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I. THE FOURTH ANNUAL BALATON GROUP MEETING

Thirty-four scientists from the research centers represented in INRIC, the International Network of Resource Information Centers, came together in Csopak, Hungary, September 8-13. This was our fourth annual meeting on the shore of Lake Balaton, and we have therefore come to call ourselves The Balaton Group.

We used our traditional meeting place, a rest house maintained for the oil-and-gas workers of Hungary. Much could be said about this modern, simple, comfortable building with a sign on top reading HOTEL PETROL. Let us note here only that the staff, lead by a new proprietor and our old friends from OKGT headquarters in Budapest, again provided an incredibly supportive and efficient surroundings that let us concentrate totally on our work.

Together they managed to provide wonderful vegetarian meals, adjust to changed flight schedules, search for lost luggage, maneuver large buses through small places, provide coffee early in the morning when no self-respecting Hungarian would drink anything but tea, track down pedigrees on Puli dogs, fashion one functional overhead projector out of three nonfunctional ones, recruit a projector and protectionist from the local cinema, maintain the sauna at an optimum temperature, search out the best csardas, and perform other miracles with grace and love. It was wonderful to arrive in Hungary again this year and see them all again (in their Balaton Group T-shirts!).

With the support of OKGT staff we are able to concentrate most of our energies on the scientific questions that are the focus of INRIC. This was a very productive meeting; most of this bulletin is a summary of the conference working groups. But we did have fun too. This year, thanks to the insistence of Niels Meyer, we burst into song. We each taught songs in our own language to the others. We wore out our legs doing the Lithuanian song-dance "Laurent-sija". We sailed across Lake Balaton and back singing about the coming of spring in Dutch, the loss of our lovers in Hungarian, and the coffee being ready in Danish. On our last evening together, after a hilarious presentation of the annual prizes by Joan Davis and Wim Hafkamp, we had an evening of international song, including a lovely Chinese ode to a river and the beginning, but not the end, of the Portuguese National Anthem. The most popular song seemed to be the Spanish "Cielito Lindo", especially the "aye, aye, aye, aye" part.

At the prize ceremony the coveted Volleyball Award was won by newcomer Li Wenhua, who combines astounding accuracy on the court with ferocious Chinese sound effects. The Best Slide of the Conference Award went to Hilde Jervan, and a special Award for Bravery in Confrontation with Hungarian Traffic Police went to Joan Davis. There were many other prizes, too numerous to mention.

We also spent several evenings entertaining each other with slide presentations on aspects of our home institutions and regions. Those sessions deepened the basis of understanding that underlies our collaboration. They also reminded us of the many profound resource problems that are confronted daily by the INRIC centers. The forest damage of Germany, the soil erosion of Costa Rica, the desert of Senegal are now real images in our heads, as well as statistical concepts.

There is so much to do, the time goes so quickly, we work so hard, that it never occurs to us until later that, by the logic of world politics, we should not really all be in the same room together, much less be communicating so easily, getting so much accomplished, and liking

each other so much. Part of the reason we get along so well is that we are scientists, who are more interested in the logic of the planet's natural processes than its politics. We all share the overarching values of sustainable, efficient resource use. We all participate in the Balaton Group, because we are simultaneously global citizens and national ones; we are concerned about the welfare of all the world's resources and peoples.

Whatever the reason, our association with each other is fruitful, inspiring, professionally useful, touching, and fun. It is only possible because of the efforts of many people, in many lands. Thank you to everyone who contributed to the success of the Fourth Annual Balaton Group Meeting.

II. WORK GROUP REPORTS A. INRIC Books 1. The Textbook

The textbook on resource management, a draft of which most of you have seen, has made very slow progress this year. A large part of the chapter on minerals has been added—that chapter is now being reviewed back in Moscow where it originated. A few stories, sent by various Balaton Group members, have been added to other chapters. Still remaining to do are:

- the atmosphere chapter (first draft already prepared by Sergei Pitovranov),
- the energy chapter (under the supervision of Bert DeVries),
- a chapter on fish and ocean resources (no one has claimed this chapter yet) , a chapter to tie everything together at the end, and all the holes still to be filled in the chapters already started.

Books come out of the time, energy, thought, and work of their creators, and over the past year our time and energy have been primarily directed to other things, all of them worthwhile, but few of them forwarding the book. The good news is that several ideas, pledges, and plans coming out of the Balaton meeting promise to move the book forward faster this year. They are:

- Bert DeVries has taken major responsibility for the first draft of the energy chapter (to be sent to Dana by Christmas). Niels Meyer, Jorgen N0rgard, Tamas Jascay, Zoltan Szirmai, and Laszlo Lovei have also agreed to add, correct, discuss, and contribute until everyone is happy with that chapter.. 3
- An interim work meeting will take place on the Meadows farm in February. Joan Davis, Hilde Jervan, and Sergei Pitovranov are arranging their schedules to come. All other interested Balaton Group members are invited. Work will include reviewing and completing partial chapters, including library research at Dartmouth if necessary; brainstorming the concluding chapter; criticizing the existing draft for clarity and for international balance. Hot soup, homemade bread, and cross-country skiing out the back door will be supplied. Participants may be asked to haul firewood or shovel snow.
- Tom Adier has agreed to take on responsibility (with research assistance from members of the Resource Policy Center) for the microcomputer teaching programs that accompany the book. Paula Antunes from Portugal will also help with that work during her current visit to Dartmouth. There is still a UNEP grant in the pipeline that will help finance that work.
- A new concept integrating the book and the workshop (see workshop report below) should speed up the work on both and should provide the conceptual

outline for the last, integrating chapter of the book. Both the book and the workshop will adopt the structure underlying the STRATEGEM-1 training game.

- Dana Meadows will be doing less teaching, and hence more writing over the coming year.

