be sadly missed. On behalf of members of the Club of Rome, I send our heartfelt condolences to you, her family and friends.

Prince El Hassan bin Talal
Royal Palace, Amman, Jordan
President, Club of Rome

* * *

Bisan Singh

Like many others I grieve the passing away of Dana. I can never forget her unique character. (I had the privilege of attending two Balaton meetings) First, she made a total stranger feel comfortable and wanted. Her friendship was inclusive and all encompassing. Second, she always wanted to learn more. Her great wealth of knowledge was all the time seeking insights to new things even on mundane matters. She was not just looking to take but to share and give back in many folds so that our civilisation may become human and humane that is caring, sharing and giving. This is Dana's third unique characteristics.

May her soul rest in peace.

* * *

Nanda Gilden

My first acquaintance with Dana was via the email correspondence she exchanged with my late husband, Wouter Biesiot, during the years of his illness. During all these years, Dana supported Wouter in a very special way and on different levels: spiritual, practical, and intellectual; challenging him to go on, inspiring him to take the best from his work. A month before his death, she visited us and I still see them sitting at the table: Dana correcting her students' papers and Wouter finalising the last revision of his manuscript. When Wouter died she supported me and invited me to the Balaton Meeting of 1998. She did this in a way that is very characteristic for her: respectful, not pushing, creating an opportunity, stimulating, and also with hope and expectations. She encouraged and inspired me in taking up my own life again. She showed me that whatever you choose is good, as long as it is close to your heart and improves our world. I feel lucky to have known her, I will continue seeing her working in the Balaton Group within the balance of being modest and being very present with her energy, her love, her drive, her constructive criticism and her sharp intellectual creativity.

* * *

Haruki Tsuchiya

As I heard from Thomas Johansson that he and Amulya Reddy were going to the Global Energy Conference in Denmark in 1991. I decided to buy air ticket to Denmark. As I worked together with end-use-oriented energy analysis group at Princeton University and San Paulo in 1982-85. At the Conference I presented a short work that the calculation of CO₂ from fossil fuel per capita is 10 times of CO₂ from breathing of human being on global average. This means each person on the planet has 10 slaves. Slaves are cars, refrigerators, air conditioners, and factories. Person in USA has 55 slaves, Japan 25. After my speech, a woman came and told me to have lunch together with Indian and Latin American guys (I knew they were Aromar and Quesada thereafter) She talked about Balaton Group and invited me to the next autumn workshop. At last I understood she was the famous Donella Meadows. I read the Limit to Growth and the global dynamic simulations was a dream work for me in my age of 20s. I admired the work. It was an honor for me to be invited to such a workshop. At Balaton in 1991 I found that the group was truly ideal group of multidisciplinary people, who always gave me gentle discussions with philosophy and intelligence. I had imagined such group could be. But I have never seen it other than Balaton Group. I always enjoyed reading the Balaton bulletin, of which I have all issues after 1991. The group and bulletin were completely her products. I remember her works forever.

Haruki Tsuchiya
Research Institute for Systems Technology
Tokyo, Japan



Photo Credit: Sustainability Institute

* * *

Jaswant Krishnayya

While happy to write about the influence that Dana has had on my thinking and practise, I am afraid that I will be repeating what many others will say. She was so generous with her energy and support that each person got something special from her.

I first met Dana nearly twenty years ago at an IIASA Conference on Global Modelling, just before the first Balaton meeting. It was inspiring to see how her enthusiasm was catching, and how she was able to bring together people from so many different places with so many different backgrounds for the common cause of Sustainability.

We spoke briefly about the Aroles (a doctor couple doing rural work near Pune) and I found that she had met and really vibed with Mabelle Arole. She had this marvellous ability to listen fully to whatever was taking her attention, and waiting till the time was ripe to make her own contribution.

Not everyone has the same people-skills, but watching her made one see how important they are for anyone who hopes to create change.

I do think that I have been inspired by Dana's example to continue in the field of Sustainability, while trying to keep things simple and to work in my own area. I have also (I think) tried to emulate her example in encouraging others in pursuing their own ideas, without burdening them with mine (I am not always successful in this)!

