



# RUMINATIONS

NEWSLETTER OF THE GLOBAL LIVESTOCK COLLABORATIVE RESEARCH SUPPORT PROGRAM

## Mexico Site of Y2K Conference

The Global Livestock CRSP will hold its Year 2000 International Conference in Mexico from March 15 – 18, 2000. The conference will be hosted by the Universidad de Guadalajara Centro Universitario de la Costa Sur and the Instituto Manantlan de Ecología y Conservación de la Biodiversidad.

During the conference, GL-CRSP projects from East Africa, Latin America and Central Asia will present their findings and progress over the past three years. Demonstrations of new technologies being used by the GL-CRSP projects are also planned. Additional presentations will focus on research being completed in the region including work being undertaken in the Sierra de Manantlan Biosphere Reserve (see page 15).

In addition, the conference will include a one-day workshop on spatial dimension and its links to the development process. The workshop will explore developments in spatial dimension technologies and ways in which these technologies can be applied globally as well as  
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*Although the Crater occupies only a small proportion of Ngorongoro Conservation Area, its spectacular scenery and easily viewable wildlife have made it the focus of much of the area's tourism, management, and administration.  
Photo by Susan Johnson.*

## IMAS & Transboundary Ecosystems in East Africa Focus of Workshop

The Global Livestock CRSP Integrated Modeling and Assessment System (IMAS) project recently held a workshop to assess the use of IMAS to improve coordinated management of transboundary ecosystems in East Africa. The workshop was organized in collaboration with ILRI and was funded by REDSO/USAID in

response to REDSO's interest in applying the IMAS to the Greater Serengeti-Mara ecosystem.

IMAS consists of spatial data bases, geographic information systems (GIS) analyses, spatial-dynamic computer models of ecosystems inclusive of humans,  
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## Central Asia in Wisconsin

Central Asia has been highly visible at the University of Wisconsin-Madison (UW) this fall. Two Kazakhstani professors of agricultural economics have been in residence as part of the U.S. Department of Agriculture's Faculty Exchange Program. Aslan Naurzgaliev, Assistant Professor at West-Kazakhstan Agrarian University and Askar Khamzin, Assistant Professor at Astana Agrarian University have been taking courses, and visiting farms, firms, and state agencies. They are joined by two agricultural economics professors from Russia. UW Professor William Dobson, who heads the UW's GL CRSP marketing research in Kazakhstan, directs their program. The objective is to help these professors strengthen their course offerings with information and materials they acquire in the U.S. Each of them is developing three new courses and writing articles for their local popular press. Their areas of emphasis include agribusiness, marketing, and land law.

Also this fall, on November 16, UW held a workshop entitled, "The Challenges of Doing Business in the Former Soviet Union: The Case of Central Asia." The focus was on agribusiness. UW's Center for Russia, East Europe, and Central Asia was the lead



*Faculty exchange program participants attending a field day during their stay at the University of Wisconsin-Madison. Shawano County Extension crops and soils agent Joe Stellato, right, described zone tillage for, from left, Yulya Bolotova, from Russia, and Askar Khamzin and Aslan Naurzgaliev, both of Kazakhstan*

sponsor. Other sponsors included the Wisconsin Department of Agriculture, ACIDI/VOCA, the College of Agricultural and Life Sciences, the School of Business, and the Law School. The workshop's first roundtable dealt with the institutional environment, including current privatization efforts and the problems of corruption. Panelists were drawn from UW's Land Tenure Center, the University of Maryland and a private firm that advises investors in Central Asia. The second roundtable was on the role of government, with two speakers from USAID, Mark Smith and Gregg Baker. The third roundtable featured executives from two US firms now active in Central Asia- Case Corporation of Racine, Wisconsin, the leading supplier of farm machinery in

Uzbekistan, and Developed Technology Resources, Inc. of Edina, Minnesota, the leading dairy processor in Kazakhstan through their Foodmaster company. GL CRSP researchers William Dobson and Kenneth Shapiro also participated in this roundtable.