What can you do to help? (We were hoping you would ask.) The answer is simple. SEND MATERIAL. SEND COMMENTS. You have a good idea of what the book is like, what kinds of stories, statistics, and concepts it contains. The first thing we need to pull the book together is raw material, illustrative stories, good and bad, data, management principles. Without raw material there can be no finished product. Send stuff to Dana, especially stuff about your own country or region.

Also, send comments. If something is wrong or incomplete, tell us how to fix it. Even if you have just a vague feeling that something is wrong, express it; that will lead to a conversation that will tell us how to do better. Please do all you can to follow up your criticism with help—if the data are too old, please send us newer data or tell us exactly where to find them. If we have ignored the relevant Russian or German or Chinese literature on the subject, please tell us how to fill in the gaps. We can only compile a truly global and comprehensive work if we have global, comprehensive participation.

And finally, do whatever you can ON TIME. When you put it off, others do too, and the work grinds to a halt. It is a systematic human trait to put short-term deadlines ahead of long-term ones, but if we all do that, this book will always be at the bottom of our work-piles. Please move it to the top!

2. Good News Stories

After a long and inspiring discussion at the Balaton Meeting, we have decided to go ahead with a book of good-news stories about sustainable, high-productivity resource management in our various countries. Yes, it is still more work. Yes, it will divert time from the textbook. But if everyone cooperates, it can be done much faster than the textbook, it can sell to a far larger audience, and it can be more politically important. And we are enthusiastic about it— we want to see it come into being.

It will be a collection of the best cases and stories we know, in each of our countries. A TITLE IS NEEDED! (Good News About Resource Management? True Fairy Tales? Success Tales from Around the World? Zen and the Art of Sustainable Resource Management? Sustainability and You? Help, please!)

The purposes of the book are:

- to awaken hope; to combat both fatalism and complacency,
- to provide concrete, undeniable illustrations of sustainable resource use, so that doubters can become believers,
- to give people ideas that might help them solve their own problems,
- to touch and involve people, to motivate, empower and mobilize them, to get them to go out and create more good-news stories,
- to promote the concepts of Sustainability, efficiency, equity, and conservation in resource management,
- to teach people something about the planet, its resources, its diversity, and the interconnections among people and resources in different parts of the world, and
- to earn some money and create some recognition for the members of INRIC. If

this book is published, all contributors will receive \$100 per story and a proportionate share in the royalties.

The intended audience is the educated general public, especially individuals who are likely to DO SOMETHING as a result of reading the book. That includes students, teachers, journalists, policymakers, aid-givers, business-people. The book might be used in schools, but it is not intended as a textbook. It is what publishers call a "trade book", one that is sold primarily in bookstores. Agreement will be made with the English-language publisher so that Balaton Group members can translate and publish it in any of their languages. The book should not exceed 200 printed pages. It could have any number of stories, each one of whatever length is necessary, from 1 page to 20 pages.

To appeal to a general audience, the book must be INTERESTING. It must catch and hold the attention even though it is not about any particular specialty or part of world or single kind of resource. It must make the reader want to keep reading.

THEREFORE, the tone must be light, journalistic, human, lively. However, it must be scientifically trustworthy, straight, clear, truthful, accurate, and complete. There should be many pictures, especially pictures of the people in the story. They should be good, professional-quality, story-telling pictures.

The whole human story should be told—who started it, how it happened, what obstacles there were, how the obstacles were surmounted, how it felt to succeed. The voice should be third person, but with first-person quotes to communicate the personal experience. Funny, sad, otherwise memorable incidents should be included. People must identify with the stories, recognize themselves in the book, or they won't read it.

There should be a mixture of stories about individuals, small groups, towns, enterprises, nations. There should be a mixture of resources—water, soil, forests, energy, capital, human resources, and especially integrated systems that consider several resources with their interactions.

The book could be structured as follows:

- an introduction describing the book and its purpose, INRIC and how the book was created, the general state of resources in the world (with a sense of urgency but not hopelessness) . Perhaps it could start right off with a good-news story—the founding of INRIC.
- the stories, probably with some intermediary "glue" to set each one in context, relate it to the others, and bring out main points. It is not yet clear how to organize the stories—by geographic region, by resource, by level of action (individual through national) , or by some other scheme.
- a conclusion that summarizes and draws out basic principles of success (such as think globally, act locally). It should also motivate people to seek out good-news stories near them, and maybe even to send them to us. It should especially inspire the multiplication of new success stories.
- an appendix describing INRIC and the people who contributed stories, and perhaps a reading list.

Possible stories suggested by the members are:

- Costa Rica—the national park system and its integration with the protection of watersheds for hydropower; the preservation of the culture and the ecosystem of the Kuna Indians.
- Hungary—the cleaning-up of Lake Balaton; the Balbolna State Farm; the Hungarian TV series "We Can Save the Earth."
- Switzerland—the organization of the community of Toessriedern around a more ecology-conscious lifestyle.
- West Germany—a practicing organic farm.
- India---the Jamkhed health project, the save-the-tiger campaign, an agroforestry project, the Chipko movement.
- China---the population policy; the biogas system; a reforestation story.
- Portugal---solid waste recycling in the Setubal region.
- Denmark---village energy conservation systems; the "Danish windmill fairy story".
- Netherlands---Waddensee (a collaboration with Switzerland).
- USA---Berkeley's local energy laws; the New Alchemy Institute.

There are certainly many other subjects for stories that did not get onto this list; more are both welcome and essential!

Send a story or two to Dana Meadows, with photographs, by January 1. A sample story is included at the end of this Bulletin, if you want a guide for style (and all stories included in previous Bulletins are also examples). Do not worry about converting your text into perfect English; Dana can edit it. But be sure all the facts and substance are there.