I am sure there are hundreds of persons around the world who may have just read something she wrote and have been inspired to work, like her, for Peace and Simplicity — Adequacy.

* * *

Carlos Quesada

I met Dana in 1983, in her first visit with Dennis to Costa Rica, while searching potential members for the relatively new Balaton Group. A few months later I was invited to my first Balaton Group meeting in 1984. That meeting was a groundbreaking experience, and in a short time I developed a close relationship with Dana.

Through the INRIC's small funds or specific grant funds, Dana helped the participation of other members of the Balaton Group in strategic activities in Costa Rica in the area of Energy efficiency in 1995 and in the pre-

sentation of Carbon Sequestration Models, as part of a Climate Change workshop in January 1996. All these activities helped in creating awareness, in promoting research options or in influencing policy in Costa Rican institutions.

At a more personal level, the contacts with Dana developed in over a dozen Balaton Group meetings, at her farm, the reflections on her writings, and the human and professional links with a group of extraordinary people she help to kept together, enriched my life at all levels beyond any remote expectation.

The contacts with Dana were always inspirational. The Research Center on Sustainable Development (CIEDES), at the University of Costa Rica, is an indirect result of my links with Dana. The visioning exercises she promoted convinced me that I had to open new opportunities for integrated, interdisciplinary research, as a way to contribute to the advancement of Costa Rica's concerns and solutions for its deteriorating environment and to offer new opportunities for the future.

To me, the legacy of Dana's remarkable life has been as large as her genius and the friendship she offered to so many people around the world. I particularly valued her example to walk her talk, living with simplicity and humbleness, yet committed to any reasonable innovation which would set an example and help to heal the wounded planet; her sense of friendship and effectiveness in honoring promises; her unique intelligence coupled with an extraordinary sensibility at the service of others. I also treasured her wit; her courage for standing up against big interests while maintaining an open dialogue; her will and determination in difficult times; her frankness in letting you know what must be changed or improved and, in a broader scale, her guarded optimism and unbreakable commitment to struggle for long term peace, justice and sustainable development for all people and the planet.

Like all of us who came in contact with Dana, we were truly blessed by the touch of an absolutely outstanding woman who made the world a little better with every action she took, a little friendlier with every sincere hug she gave and easier to move along a cleaner path she left with every step in the great journey of her amazing personal, professional and academic life.

* * *

Niels Meyer

I met Dana and Dennis at a seminar in Germany soon after the publication of *Limits to Growth*. This encounter had a significant influence on my professional work as I switched from basic physics to energy and environment for the rest of my university career.

My most vivid picture of Dana is her presence in the crowded meeting room in the guesthouse at Lake Balaton. There was no way that you could overlook Dana. After each presentation Dana would have the most original and creative responses. They would always be kind and positive in tone but the careful listener could distinguish the levels of her satisfaction with the speaker.

The discussions at Lake Balaton will never be the same without Dana. Life will never be the same for all of us who had the great luck of enjoying Dana's friendship. Let us be reminded to care even more for our friends while it is possible. Let us work even harder to promote a more sensible world with Dana's example in our hearts.

* * *

Joan du Toit

Limits to Growth inspired one of South Africa's industrialists who had sent a representative to the Club of Rome to seedfund what would later become the Institute for Futures Research (IFR) at the University of Stellenbosch where I have been working as an energy researcher for the last 15 years. Since 1993, I have been fortunate enough to represent the IFR at the annual Balaton Group meeting and have become a member of that special family which has so profoundly influenced me as a person — both professionally and personally. Dana (as one of the strongest driving forces of this group) always encouraged and inspired me and I would be a poorer person if I had not known her. She counselled me on ways to push for renewable and more benign forms of energy and she put me in touch with information and people who could help me in this regard. On the eve of South Africa's political transformation — a worrying time for all the people of South Africa — her encouragement and insights supported me. Only days before her fatal illness she sent me 'electronic hugs' and warm words of comfort for my own personal struggle with illness.