Finally, the UW held its Fourth Annual Workshop on Central Asian Studies October 21 - 24. This is the only national gathering of scholars from all disciplines who work on Central Asia. Over 50 papers were presented by participants from around the US, from Central Asia, and elsewhere.👍👍

*For more information on the GL-CRSP project led by UW, please contact Dr. Kenneth Shapiro, UW-Madison, International Agricultural Programs, Madison, WI 53706-1562. Fax: 608-262-8852 or email: kenneth.shapiro@ccmail.adp.wisc.edu.*

# Cornell Lectureship Series Honors Dr. Gordon Campbell

Dr. S. Gordon Campbell was a distinguished member of the faculty of the College of Veterinary Medicine at Cornell University for many years and was its first Director of International Programs. For over 10 years, he served on the External Evaluation panel of the Small Ruminant Collaborative Research Support Program and chaired this panel. His sudden death in September 1997 came as a profound shock for all those who worked with him both inside and outside of Cornell, but especially those students with whom he interacted.

He was responsible for initiating a program entitled "Expanding Horizons", which was financially supported by Cornell University and an external foundation. It allowed students the opportunity of spending a



*Dr. Gordon Campbell (center) with fellow EEP members, Dr. Gerald Thomas (left) and Dr. Hudson Glimp (right) at Washington State University in 1989. Gordon Campbell served on the Small Ruminant CRSP External Evaluation Panel for over 10 years.*

ten-week period working in a developing country. The purpose of this was to apprise students of career possibilities in developing countries and many of the former participants have entered into careers along these lines, and have, therefore, availed themselves of an

opportunity that would not normally be available in a college of veterinary medicine. The students who had benefited from these experiences wished to sustain Dr. Campbell's memory in a very specific way and established a fund to bring lecturers to the Cornell campus on an annual basis, who could address issues relating to career development in the international arena, with particular emphasis on

veterinary medicine in developing countries. The initial financial goal was very quickly met and exceeded, which reflects the high esteem with which Dr. Campbell was held. Thus, the initiatives that he put into place with respect to providing a more global perspective to veterinary education are not only providing a more global perspective to veterinary education but are part of his legacy that will now be sustained in perpetuity by this student-initiated memorial. Contributions continue to be received for the Gordon Campbell Memorial Lectureship and can be sent to the **Office of Public Affairs, Box 39, College of Veterinary Medicine, Cornell University, Ithaca, NY 14853.**

## Call for Poster Sessions

To encourage student participation at the Year 2000 International Conference, the Management Entity of the Global Livestock CRSP will offer a select number of travel grants to students submitting poster papers. Students working on GL-CRSP projects are invited to prepare a poster on a topic related to their GL-CRSP research. To request a poster session, please contact Susan Johnson, Global Livestock CRSP, University of California – Davis, 258 Hunt Hall, Davis, CA 95616. Fax (530) 752-7523. Email: [glcrsp@ucdavis.edu](mailto:glcrsp@ucdavis.edu).

# Central Asian Scientists in US for Training

A team of scientists from Central Asia has arrived in the United States to receive training on GIS and CO<sub>2</sub> modeling. The training is the first phase of a grant awarded by the Association Liaison Office for University Cooperation in Development to Dr. Emilio Laca of the University of California, Davis.

The training is designed to develop the capacity of regional scientists to use GIS technologies for measuring and modeling CO<sub>2</sub> fluxes in rangelands as potential atmospheric carbon sinks affecting global climate change and agricultural productivity. The GL-CRSP Livestock Development and Rangeland Conservation Tools (LDRCT) project will provide an applied backdrop to the training.

The project partners education and research institutions of Central Asia and three US Universities. Two researchers from Turkmenistan, Uzbekistan and Kazakhstan each were selected for the training. Mukhtor Nasyrov, an assistant professor at Samarkand State University and Bachtiyor Mardonov, Leading Researcher of the Department of Desert Research, Research Institute of Regional Problems, Samarkand Division of the Uzbek Academy of Sciences is attending from Uzbekistan. Dr. Kanat



*First row-kneeling: Kanat Akshalov (Kaz.), Moukhamet Dourikov (Turkmen.), Nick Saliendra (U.S.). Second row-standing: Bachtiyor Mardonov (Uzbek.), Mukhtor Nasyrov (Uzbek.), Valerii Nikolaev (Kaz.), Alexandr "Sasha" Nikolayenko (Kaz.)*

Akshalov, Deputy Director of the Baraev Institute of Grain Farming, and Alexandr Nikolaenko, Coordinator of the Analysis and Data processing Department of the Institute of Ecology and Sustainable Development from Kazakhstan. Dr. Moukhamed Dourikov, Head of the Laboratory of Forests and Rangelands, and Valery Nikolaev, Senior Research Officer, both of the National Institute of Deserts, Flora and Fauna from Turkmenistan.