In January Dana will assemble all the stories and assess whether there are enough to make a book. If there are, she will start selecting and editing. All stories may not be used—they will be selected for a good balance of resources and main points. (Unused stories can be added to the textbook.) Stories will be edited and returned to you for checking or for answering questions within a month.

If there are not enough stories in January, or if they are not complete enough, human enough, clear enough, or good enough, there are several options:

- we could drop the whole idea,
- we could keep recycling drafts until their quality is sufficient, or
- we could send Dana or some other volunteer to go work with each center directly, rewriting and/or photographing until everyone is satisfied.

Obviously the second and third options will add considerable expense and delay to the preparation of the book. If everyone does his or her part and all goes well, a complete draft of the book should be ready for everyone's approval by the next Balaton meeting.

3. A Book for Children

The first book of INRIC to reach a publisher came about by accident! Last March Dana Meadows wrote a newspaper column, extracted from materials in the INRIC textbook. A copy of the column is provided on the next page.

A teacher at a local school cut out the column, read it to his students (age 12-13), and asked each of them to pick out whatever statement in it most interested him or her and to draw a picture about it. The teacher posted the column and the pictures on the wall of the school and asked Dana to come see them and to talk to the students.

Dana found the pictures very moving—kids have wonderful imaginations and sometimes can communicate, without words, better than adults can. She asked the students if she could keep the pictures and put them together with her column into a book—a book about the state of the world's resources, for children, illustrated by children. They agreed.

The book is now being considered by an American publisher. If it is published, it will be an INRIC book, and half the royalties will go to INRIC.

The other half to the school where the students made the pictures. The book contract will retain permission for any other INRIC center to arrange for publication in other languages—perhaps even with new pictures, drawn by students in other countries.

More news on this book will appear in the next Bulletin

B. Sustainable Development

A group consisting of Niels Meyer, Gerardo Budowski, Berndt Hornung, Hartmut Bossel, Hilde Jervan, Jane King, Karl-Heinz Simon, Li Wenhua, and Jorgen Norgard met to discuss how the concepts of sustainable development could become more recognized at the policy level, and particularly what members of the Balaton Group could do to make that happen. Their suggestions included:

- work more actively with international bodies and commissions to insert information about sustainable policy alternatives—for example, Tomas Jascay's work in introducing conservation alternatives into the World Energy Commission.
- consult for and provide information to Green Parties where they exist (one can do that without being an active member or violating the non-profit tax-free status of INRIC).
- prepare questionnaires for election candidates, find opportunities to brief them, publicize their past records on supporting sustainability.
- exchange among ourselves the best environmental laws of our countries, to see how they are written (the IUCN has a center in Bonn that collects such laws).
- work more directly through international channels, invite more of their members to Balaton meetings, involve Balaton Group members in their projects (examples of such channels include Gro Harlem Brundtland's World Commission on Environment and Development, the OECD Commission on the Environment, the UNDP, the World Bank, the UN University and the UN University for Peace).

The group has promised to work out a more complete list for next year's meeting.

C. New Games

At the 1983 meeting we agreed to create an educational game for senior managers that all INRIC members could use to convey concern and sophistication regarding key, long-term resource problems. The game was completed 15 months ago, and we have now conducted it for several thousand people in 35 countries. Over 150 sets have been distributed for regular use in universities, ministries, research institutes, and centers for continuing education. A five-day workshop based on the game has been conducted on three continents for senior officials from 35 countries. Thus we have now a significant basis on which to plan for revisions and extensions to the game.

One group met during two afternoons to review all of our experiences with running the INRIC game, STRATEGEM-1 (S-1). Suggestions regarding the current game were of three types;

- improve the formats through which we present participants with information on the status of the system and the results of their own past decisions. Better graphics and drastically revised data sheets are both required. Bert DeVries' group has already made significant progress on these goals. Their output format was tested at the workshop in Sopron, Hungary, September 1-6, and it greatly facilitated interpretation and learning.
- add additional relationships and sectors to the game. Several new cause-effect links could be incorporated. For example, increased lifetime should have some influence on fertility. In addition, water, forests, transportation, soils, and minerals could all be added to the board. The Resource Policy Center is working to adapt S-1 specifically for use in Costa Rica. The values of all numbers in the game are being changed to reflect the situation in Costa Rica, and new sectors are being added - transportation and household energy, forests, and wood energy.
- drastically revise the curriculum of the workshop to focus much more attention on the structure and the dynamics of each sector in the game. This is a bigger job, but it is one that will be initiated in preparation for the Portugal workshop to be held in July 1986.

This working group also provided the opportunity for four teams to define new games that could be modeled on the approach of S-1. Enrique Campos is creating a game for use in training those who administer the agro-industrial sector of Mexico. Since the Balaton meeting he has received funding from CONACYT, the Mexican National Science Foundation, for four man-years of effort on this project.

Bert DeVries and Wim Hafkamp have created the design for a game that will show short-term and long-term effects of different capacity investment decisions for the electricity sector of The Netherlands. Chirapol Sintunawa has already revised the S-1 computer program to include a forestry sector, an aspect of resource policy that is critical in Thailand.

Dennis Meadows and Tom Adier have received a contract from the United Nations Industrial Development Organization to adapt the S-1 technique for use in training Third World, corporate managers. Task forces will be assembled in Hungary this winter and at IIASA next summer to carry out this work. We currently expect to develop microcomputer-based games that focus on inventory control and assembly line balancing. The topics are not of direct

relevance to INRIC, but this assignment will give us an opportunity to experiment with a new workshop format. What we learn from the UNIDO project will be of directly relevance to our work with the resource workshop.

Dennis is "Editor for Microcomputer Games" of the leading international journal in this field. Simulation and Games, so any members of INRIC who do work to extend S-1 would find a ready publisher for the resulting paper.