Apart from the intellectual things I was lucky enough to get from her, Dana's humaneness will always stay with me. I will sorely miss her comforting (Earth Mother) hugs. Her sense of wonder at all things and people, and her willingness to learn from others — despite her own intellectual strengths — are things that will stay with me. Two of the things I remember about her at the last Balaton Group meeting (2000) was the photo of three lovely Jersey calves she put up on the bulletin board under Photos of Friends and Family and the caption (in big bold letters) on her notebook (always present to make those remarkable summaries) NEED LESS.

* * *

Michael Lerner

This is so hard. As I read Hal's message at 4 a.m. in the holy silence of early Sunday morning the tears began to flow. Dearest Dana, you are so beloved to us. Our sense of loss at your passing, if this is your passing, is just overwhelming to us. It does not seem possible that this could be your time to leave. You have so much more to give, so much more to live.

Life without you cannot be the same. All around the world we are crying together, Dana. All around the world your friends are weeping, Dana. The earth herself must cry that one who loved her so is passing on. Yet our prayers for you do not cease, Dana. I do not know what comes next for us, but I have enough belief to pray that if you must go you are lifted with our grief and our prayers and our love into the Light. I pray that in the Light the greatness of your soul will be with us all. I pray that you will be with us in the morning mist and touch our faces when we walk out into a world without you. We love you, Dana. It is that simple. We love you.

* * *

Philip Sutton

Dana,

I never met you in person but I cried when I heard you died. You have given so much of yourself to us all.

* * *

Bart Strengers

Although I only met her once during the Balaton meeting of 1998, I felt very sad such a wonderful woman died much too soon.

She could have done so much more in the years that seem to lie before her just a few weeks ago.

It feels not right and unfair. I simply don't understand why this happened.

Nobody does.

Through this e-mail I want to express my support to all the people that will have a difficult time in the weeks, months and years to come.

May her dreams become reality by those inspired by her.

* * *

Yukari Miyamae

Friends,

Although I have been a silent member of this list group for many years, and I have never met Dana in person, I have received so much inspiration from Dana and her work. The suddenness of her passing makes me feel an urgency, that we need to step up to her rank, and intensify our work to carry her vision forward.

I share deep grief and sadness with all of you, especially for Dana's close circle of friends and family.

May peace be with you, and I love you, Dana...

* * *

David Berry

There's a hole in the water. You can feel it.

It's been said "To know how much difference you make in the world, put your finger in a bowl of water and look at the imprint you leave when you pull out your finger".

There is a hole in the water. Dana withdrew her finger and we all feel a hole. She changed the shape of the flow as she touched us all. People I tell who never met her are stunned by the news. Dana reached many many people all over this world.

Aro, thank you for the list of actions we can take in support of Dana's vision and to honor her memory. I suggest is that as a memorial, we create a written invitation for each of us to declare specific next actions we will take to move ourselves, our families, communities, organizations and nations toward sustainability. Dana sought expressions of sustainability in her writing, her support of others, the design of her home, her car, her reduced travel, her community, her food production, and many more areas. This invitation could be part of a Balaton Website memorial.

Dana will smile somewhere, if her passing serves to remind each of us to take a next step. This last two weeks has brought an even deeper sense of community to the Balaton Group. That also is a parting gift from Dana.

With the twinkle in her eye and her sometimes impish sense of humor it should not be a surprise if the gifts keep on coming. Maybe the hole in the water is because her finger is still in it.

Condolences and love to everyone who loves Dana.

* * *

Genady Golubev

Any time I was coming to America my first telephone call was to Dana followed by a wonderful conversation. Now I feel I became an orphan. But the remembrance will be always with us, the Balatoners.

* * *

Jelal Ezzine

To Dana and to all of those who knew her; indeed she is and will remain among us!

Then Almitra spoke, saying

"We would ask now of Death."

And he said:

You would know the secret of death.