The first half of the training took place in Logan, Utah where the scientists worked with researchers from Utah State University and South Dakota State University specifically on CO<sub>2</sub> modeling. The researchers attended workshops on the

theoretical foundations and practical aspects for modeling CO<sub>2</sub> flux in terrestrial ecosystems. The training included hands-on training on the use of statistical and modeling software for CO<sub>2</sub> flux measurements. Training on the processing of the daily, 24-hour Bowen-ratio (carbon flux) data was provided to those trainees from the 3 CO<sub>2</sub> flux monitoring sites collaboratively established in Central Asia by LDRCT and the USDA. Quality assurance of the CO<sub>2</sub> flux data was also provided. Hands on data processing protocols was practiced through the facilities available in the USDA-ARS Forage and Range Research Laboratory and at Utah State University.

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# Kenya's Egerton University Initiates Post-Graduate Studies Through Pastoral Risk Management Training Component

*By Professor Abdillahi Aboud, Department of Natural Resources, Egerton University, Njoro, Kenya.*

Egerton University in Kenya represents a training component and a collaborating institution of the GL-CRSP's Pastoral Risk Management Project (PRMP). The linkage established two years ago, and based in the Department of Natural Resources of the Faculty of Environmental Studies and Natural Resources has grown to great strengths since then, and all indications point to even greater progress and mutual benefits in the future.

## **Brief History**

In historical perspectives, Egerton University was elevated to full

University status in 1986, from the old Egerton College which was set up in 1939 through generous donations of 320 hectares of land in Tatton Farm and 1,125 hectares of land in Ngongongeri Farm in 1958 by Lord Egerton of Tatton.

Located in the high agricultural potential areas of Kenya's Rift Valley, Egerton College initially conducted short informal courses and training for the children of colonial settlers and the British ex-service men from World War II, who were being prepared for farming in the Kenya highlands.

The trainees were few then, and as humorously put, in the beginning there were 7 teachers that taught only three students. The short informal courses were ultimately upgraded to Certificate and Diploma programs, taking up to three years of theoretical and practical training. This was especially enhanced with the handing over of the College to the new Kenya Government at about independence time, in the early 1960s.

The Department of Natural Resources on the other hand grew out of the old Department of Range Management, just about the same time the institution was upgraded to University status. The significant development of events is that while the Department is amongst the first three that were established, its performance had been slow and stalling until the Global Livestock CRSP came around.

## **GL-CRSP's Impact**

Because the coming of the GL-CRSP's PRMP coincided with two important events, namely the establishment of a postgraduate studies in the Department in 1998, and the upgrading of the Department to the Faculty level in 1999, it is generally felt that the PRMP collaboration generated a

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During the Winter 2000 quarter, the participants will attend seminars on GIS and conduct GIS modeling of agro-ecosystems at UC Davis. By the end of their stay, they will have prepared a project applied to the carbon-flux research. They will also perfect their communication and presentation skills by attending English language classes. Each participant will give cultural seminars during the quarter on topics ranging from a student's perspective on the Post-Soviet educational system in Central Asia to living in transition economies – a scientist's perspective.

Phase I of the training grant will provide the Central Asian scientists with the opportunity to work and study together with US scientists. It is expected that the Central Asian scientists will gain a better understanding of each other's methods, problems and cultures. This understanding will form the foundation for a regional network to be developed in phase II of the grant. 📖

*For more information, please contact Dr. Emilio Laca, Department of Agronomy and Range Science, University of California, Davis, CA 95616. Email: ealaca@ucdavis.edu.*

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## Egerton University Post-Graduate Studies Initiated Through PRMP

catalyst effect on the rejuvenation of the Department.

A number of useful activities and assistance came out of the collaboration. The primary activity which was in fact the basis of the collaboration was the sponsorship of the MSc candidates in their thesis field work. The agreement being that the candidates would undertake thesis research in the areas of interest and objectives of the PRMP. Consequently, out of the first ten MSc students admitted to the Departmental

postgraduate studies in the academic year 1998/1999, four are PRMP sponsored. One of them is an international student from Ethiopia, Ato Mulugeta Shibru, while the other three are Kenyans, Messrs John Tangus, Clement Lenachuru and Moses Esilaba.

The second supportive activity was the funding (basically from the GL-CRSP core funds) of one desktop computer, three laptop computers, a printer, a number of accessories, and the setting up of an e-mail facility for the Department's use. These have proved extremely useful to the graduate students and their teaching staff.

Then there was the establishment of the Departmental computer room and the graduate classroom, along with the necessary teaching structures.