D. Acid Rain and Energy Efficiency

Joe Alcamo of the IIASA Acid Rain Project met with Niels Meyer and Jorgen Norgard of the Danish Technical University and planned an integration of their two areas of expertise that should produce some fascinating and politically important results.

The IIASA Acid Rain model takes various energy scenarios for Europe and transforms them into maps of acid deposition and soil acidity accumulation. The model is carefully designed to be usable by, and relevant to, decision-makers. Its output maps, showing acid deposition isobars crossing the map of Europe are widely used by European policymakers to gain a concrete, long-term understanding of the problem.

The problem is, however, that ministerial model-users are not likely to design, or believe, a truly effective and feasible energy-efficient input scenario, one that assumes declining overall energy use. If one is only willing to assume future increases in energy use, the acid rain problem looks fairly intractable.

Meanwhile, our Danish members have gained an advanced understanding of technologies and potentials for energy conservation. Their reports and work, based on deep technological understanding of what is physically and politically possible, have demonstrated convincingly that the West's industrialized economies could drastically reduce their use of energy without major changes in lifestyle. They have made detailed calculations of the most energy-efficient possible scenario for Denmark, and they are currently designing appliances required to implement that scenario. For example, their prototype refrigerator uses only 10 percent of the energy commercial models now require.

The IIASA and Danish groups will come together to design a feasible, energy-efficient scenario for Europe, as a starting point for the acid rain model's calculations. The scenario will describe energy use to the year 2030 in several sectors of 27 of the geographically-largest countries in Europe. This scenario is intended to (1) promote discussion about a more energy-efficient scenario as an alternative to other official energy forecasts, and (2) permit evaluation of vigorous energy conservation and renewable energy use as a strategy for reducing pollution emissions.

E. Expert Systems

The groups from West Germany and Portugal discussed the possible role of expert systems in dealing with environmental and resource problems. Both the Lisbon and the Kassel groups have some experience in working with reasoning systems and applying them to these problem areas.

The Kassel group reported on their experience (since 1974) with developing and using the reasoning system DEDUC (see Vol. 3 "Cognitive Systems Analysis" of H. Bossel (ed.): Concepts and Tools of Computer-Assisted Policy Analysis, Birkhaeser, Basel, 1977; also H. Bossel, K.F. Mueller-Reissmann; "Simulation of the Cognitive Processes of Policy Analysis", Policy Science and Information Systems, June, 1979, Vol. 3, No. 1, pp. 1-25). DEDUC uses first-order predicate calculus, but it is somewhat restrictive concerning inference processes. The Kassel group has applied the approach quite successfully to simulate the likely decision behavior of West German political actors with respect to energy and environmental issues. This application employs normative inference processes based on orientation theory to derive decision criteria from values. The underlying value set is derived in part from analysis of the inherent properties of self-organizing systems.

The Kassel group is presently preparing to take up this work again, using newer software and better computers, to modify the approach on the basis of past experience, and to apply it to a full-scale regional environmental problem.

The Lisbon group cooperates with a group of leading software specialists in the field of expert systems, who are presently carrying out important development work for international computer companies. The work concentrates on the use of the PROLOG system. The Lisbon group is applying this know-how to the development of an expert system dealing with the important, non-quantified information on ecological questions related to a large reservoir and water management project.

Both groups agreed to an exchange of information. A member of the Kassel group will probably visit Lisbon in the near future to learn about their PROLOG experience.

The group discussed the alternative approach to computer reasoning with qualitative information: using the fuzzy set approach. Both groups had independently come to the conclusion some time ago that the fuzzy set approach may not be appropriate for the description of linguistic variables, but that it may be helpful in linking quantitative to qualitative data—a task that has so far not been adequately solved.

The group also discussed the relative merits of using LISP or PROLOG. LISP offers greater flexibility, but PROLOG seems to be more efficient in applications. Both approaches are well suited for the development of reasoning systems in resource and environmental problems. Within limits, they are also compatible.

F. INRIC Administration

We discussed many factors related to the time and location of the annual meetings, INRIC membership, funding, INRIC organization, INRIC publications, the electronic information system, and The Balaton Bulletin. This is a summary of the decisions made by the Balaton Group on the last day of our meeting.

1. Annual Meeting

Our Hungarian hosts have clearly stated that we are welcome to continue using the OKGT facilities at least for the next several years. We have decided to accept this kind offer. The generosity of the Hungarians in making these accommodations available, the quality of the staff at the Hotel Petrol, and the centrality of the location are difficult to match. In addition, the scientific contributions of the Hungarians to issues of sustainable, high-productivity ecosystem management continue to be near-at-hand inspirations and resources for our work.

We have not ruled out possibilities for meetings in other INRIC countries. We are willing to meet elsewhere, whenever any member of the Balaton Group volunteers to take the responsibility for financing and managing the domestic arrangements. We will need at least one year's advance notice of any change of location, so it can be discussed and agreed upon at the meeting preceding.

As long as the meeting is held at Csopak, it will continue to be the second week of September, after the tourist season ends for the rest house, and before the academic year begins for most of us. Whenever funding sources and an appropriate topic are found, we may again conduct a day-long, public seminar in Budapest on the day before the annual meeting. We did this last year. The meeting addressed technologies for sustainable agriculture, and it had a major influence on Hungarian national policy in this area.

It was generally agreed last year that these seminars should not be an official part of the annual meeting. Thus all future seminars will be open to Balaton Group members, but participation will not be required. We currently expect that next year's meeting will be preceded with a day-long seminar on radical energy conservation options, if we find funding for the session. The official opening session for our fifth annual meeting will be Monday evening. The final session will be Saturday noon, September 13.

This year we separated responsibility for the meeting's administration (held by Dennis Meadows) from authority over the substantive agenda of the session. The program chairman was Hartmut Bossel. Everyone agreed that the practice should be continued in future years. Gerardo Budowski has agreed to be next year's program chairman.