*But how shall you find it unless you seek
it in the heart of life?*

*The owl whose night-bound eyes are
blind unto the day cannot unveil the mystery
of light.*

*If you would indeed behold the spirit of
death, open your heart wide unto the body
of life.*

*For life and death are one, even as the
river and the sea are one.*

*In the depth of your hopes and desires
lies your silent knowledge of the beyond;
And like seeds dreaming beneath the snow
your heart dreams of spring.*

*Trust the dreams, for in them is hidden
the gate to eternity.*

*Your fear of death is but the trembling
of the shepherd when he stands before the
king whose hand is to be laid upon him in
honour.*

*Is the sheered not joyful beneath his
trembling, that he shall wear the mark of
the king?*

*Yet is he not more mindful of his trem-
bling?*

*For what is it to die but to stand naked
in the wind and to melt into the sun?*

*And what is to cease breathing, but to
free the breath from its restless tides, that
it may rise and expand and seek God unen-
cumbered?*

*Only when you drink from the river of
silence shall you indeed sing.*

*And when you have reached the moun-
tain top, then you shall begin to climb.*

*And when the earth shall claim your
limbs, then shall you truly dance.*

—excerpt from *The Prophet*, by Kahlil Gibran

* * *

Jonatahn Rowe

All: I have been thinking this past week about the strange — by some reckonings — relationship that I have with the National Parks and wilderness areas. I am an ardent proponent of these, would increase them in any way possible. Yet I rarely go to them myself. It is their presence that is important to me, and what they represent. That there are still places that are wild, more or less, unspoiled. It is a source of hope that an awareness of the importance of this still flickers in our jaded urban hearts.

I think we measure the significance of people on a similar scale. Do they loom large in our lives even when not present, even when we ourselves do not personally meet them much. I encountered Dana personally I think twice. Once at a Balaton meeting it was my good fortune to attend, once again at a gathering in D.C. Yet she has been a large presence during all that time, for the reasons so many of you have so eloquently expressed.

That generosity of mind and heart, the brilliance and simplicity, the simple kindness not often found in brilliant minds, and the thing that stays with me most, that hopefulness and capacity to be moved, the resistance to the hardening process that is too often the result of passing years. The sense of someone who had experienced pain but not been beaten or disfigured by it. These I still have, just as I have the parks I rarely go to.

I am grateful to all of you who have been part of this experience and have given me the occasion to dwell on these things, which are the important things in the end.

* * *

John de Graaf

I was so saddened to learn of Dana's death I had trouble writing at all. But I'd like to share my strongest memory of her. It was the second time I met her. I came to her farm to interview her for my film *Affluenza*. Humble as Dana was, she would never consent to my wish to get her on camera, but she spent considerable time with me providing excellent background information, after first making me a wonderful bowl of soup. What I remember most about that interview is not what Dana said but that through it all she was nursing a sick lamb back to health using a baby bottle. I still visualize that so strongly; it was a metaphor for her entire life and work—trying to nurse the entire world back to health and sustainability but in a humble way with great attention to the details and great caring for individuals. I will miss her deeply.

* * *

Betsy Taylor

Dear friends,

I have not been able to write about Dana. My reactions to her death have been deep and complex. I miss her so much, on so many levels. I would not be at the Center for a New American Dream if not for Dana.

I like the idea of a book — something unconventional and inspirational. Perhaps Chelsea Green would commission a writer — telling the story of the power of one. It could include some mix of Dana's vision, message, and lifestyle, including excerpts from many of the moving tributes that have been written in response to her death. She embodied wisdom, faith, hope, and love but the greatest of these was most definitely love. Perhaps the book could, at its core, be about a life lived from a core of love.

Albert Einstein once wrote, "Do not grow old, no matter how long you live. Never cease to stand like curious children before the Great Mystery into which we are born." Dana never grew old and had she lived far longer, she would have remained an enchanted child, curious about how things work, how problems get solved, how hearts touch hearts.

Balaton was Dana's extended family. May you all be peaceful and happy, safe and protected, strong and healthy, and may the reality of despair be countered by the reality of mystery and wonder.

* * *

Steve Ray

In the wake of Dana Meadows' death I found this. I didn't know her but she has always been a powerful influence even without me knowing it. Moreover, she seemed to personify the approach to life all of us should take, particularly in the face of the enormity of the sustainability challenge.