This involved the redesigning and renovation of existing space.

Thanks to the efforts of Dr. Layne Coppock, the PI, the USAID Kenya Mission complied with the request to grant the Department a substantial amount of funds that went to benefit all the 10

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pioneer students in various ways, including through (1) a PRA training; (2) Advance SPSS training; (3) educational visits to places and institutions of interest and relevance to their training; and (4) attendance to a food-aid Seminar in Baringo District. The general feeling is that these exercises proved extremely useful as they supplemented and complemented the theoretical aspects of the various MSc courses taken.

Finally, the USAID funds facilitated the attendance of Mr. Frank Lusenaka and Aboud (Egerton members of the PRMP team) to the International Rangeland Congress in Australia in July, 1999, and their attendance, together with Dr. D.K. Too, the chairman of the Natural

Resources Department, and the four PRMP sponsored students, to the Project's First Biennial Research and Outreach Workshop held in Addis Ababa, Ethiopia also in July 1999.

### ***Thesis research***

The 10 pioneer graduate students successfully completed their course work and have developed and some defended their proposals, and are about to go for data collection. One of them has already started his data collection.

While the four PRMP sponsored students have, as required, written proposals in line with the Project's objects and areas of interests, which are basically on pastoral risk management, the other six students have chosen varying topics in natural resources use and management areas. For instance, one of them is looking at the rate of adoption of community forestry innovations in the JICA/KEFRI forestry project in Kitui district, while another is studying the effects of cooperative ranches sub-division on land condition in Machakos district. Another student is probing the influences of land tenure systems on the socioeconomic status of households in the Coast Province, while another is looking at the forces that

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## GL-CRSP Principal Investigators Participate in BASIS CRSP Workshop

*By Charlotte Neumann, M.D., MPH, UCLA School of Public Health*

A Horn of Africa Regional Workshop on “Agricultural Policy, Resource Access and Human Nutrition” was held in Addis Ababa from November 3-5 1999. The meeting was organized by Dr. Michael Roth, Program Director of the BASIS CRSP and co-sponsored by OSSREA and USAID/REDSO. Drs. Charlotte G. Neumann of UCLA and Dr. Nimrod O. Bwibo of the University of Nairobi, co-principal Investigators of the GL-CRSP research project “Role of Animal Source Foods in Diet Quality and Growth and Development of Rural Kenyan Children”

presented a joint paper on “Animal Products and School Performance in Kenya”.

Participants came from the US, Ethiopia, Eritrea, Tanzania, Kenya, and Zimbabwe. The participants were truly multidisciplinary, representing economics, agriculture, policy, nutrition, food security, health and gender issues. NGO's, government ministries, bilateral and multilateral organizations and universities were represented. The US participants came from USAID, BASIS CRSP, International Center for Research on Women,

the Academy of Educational Development, University of California Los Angeles and the Global Livestock CRSP.

A common thread running throughout the various panels was the identification of existing and potential linkages among economic growth, income generation and how to enhance nutritional impacts of agricultural interventions. Presentations were given on how to integrate nutrition, and agricultural programs, and descriptions of successful programs. Several excellent

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promote and discourage urban agriculture in the Nakuru Municipality. One of the students is evaluating the performance of another community forestry project in Makueni district, and the last student is studying the impacts of gender and education on household pastoral risk management among the Baringo herders of Kenya.

### **Future Needs**

The future vision for an even better performance of the Faculty of Environmental Studies and Natural Resources postgraduate programs will need the following: (1) the social science aspects of the

curriculum need to be strengthened - one example is to increase training for courses such as PRA survey methods; (2) establishment of a GIS unit and train the staff accordingly ; (3) statistics training needs to be strengthened, especially for packages such as SPSS; (4) the computer capacities need to be strengthened further; (5) more support for the community outreach activities in Baringo; (6) improvement of the department's library; (7) an exchange program for faculty and students, in partnership with other universities, could be very helpful; and (8) more funds to ensure that post-graduates working with the GL-CRSP are adequately supported.