2. INRIC Membership

INRIC has been adding 2-3 new centers per year. Our increasing worldwide membership directly fulfills our purpose of promoting sustainable resource use everywhere. However, each additional center increases our expenses and our administrative⁰ burdens. At some stage of growth it will also become difficult to maintain the informality of our annual meeting discussions. After much discussion, we agreed on a need to consolidate for awhile and to limit our "core" membership to centers in about 20 countries (there are 16 now, after the addition of Portugal and China this year). We agreed that new members should come primarily from the Third World and especially Africa. Peru, Tanzania, and the Sudan were mentioned as possible new members next year. Current members are encouraged to identify new potential members, as they have in the past.

The fairly informal criteria for membership and methods of locating new members seem to be working for now and should be continued for one more year. Eventually we will need some sort of membership committee and formal criteria and procedures for adding new members.

It was decided that centers not represented at two successive Balaton meetings will be dropped from the active membership list.

3. Funding

Our most basic annual funding needs are about \$10,000 to cover travel to the annual meeting, \$5,000 for the electronic mail system, \$5,000 for printing and mailing the Bulletin, and \$10,000 for administrative expenses and overhead at Dartmouth. That amount of money permits the network just to exist, not to undertake special projects, conduct workshops,

prepare books, or compensate anyone for their time. A full budget for the sorts of activities we have planned for the coming year would be about \$200,000.

Of that amount, we currently have a three-year grant for \$30,000/year to cover costs of exchange and training. These funds were provided by the Noyes Foundation; the text of the Noyes proposal is attached to this bulletin. We have received \$65,000 from UNIDO for the development of training games and \$15,000 from UNEP for book preparation. We have submitted a proposal to a U.S. foundation for \$50-75,000/year for general administrative expenses; we will hear in December whether that proposal has been successful.

We agreed that each INRIC member center should submit this year at least one new proposal to a possible funding source for general INRIC expenses or for special projects. INRIC members receiving this Bulletin will find an enclosure containing some examples of past successful proposals as examples or models. Attached to the bulletin is an information sheet on which each center should indicate the topic, size, and potential funding sources for the proposals they intend to submit. Please return this to Dennis before December 10, so that he can compile a summary of funding plans. This will be distributed to all members, so that they may look for opportunities to collaborate.

4. INRIC Organization

INRIC has now been legally incorporated in the United States and has received tax-exempt status from the U.S. Internal Revenue Service. These steps were necessary in order to receive grants from U.S.-based private foundations. Achieving tax-exempt status required us to have a more formal organizational structure, an Executive Secretary (Dennis Meadows) and a Board of Directors. The Articles of Incorporation of INRIC have been shared with all who were at the Balaton meeting, and copies are available upon request. The initial Board of Directors of INRIC consists of:

- Hartmut Bossel, F.R. of Germany
- Gerardo Budowski, Costa Rica
- Csaba Csaki, Hungary
- Victor Gelovani, USSR
- Dana Meadows, USA
- Niels Meyer, Denmark
- Chirapol Sintunawa, Thailand

The duties of these Directors are for now fairly ceremonial; they will have one meeting a year (at the annual meeting) ; they have the power to replace the Executive Secretary; and they are consulted whenever important decisions have to be made between annual meetings (as are as many other members of INRIC as we can get hold of). As far as possible, basic INRIC decisions will continue to be made after discussion with the whole group at the annual meeting. Starting at the next meeting. Directors will be elected. Directors serve a three-year term; roughly one-third come up for election each year.

5. INRIC Publications

Several publications are moving toward completion, including the three books mentioned in this Bulletin and a Hungarian publication of the sustain-able agriculture presentations made at last year's meeting. Individual members also produce books that could be considered INRIC publications, such as Hartmut Bossel's book on environmental teaching models. We felt the need to formalize and clarify our policy about using the INRIC logo on books, on royalties, on publication standards, etc.

We agreed to create a publications committee of three members to generate an overall policy and to review submissions. VOLUNTEERS FOR THAT COMMITTEE ARE NOW BEING SOLICITED. If you would like to be a member, please let Dana Meadows know.

6. INRIC Brochure

To assist in our fundraising and in efforts to explain INRIC to others, we need a printed brochure describing ourselves and our work. At the meeting we collected and updated the material for such a brochure; the new draft is included with this newsletter. IF YOU WOULD LIKE TO MAKE ANY CHANGES IN THIS DRAFT, LET DENNIS KNOW BEFORE DECEMBER 1. After that date, we will start working with a printer to design and produce the brochure.

III. INRIC WORKSHOPS

The five-day INRIC workshop on Sustainable Resource Systems was given in Nairobi, Kenya in March, at CATIE in Costa Rica in July and in Sopron, Hungary in September. The African session was funded by the United Nations Environment Program, the CATIE workshop was sponsored by USAID and by CATIE, and was arranged by Carlos Quesada and Gerardo Budowski. The Sopron workshop was sponsored by UNIDO, IIASA, and the Hungarian Bureau for Systems Analysis, with help from UNEP in covering travel expenses of African participants. Hartmut Bossel, Joan Davis, Tom Adier, and Dennis and Dana Meadows were the instructors. Betty Miller provided administrative support.

The Kenyan workshop was described in the last Bulletin. Participants in the Costa Rica workshop were planners and managers with special interest in watershed management from all Central American countries and the Dominican Republic. The CATIE staff supplemented the normal systems-theoretical parts of the workshop with special presentations on the resource situation in Central America and good-news stories from that region. It was the first time we had presented the workshop to participants with a common regional interest (the way it was originally intended) and with presentations by experts from that region. We think it worked well. CATIE will maintain the network of professional associations created from the workshop and will also translate many of the workshop materials into Spanish, to incorporate them into their own curriculum.