*I will not die an unlived life,
I will not go in fear
Of falling or catching fire
I choose to inhabit my days,
To allow my living to open to me,
To make me less afraid,
More accessible,
To loosen my heart
Until it becomes a wing,
A torch, a promise.
I choose to risk my significance:
To live.*

*So that which came to me as seed,
Goes to the next as blossom,
And that which came to me as blossom,
Goes on as fruit.”*

— Davna Markova

* * *

David Marsden-Ballard

I did not personally know Dana Meadows, but as a high school student when *Limits to Growth* was published, I read it, and it made sense to me about the world. *Limits to Growth* and its sequel *Beyond the Limits* have really had a big impact on who and what I am.

I am now an environmental educator doing a professional doctorate, and when I lecture at the University of Canberra, it is these books and Dana’s more recent work at the Sustainability Institute and her column for the Daily Grist that I use to change the lives of my students.

Dana is the sort of person I would have loved to know personally, but someone that I felt close to through her work and writings. She was one of those special people that have made the world a better place for her having been. She reminds me of the statement by Bernard of Chartres who in the 1100s said that

“We are not great, but stand on the shoulders of those who go before us.”

* * *

Annababette Wils

Dana changed my life in a number of profound ways. When I was a child in 1973, my father read *Limits to Growth* (probably in one night). He was so inspired that he decided then and there to quit his career as a professor and become a system dynamicist. That certainly affected the way we talked about things at home and also caused us to return to the Netherlands. Later, when I was looking for a place to do a post-doctorate, I asked Dana if there was a possibility at Dartmouth, and she sent me on to MIT. There, I learned to work in a new way, I met my husband, and, I met Dana.

Meeting her changed me in subtler but deeper ways. Visits to her farm were a lesson in sensible living; to combine work with friends, love, and time for the garden, for keeping a beautiful house. With her, I saw a balanced, inspired life being lived. And that image has become my guiding sensor, as I try to create my own life with my husband, work that I care about, and my two little girls. Whenever I work (too) many hours, there is Dana on the farm, or Dana and her community at Cobb Hill, taking time to plant seedlings, to knit sweaters and socks, to feed chickens, care about sheep, and care about the world, trying to bring me back. So I work fewer hours, and try to use them well.

Now that she has passed on to another place, she is there in yet a new way. She is the stronger energy that prompts me to say what I think and to stand up for what I believe in. She passed away in peace because she trusts those she left behind to carry on with the work that she was a leader in. Now, in her new form, she is able to be part of so many of us, spread around the world, as vibrant energy. I was so moved to hear that the people in the Cobb Hill community sense this also. She trusts us to carry on, to do what needs to be done, and she is with us, within us.

DONELLA H. MEADOWS

1941-2001

Donella H. Meadows, known to many friends and colleagues as "Dana", described herself as a systems analyst, journalist, college professor, international coordinator of resource management institutions, and farmer.

She was born March 13, 1941 in Elgin, Illinois, USA, and was the valedictorian and recipient of the senior science award in 1959 at Arlington High School in Arlington Heights, Illinois. She was trained as a scientist, earning a BA in chemistry, magna cum laude, from Carleton College, Northfield, Minnesota, in 1963 where she was also a member of Phi Beta Kappa and Sigma Xi. She went on to do graduate work in biophysics at Harvard University, Cambridge, Massachusetts, earning a Ph.D. in 1968.

After finishing graduate school, she spent a year driving through Asia, living in villages, climbing mountains, and kayaking whitewater rivers. She often talked about this trip being as educational as any of her formal schooling.

Returning to Massachusetts, she worked as a research assistant in the Department of Nutrition, MIT, and in the Center for Population Studies, Harvard University. In 1972 Donella Meadows was on the team at MIT that produced the global computer model "World3" for the Club of Rome. She was the principal author of the book *The Limits to Growth* (1972, Universe Books), which described that model, and which sold millions of copies in 28 languages. She was also co-author of two technical books about the global model: *Toward Global Equilibrium* and *The Dynamics of Growth in a Finite World* (1973 and 1974, both MIT Press).