Overall, the GL-CRSP-Egerton University collaboration is a success story. We at Egerton will never pass an opportunity to express our gratitude. 🙏❤️

*Dr. A.A. Aboud is a socio-ecologist at Egerton University. Prior to joining Egerton University, Dr. Aboud had 17 years experience in livestock development and administration while working with Kenya's Ministry of Agriculture and Livestock Development. For more information, please contact Dr. Aboud at eu-crsp@net2000ke.com or Egerton University, Dept. of Natural Resources, P.O. Box 536, Njoro, Kenya. Tel: 254-37-61464/61620, Fax: 254-37-61213/61145.*

# Helping the world's poorest

*Jeffrey Sachs, a top academic economist, argues that rich countries must mobilise global science and technology to address the specific problems which help to keep poor countries poor.*

**I**N our Gilded Age, the poorest of the poor are nearly invisible. Seven hundred million people live in the 42 so-called Highly Indebted Poor Countries (HIPCS), where a combination of extreme poverty and financial insolvency marks them for a special kind of despair and economic isolation. They escape our notice almost entirely, unless war or an exotic disease breaks out, or yet another programme with the International Monetary Fund (IMF) is signed. The Cologne Summit of the G8 in June was a welcome exception to this neglect. The summiters acknowledged the plight of these countries, offered further debt relief and stressed the need for a greater emphasis by the international community on social programmes to help alleviate human suffering.

The G8 proposals should be seen as a beginning: inadequate to the problem, but at least a good-faith prod to something more useful. We urgently need new creativity and a new partnership between rich and poor if these 700m people (projected to rise to 1.5 billion by 2030), as well as the extremely poor in other parts of the world (especially South Asia), are to enjoy a chance for human betterment. Even outright debt forgiveness, far beyond the G8's stingy offer, is only a step in the right direction. Even the call to the IMF and World Bank to be more sensitive to social conditions is merely an indicative nod.

A much more important challenge, as yet mainly unrecognised, is that of mobilising global science and technology to address the crises of public health, agricultural productivity, environmental degradation and demographic stress confronting these countries. In part this will require that the wealthy governments enable the grossly underfinanced and underempowered United Nations institutions to become vibrant and active partners of human development. The failure of the United States to pay its UN dues is surely the world's most significant default on international obligations, far more egregious than any defaults by impoverished HIPCS. The broader American neglect of the UN agencies that assist impoverished countries in public health, science, agriculture and the environment must surely rank as another amazingly misguided aspect of current American development policies.

The conditions in many HIPCS are worsening dramatically, even as global science and technology create new surges of wealth and well-being in the richer countries. The problem is that, for myriad reasons, the technological gains in wealthy countries do not readily diffuse to the poorest ones. Some barriers are political and economic. New technologies will not take hold in poor societies if investors fear for their property rights, or even for their lives,

in corrupt or conflict-ridden societies. *The Economist's* response to the Cologne Summit ("Helping the Third World", June 26<sup>th</sup>) is right to stress that aid without policy reform is easily wasted. But the barriers to development are often more subtle than the current emphasis on "good governance" in debtor countries suggests.

Research and development of new technologies are overwhelmingly directed at rich-country problems. To the extent that the poor face distinctive challenges, science and technology must be directed purposefully towards them. In today's global set-up, that rarely happens. Advances in science and technology not only lie at the core of long-term economic growth, but flourish on an intricate mix of social institutions – public and private, national and international.

Currently, the international system fails to meet the scientific and technological needs of the world's poorest. Even when the right institutions exist – say, the World Health Organisation to deal with pressing public health disasters facing the poorest countries – they are generally starved for funds, authority and even access to the key negotiations between poor-country governments and the Fund at which important development strategies get hammered out.

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### The ecology of underdevelopment

If it were true that the poor were just like the rich but with less money, the global situation would be vastly easier than it is. As it happens, the poor live in different ecological zones, face different health conditions and must overcome agronomic limitations that are very different from those of rich countries. Those differences, indeed, are often a fundamental cause of persisting poverty.

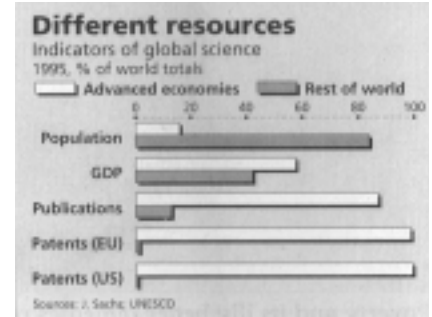
Let us compare the 30 highest-income countries in the world with the 42 HIPCS (see table below). The rich countries overwhelmingly lie in the world's temperate zones. Not every country in those bands is rich, but a good rule of thumb is that temperate-zone economies are either rich, formerly socialist (and hence currently poor), or geographically isolated (such as Afghanistan and Mongolia). Around 93% of the combined population of the 30 highest-income countries lives in temperate and snow zones. The HIPCS, by contrast, include 39 tropical or desert societies. There are only three in a substantially temperate climate, and those three are landlocked and therefore geographically isolated (Laos, Malawi and Zambia).