In contrast, the Sopron workshop brought participants from 18 different countries, including 6 African countries, Mexico, China, Syria, the USSR, and many countries of East and West Europe. It was certainly the most diverse group we have ever brought together. There are advantages in having such an international perspective in the workshop, but there are also disadvantages; we could not focus on a single resource problem of equal interest to everyone, and we had to work with people of very different quantitative skills and national backgrounds. In the future we will concentrate on presentation to national or regional groups.

With the experience of these three workshops behind us, Dennis Meadows, with help from many INRIC members, will be working on a final restructuring of the seminar's content and schedule. We now see how to make the workshops more consistent with both the structure of the STRATEGEM-1 game and of the textbook. STRATEGEM-1 has turned out to provide even more of an integrating framework than we had expected—with the addition of another one or two explicit resource sectors, it will capture most of the overarching interac-

tions among the different sectors of a developing nation or region. In the workshop, as in the textbook, we hope to work through the structure and dynamics of each separate sector (population, capital, agriculture, energy, etc.) and then integrate them through the entire game. Most of the pieces are already at hand; it is just a matter of organizing them more consistently.

The next scheduled workshop will be in Lisbon, Portugal, July 13-18, 1986. Half of the participants will come from Portugal, and INRIC may nominate the remainder. Contact Dennis Meadows or Antonio Camara for more information on the program.

We expect to organize a workshop in the U.S. July 20-25, principally for senior officials from the United Nations and the international development agencies. There will be a workshop in Beijing in early 1987. The Chinese INRIC members participated in the Sopron session, and they are already working on the translation of the materials. Meanwhile INRIC members are adapting and using the workshop materials for their own purposes in many different countries

IV. THE INRIC ELECTRONIC INFORMATION SYSTEM (TIES)

We created TIES to encourage frequent, informal information exchanges among INRIC centers during the periods between the annual Balaton meetings. TIES is a set of information files developed to facilitate exchange. Messages can be transmitted between any two members, and papers, computer programs, or other text can be posted to central files that are accessible to all. Three types of equipment are necessary to access TIES:

- a telephone service that has relatively low background noise (almost all standard telephones systems will meet this requirement),
- a computer terminal or microcomputer, and
- a modem to connect the terminal or microcomputer to the telephone line.

The Dartmouth computer on which TIES operates is connected to a major international computer network called TELENET. TELENET can be accessed by local telephone calls in major cities in most regions of the world. Arrangements for accessing TELENET should be made locally; staff at a nearby computer center may be able to assist you with this. In areas without TELENET support, other computer networks that can in turn access TELENET may be used.

Dartmouth computer costs and TELENET links to the U.S. are covered by the Resource Policy Center. Charges for local TELENET access vary from area to area but are based on the amount of time connected to the system and the amount of information transmitted.

There are three primary uses of TIES: message exchange, conferencing, and general information transfer. The sample session, enclosed with this bulletin, illustrates each of these features. To use any of them, it is first necessary to connect to the Dartmouth computer via TELENET (or other network). The TELENET command for this is: c 60320. (The c means "connect", and the 60320 denotes the Dartmouth computer.)

Once you are connected to DCTS (Dartmouth Computer Timesharing System), you will be asked for your user number and password. Type them in separated by a comma or a carriage return. First-time users who do not yet have their own user number may use the "open"

number of R20020 with the password ETAZ. You can send Tom Adier a message through this account. Tell him the four letter string you wish to have as a personal password, and he will create a special account for you. You will then be able to learn the number of your account by accessing R20020 a few days later.

After you have logged in, a short message describing the current status of TIES will be displayed, and if you have mail messages posted to your number, the system will tell you so. You can enter the MAIL system to list out your messages (type LIS) , send new ones (type SEND) , or discard old ones (type DIS). Or you can transfer whole files to or from the TIES file system.

If you have questions, ask Tom, Dana, Dennis, Joan Davis, Hartmut Bossel, Jane King, Ferenc Toth, or Hilde Jervan, all of whom are active users at the moment.

V. THE NOYES GRANT FOR EXCHANGE AND TRAINING

INRIC has received from the Jessie Smith Noyes Foundation of New York a grant of \$30,000 per year for three years for exchange of personnel among our centers for the purpose of advanced-level training. The money is for exchange and study grants, of long or short duration, between any two INRIC centers.

We agreed at the annual meeting that the grant would be administered by Dana Meadows, and that the money would be allocated according to the following criteria:
consistency with the objectives of INRIC,

- effectiveness in strengthening INRIC centers,
- currency and importance of the issue/problem addressed,
- likelihood of recipients' continuing contribution to INRIC, and availability of matching contribution.

None of the money may be used for direct tuition payments. Tuition should be provided by a matching grant from the host university. Several written proposals for use of this money were already generated at the Balaton meeting. Other proposals can be sent to Dana at any time. They can be very informal, but please put them in writing and include a proposed budget. Even if the Noyes grant is not sufficient to cover all proposals, we will try to work out matching grants or other forms of support for all worthy suggestions.

The first award from the Noyes grant will pay for a visit by Hungarians to the U.S. In August 1986 selected Hungarian officials and INRIC members will tour operating organic farms in the United States, for the purpose of planning an experimental organic research farm in Hungary. Csaba Csaki, Istvan Lang, and Dana Meadows will make the arrangements.

VI. A WORD ABOUT THE BALATON BULLETIN

Forthcoming in future Bulletins will be some presentations from the meeting in Hungary that members requested to be reprinted. Also, news, stories and quotes, notices of future meetings, and other vital matters.

This Bulletin is both by and for the members of the Balaton Group. It serves us best when we view it as our notice board; open to all, used by all. Think of what you would like most to hear from other members. Book reviews? Condensations of their latest papers? News of their centers? Jokes? Inspirational quotes? Then, please sit down and send in just what you

would most like to see from others, to inspire us all to do likewise. We would be pleased also to include material from readers who are not members of the Balaton Group, if there is anything you would like to say to us!