Subsequently, she was involved in numerous studies of social, environmental, energy, and agriculture systems. She chronicled the emerging field of global modeling in her 1981 book *Groping in the Dark: the First Decade of Global Modeling* (John Wiley). In a later book she criticized the state of the art of social system modeling using nine case studies (*The Electronic Oracle: Computer Models and Social Decisions*, also John Wiley, 1983).

In 1985 Donella Meadows began a weekly newspaper column "The Global Citizen," commenting on world events from a systems point of view. The column was awarded second place in the 1985 Champion-Tuck national competition for outstanding journalism in the fields of business and economics. It also received the Walter C. Paine Science Education Award in 1990 and was nominated for a Pulitzer Prize in 1991. The column was self-syndicated and appeared in more than 20

papers. Selected columns were published as a book, also called *The Global Citizen* (Island Press, 1991).

Beginning in 1972, Donella Meadows taught at Dartmouth College in the interdisciplinary Environmental Studies Program and in the graduate program of the Resource Policy Center. In 1983 she resigned her tenured professorship to devote more time to international activities and writing. She retained an Adjunct Professorship at Dartmouth and taught environmental journalism and environmental ethics.

With Dennis Meadows she founded and coordinated INRIC, the International Network of Resource Information Centers (also called the Balaton Group). INRIC is a coalition of systems-oriented analysts and activists in 50 nations, all of whom work to promote sustainable, high-productivity resource management. Through INRIC Donella Meadows developed training games and workshops on resource management, which she presented in Hungary, Kenya, Costa Rica, Portugal, Singapore, Germany, and the United States. Each year she helped organize a conference in Hungary at which Balaton Group members exchange information and plan joint projects.

During 1988-90 she worked with television producers at WGBH-TV in Boston to develop the ten-part PBS series "Race to Save the Planet." She was writing a college textbook to accompany the programs as part of an Annenberg/CPB telecourse. The book is tentatively titled *A Sustainable World: an Introduction to Environmental Systems*. It will be published by John Wiley.

Donella Meadows served on the Board of Directors of the Hunger Project, the Winrock International Livestock Research Center, the Trust for New Hampshire Lands, the Upper Valley Land Trust, and the Center for a New American Dream, the latter two of which she helped found. She was a consultant to the Office of Technology Assessment of the U.S. Congress and a member of the Committee for Population, Resources, and the Environment of the American Association for the Advancement of Science, and the Committee for Research and Exploration of the National Geographic Society. She was a visiting scholar at the East-West Center in Honolulu, the Resource Policy Group in Oslo, Norway, the International Institute of Applied Systems Analysis (IIASA) in Vienna, and the Environmental Systems Analysis Group of the University of Kassel in Germany.

In 1991 Donella Meadows was selected as one of ten Pew Scholars in Conservation and the Environment. Her three-year award supported her international work

in resource management with a systems point of view. Also in 1991 Donella Meadows collaborated with her previous co-authors Dennis Meadows and Jørgen Randers on a twenty-year update to *Limits to Growth*, called *Beyond the Limits* (Chelsea Green Publishing Company, 1992), which has been translated, at last count, into fifteen languages.

In 1994 Donella Meadows was awarded a five-year MacArthur Fellowship by the John D. and Catherine T. MacArthur Foundation.

She lived for 27 years on a small, communal, organic farm in New Hampshire, where she worked at sustainable resource management directly. In 1997 she

started the Sustainability Institute and was a founding member of its sister organization, Cobb Hill, both located in Hartland Four Corners, Vermont. Cobb Hill is an intentional community dedicated to exploring the challenge of living in ways that are materially sufficient, socially and ecologically responsible, and satisfying to the soul. The community practices sustainable land management — organic farming, ecological forestry, and minimization of waste.

The Sustainability Institute is a think-do tank dedicated to sustainable resource use, sustainable economics, and sustainable community. The purpose of Sustainability Institute is to provide information, analysis, and practical demonstrations that can foster transitions to sustainable systems at all levels of society, from local to global.

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POLAR BEARS AND THREE-YEAR-OLDS ON THIN ICE

by Donella H. Meadows

This is the last "Global Citizen" column written by Dana — February 1, 2001.