Material for the Bulletin should be sent to Dana Meadows, Resource Policy Center, Box 8000, Dartmouth College, Hanover, N.H. 03755 USA. Deadlines for contributions are October 1, January 1, April 1, and July 1. Mailing dates for the Bulletin are roughly the 15 of October, January, April, and July.

VII. ANNOUNCEMENTS

New Alchemy Institute Semester Program

Members of the Balaton Group met John Todd last year and saw some slides of the outstanding solar architecture and organic agriculture of New Alchemy Institute (for more information, see the story at the end of this Bulletin). The Institute would like to inform us of their new educational program, in case any of our centers might like to send students.

The New Alchemy Semester is a four-month accredited college-level program in biological agriculture and appropriate technology. The Semester offers an exciting blend of academic studies and hands-on work within the context of New Alchemy's ongoing research and education projects in ecological food production, energy-efficient design, and resource conservation. The Institute's sixteen-year history, twelve-acre site, and diverse staff create the setting for the program, giving students a unique opportunity to explore the practical applications of their studies.

The Spring 1986 program begins on January 27 and ends on May 16. Students take four required courses:

- Biological Agriculture and Appropriate Technology covers a variety of topics in ecological food production and energy-efficient design.
- Ecosystem Design Seminar gives an in-depth view of ecological principles and practices for ecological design of landscapes.
- Regional Resource Systems brings a systems perspective to understanding regional resource issues and their place in the larger global picture.
- Applied Studies is set up, so that each student works as part of a team of three on an integrated project closely linked to one of the major programs at the Institute.

Cost for the program is \$2500 plus about \$300/month for living expenses. It is possible that Noyes grant funds could be used for this purpose, if other conditions (listed above) are met. Applications for the coming semester are now being accepted. For more information please contact: Wendy Marshall, Semester Manager, New Alchemy Institute, 237 Hatchville Road, East Falmouth, Mass 02536, USA.

VIII. THE FIFTH ANNUAL BALATON GROUP MEETING

Dr. Laszlo Kapolyi, Hungary's Minister of Industry, kindly invited us to come again next year and to hold our meeting in the OKGT Oil-and-Gas-Worker's Rest house in Csopak - an invitation we were pleased to receive and pleased to accept. We have now made preliminary plans for next year's meeting.

We will hold a day-long public seminar at the Hungarian Academy of Sciences in Budapest on Monday, September 8, 1986. The session will focus on technologies and public policies to achieve radical energy conservation. Members of the advisory committee are Bert DeVries, Jorgen Norgard, Hartmut Bossel, and Tamas Jaszay. Several Balaton Group members with special expertise in the topic will prepare speeches for the meeting? all others are invited to attend, though the seminar is not an official part of the annual meeting.

The bus to Csopak will depart in the evening of September 8. The Balaton Group meeting will begin officially Monday evening September 8, 1986, and run through noon on Saturday September 13. Please mark these dates in your calendar now, and notice the shift from a Monday-Friday to a Tuesday-Saturday schedule. That will allow us to have the special seminar in Budapest without sacrificing any of our own meeting time.

Gerardo Budowski has agreed to organize the schedule for next year's meeting. He is open to ideas and suggestions (and was already offered plenty of them. at the end of this year's meeting.) More detailed plans for the meeting will be announced in further Bulletins.

IX. QUOTES AND A GOOD-NEWS STORY: THE NEW ALCHEMY INSTITUTE

Some Inspirational Quotes (courtesy of Antonio Camara)

The Oneness of all life means that the same stream of life energy runs through all the veins of the Universe. It is this stream which binds all life together making them one, each being governed by its own particular laws, which it must obey. So while there are higher forms of life in other worlds, and human life is the highest form on this planet, mineral life, plant life, animal life, human life, and other-world life are one in their essence. A realization of this Oneness should do much to eliminate discrimination, especially against color, race, and caste.

Essentials and Symbols of the Buddhist Faith

There is nothing more difficult to carry out nor more doubtful of success, nor more dangerous to handle than to initiate a new order of things. Machiavelli

Beware of those who think it can never happen. Their ancestors hassled Galileo and ridiculed Darwin.

Patrick Winston

Artificial Intelligence

Addison Wesley, Reading, Mass., 1977

A Good News Story

For fifteen years the New Alchemy Institute has been a place of inspiration for thousands of dreamers, who see in it a concrete, living, working example of how the future could be, if we could learn to bring together modern science, respect for the earth, and human caring.

The New Alchemy Institute is located on Cape Cod, a sandy promontory jutting into the Atlantic Ocean from the eastern coast of the United States. The 5 hectares of land occupied by the Institute was formerly a dairy farm. Now it is a landscape dotted with windmills, gardens, young orchards, fishponds, and strangely beautiful modern structures, creating a unique transition zone between the neat houses and yards of its suburban neighbors and the second growth pitch pine and scrub oak woods behind it.

The Institute was founded in 1969 by John and Nancy Todd and Bill McLarney. John and

Bill had advanced degrees in ecology and oceanography and had been employed at the prestigious Woods Hole Oceanographic Institute on Cape Cod. They had ideas far beyond what they were permitted to do in conventional scientific institutions: they wanted to design buildings and landscapes that brought together ecological principles and solar energy sources, to meet human needs with elegance and with beauty. They started with no money, no organizational backing.

"Taking as a starting point an examination of basic human needs, we began to explore alternatives in the areas of food, energy, and shelter. We set to work, experimenting in the first seasons with soil restoration, organic agriculture, and aquaculture. With time, the scope of the work became broader. Early successes with soil fertility and high yields from the fish ponds led us to synthesize agriculture and aquaculture with architecture and advances in the materials sciences, like polymer physics. This led us to the development of a form of solar greenhouse we call a bioshelter."