The place to watch for global warming — the sensitive point, the canary in the coal mine — is the Arctic. If the planet as a whole warms by one degree, the poles will warm by about three degrees. Which is just what is happening.

Ice now cover 15 percent less of the Arctic Ocean than it did 20 years ago. In the 1950s that ice averaged 10 feet thick; now it's less than six feet thick. At the current rate of melting, in 50 years the northern ocean could be ice-free all summer long.

That, says an article in *Science* of January 19, would be the end of polar bears. In fact many creatures of the Arctic Ocean are already in trouble.

Until recently no one knew that there were many creatures of the Arctic Ocean. In the 1970s a Russian biologist named Melnikov discovered 200 species of tiny organisms, algae and zooplankton, hanging around ice floes in immense numbers, forming slime jungles on the bottoms of bergs and plankton clouds in every break of open water. Their carcasses fall to the bottom to nourish clams, which are eaten by walrus. Arctic cod live on algae scraped off the ice. The cod are eaten by seabirds, whales, and seals. The king of the food chain, hunting mainly seals, is the great white bear.

That was the system until the ice started to thin. In 1997 and 1998 Melnikov returned to the Beaufort Sea and found most of the plankton species, many named by him (and for him), were gone. The ice was nearly gone. Creatures dependent on the plankton (like the cod), or on the ice for dens (seals) or for travel (bears) were gone too.

Many had just moved north, following the ice, but that means moving farther from land, with widening stretches of open water between. Creatures like the black guillemot, a bird that depends on land for shelter and the ice floe for food, can no longer bridge the gap.

The Arctic is changing faster than scientists can document. Inuit hunters report that ivory gulls are disappearing; no one knows why. Mosquitoes are moving north, attacking murre, which will not move from their nests, so they are literally sucked and stung to death. Caribou can no longer count on thick ice to support their island-hopping in search of the lichens that sustain them. One biologist who spots caribou from the air says, "You sometimes see a caribou trail heading across [the ice], then a little wormhole at the end with a bunch of antlers sticking out."

Hudson's Bay polar bears are thinner and are producing fewer cubs. With the ice going out earlier, their

seal-hunting season is shrinking. Hungry bears retreat to land and ransack garbage dumps. The town of Churchill in Canada has more jail cells for bears than for people. The bears are also weakened by toxic chemicals that drift north from industrial society and accumulate in the Arctic food chain.

Every five years the world's climatologists assess current knowledge about global warming. Their latest report was just released. It erases any doubt about where this warming is coming from and warns that we ain't seen nothing yet. If we keep spewing out greenhouse gases according to pattern, we will see three to ten times more warming over the 21st century than we saw over the 20th.

Some biologists are saying the polar bear is doomed.

A friend of mine, in response to this news, did the only appropriate thing. She burst out weeping. "What am I going to tell my three-year-old?" she sobbed. Any of us still in contact with our hearts and souls should be sobbing with her, especially when we consider that the same toxins that are in the bears are in the three-year-old. And that the three-year-old over her lifetime may witness collapsing ecosystems, north to south, until all creatures are threatened, especially top predators like polar bears and people.

Is there any way to end this column other than in gloom? Can I give my friend, you, myself any honest hope that our world will not fall apart? Does our only possible future consist of watching the disappearance of the polar bear, the whale, the tiger, the elephant, the redwood tree, the coral reef, while fearing for the three-year-old?

Heck, I don't know. There's only one thing I do know. If we believe that it's effectively over, that we are fatally flawed, that the most greedy and short-sighted among us will always be permitted to rule, that we can never constrain our consumption and destruction, that each of us is too small and helpless to do anything, that we should just give up and enjoy our SUVs while they last, well, then yes, it's over. That's the one way of believing and behaving that gives us a guaranteed outcome.

Personally I don't believe that stuff at all. I don't see myself or the people around me as fatally flawed. Everyone I know wants polar bears and three-year-olds in our world. We are not helpless and there is nothing wrong with us except the strange belief that we are helpless and there's something wrong with us. All we need to do, for the bear and ourselves, is to stop letting that belief paralyze our minds, hearts, and souls.