The New Alchemy site now has a collection of bioshelters, each one more sophisticated than the last, each one built on the lessons learned from experiments with the earlier ones.

The first few bioshelters are basically pits in the ground, filled with water and turned into productive fishponds, surrounded by green plants, with some sort of dome or covering over the whole. The water stores heat for the winter to keep the plants growing. Some of the plants feed the fish. Detritus from the bottom of the fishpond feeds the plants. A small windmill turns a paddle to aerate the water. All very simple beginnings to much more sophisticated structures that came later.

"A bioshelter is a building to absorb and store solar energy and to use the energy to grow plants and fish in a semi-enclosed ecosystem. Working with the bioshelter, we learned increasingly to use as models our observations of the natural world, designing around living soils, light cycles, and pond ecosystems, imitating in our structures the land masses, water bodies, and atmosphere of the globe."

"With time we began to apply the same kind of thinking to the rest of our land, in an attempt to project the inherent possibilities for Cape Cod, an overcrowded, sea-bound, glacial terminal moraine, for continued habitation into the next century. Recognizing that, as with most of the northeastern United States, the proclivity of our sparse soil is to grow trees, we were drawn to the concept of agricultural forestry, or farming in the image of the forest. By this we meant creating, over time, a forest made up, in the main, of trees useful for food, fuel, or manufacture. Under or between canopies of trees seemed the place for gardens and field crops, ponds, bioshelters, and livestock, the whole farm gradually becoming an epicenter of products and ideas useful to Cape Cod and other similar bioregions."

The New Alchemy farm of today is not yet a farm in the image of the forest. But it is a good deal closer to it than it was when the Todds and McLarney came to it in 1971. They cleared brush and brambles from the pasture to establish a first garden. They experimented with using seaweed and legumes to fertilize the sandy soil. They interplanted vegetables and flowers, both for beauty and for repelling pests.

It was from the beginning a place of peaceful gardens but exciting ideas. All sorts of people came to help. Beyond the old farmhouse more gardens began to appear, and geodesic domes, fishponds, and windmills. There were nodding sunflowers, compost piles, cats, geese,

roaming bands of children. New Alchemy has always been good at celebrations; at combining hard work with feasts, flags, parties, song, and dance. Increasingly the feasts were home-grown—vegetables and fruits from the gardens, tilapia and other freshwater fish from the ponds.

People came for visits, asked questions. Young, creative minds provided ideas, there was a shared, sustained vision, and long hours of dedicated labor—very little of it depending on machinery or on large amounts of money. Human energy, ideas, and care created the New Alchemy of today.

Now the old dairy barn houses not only the workshop and storage areas, but a lab, computer terminals, and a superinsulated auditorium that demonstrates the most advanced materials and concepts in energy conservation. The auditorium is needed for the many kinds of instruction going on at New Alchemy, from on-site internships to community short-courses, to a college-level semester of hands-on experience with ecosystem design. A network of signs steers visitors, who now number more than ten thousand a year, on a self-guided tour of the premises.

In the gardens the sandy soil has been enriched and balanced and supports community and experimental plots that produce close to optimal yields with no commercial fertilizers or pesticides. Farther away from the house are extensive herb gardens and an orchard of young fruit trees being tested for adaptability to the Cape's climate and soil. Behind the barn are many more trees and food-producing and nitrogen-fixing shrubs and several different species of bamboo, all patrolled regularly by a vociferous gaggle of geese.

At the far end of the geese's terrain is a huge building, sheltered from the north by earth built up into a berm and planted with a windrow of trees. Hounding the corner to the front of the building brings a sudden and sharp contrast. Here, on the south side, one sees the full size of the Ark, New Alchemy's most impressive bioshelter. Every architectural effort has been aimed at capturing and retaining sunlight. For most of its length the translucent scalloped roof slopes almost to the ground. The lines of the building are clear, even sharp, not unlike a yacht in a meadow, but the general impression is friendly and human in scale.

It is always beautiful inside the Ark. During the warm months of the year it is tropical; during the cooler months the climate is more like perennial spring. It is especially striking to walk on a sunny but cold February day from the snow outside to the fresh, moist smell of earth and the abundance of green and blooming things inside. The translucent, above-ground fish tanks, the indoor garden of vegetables, the colorful splashes of flowers, the silent monitoring of the computer are constant the year around.

In the summer the Ark is used as an extension of the garden where okra, peppers, tomatoes, and eggplants will bear sooner and longer. In the winter the main crops are salad greens, herbs, and hardy vegetables like broccoli and Chinese cabbage. Thousands of seedlings for the summer garden are produced each spring. Insects within the Ark are controlled by the use of other insects; ecosystems are deliberately constructed to contain the natural enemies of potentially harmful pests. Sensors continually monitor the equilibrium of the building, recording relative humidity, temperature, acidity in the fishtanks, incoming solar radiation, feeding the information into the central computer in the barn so that New Alchemy's scientists may understand more thoroughly the interplay of elements within the whole. Commercial electricity powers the computers and monitoring system. Otherwise the energy comes from the sun.

"A visitor to the farm some years from now is likely to see as great a difference again as we have already experienced. Then only renewable energy will be used. The trees will have grown to yield fruits, nuts, animal feed, fuel, and building materials. These, like the fish, fresh and smoked, and the produce from the gardens and bioshelters, will find ready markets and be a major source of economic support for the Institute and its staff. The farm's ecosystem will have proceeded through the phases of ecological succession to a near-climax state where the soil and plant communities are renewed and maintained in an ongoing, productive, yet stable condition."

"As our farm in the image of the forest reveals a pattern of sustain-ability for our own bioregion, the hope is that the same kind of thinking and observations can be applied to other areas to create farms in the image of the prairie, the desert, or the savannah."

(written by Nancy Jack Todd and Dana Meadows)