Not only life but also death differs between temperate and tropical zones. Individuals in temperate zones almost

everywhere enjoy a life expectancy of 70 years or more. In the tropics, however, life expectancy is generally much shorter. One big reason is that populations are burdened by diseases such as malaria, hookworm, sleeping sickness and schistosomiasis, whose transmission generally depends on a warm climate. (Winter may be the greatest public-health intervention in the world.) Life expectancy in the HIPCS averages just 51 years, reflecting the interacting effects of tropical disease and poverty. The economic evidence strongly suggests that short life expectancy is not just a result of poverty, but is also a powerful cause of impoverishment.

All the rich-country research on rich-country ailments, such as cardiovascular diseases and cancer, will not solve the problems of malaria. Nor will the biotechnology advances for temperate-zone crops easily transfer to the conditions of tropical agriculture. To address the special conditions of the HIPCS, we must first understand their unique problems, and then use our ingenuity and co-operative spirit to create new methods of overcoming them.

Modern society and prosperity rest on the foundation of modern science. Global capitalism is, of course, a set of social institutions – of property rights, legal and political systems, international agreements, transnational corporations, educational establishments, and public and private research institutions – but the prosperity that results from these institutions has its roots in the development and applications of new science-based technologies. In the past 50 years, these have included



technologies built on solid-state physics, which gave rise to the information-technology revolution, and on genetics, which have fostered breakthroughs in health and agricultural productivity.

### Science at the ecological divide

In this context, it is worth noting that the inequalities of income across the globe are actually exceeded by the inequalities of scientific output and technological innovation. The chart above shows the remarkable dominance of rich countries in scientific publications and, even more notably, in patents filed in Europe and the United States.

The role of the developing world in one sense is much greater than the chart indicates. Many of the scientific and technological breakthroughs are made by poor-country scientists working in rich-country laboratories. Indian and Chinese engineers account for a significant proportion of Silicon Valley's workforce, for example. The basic point, then, holds even more strongly: global science is directed by the rich countries and for the rich-country markets, even to the extent of mobilising much of the scientific potential of the poorer countries.

The imbalance of global science reflects several forces. First, of course, science follows the market. This is especially true in an age when technological leaps require expensive

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Different ecologies		
1995	HIPCS*	Rich countries
	(42)	(30)
GDP per person, PPP†	1,187	18,818
Life expectancy at birth, years†	51.5	76.9
Population by ecozones, % in:		
tropical	55.6	0.7
dry	17.6	3.7
temperate and snow	12.5	92.6
highland	14.0	2.5
Source: J. Sachs	*Highly indebted poor countries	
	†Unweighted averages	

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scientific equipment and well-provisioned research laboratories. Second, scientific advance tends to have increasing returns to scale: adding more scientists to a community does not diminish individual marginal productivity but tends to increase it. Therein lies the origin of university science departments, regional agglomerations such as Silicon Valley and Route 128, and mega-laboratories at leading high-technology firms including Merck, Microsoft and Monsanto. And third, science requires a partnership between the public and private sectors. Free-market ideologues notwithstanding, there is scarcely one technology of significance that was not nurtured through public as well as private care.

If technologies easily crossed the ecological divide, the implications would be less dramatic than they are. Some technologies, certainly those involving the computer and other ways of managing information, do indeed cross over, and give great hopes of spurring technological capacity in the poorest countries. Others – especially in the life sciences but also in the use of energy, building techniques, new materials and the like – are prone to “ecological specificity”. The result is a profound imbalance in the global production of knowledge: probably the most powerful engine of divergence in global well-being between the rich and the poor.

Consider malaria. The disease kills more than 1m people a year, and perhaps as many as 2.5m. The disease is so heavily concentrated in the poorest tropical countries, and overwhelmingly in sub-Saharan Africa, that nobody even bothers to keep an accurate count of clinical cases or

deaths. Those who remember that richer places such as Spain, Italy, Greece and the southern United States once harboured the disease may be misled into thinking that the problem is one of social institutions to control its transmission. In fact, the sporadic transmission of malaria in the sub-tropical regions of the rich countries was vastly easier to control than is its chronic transmission in the heart of the tropics. Tropical countries are plagued by ecological conditions that produce hundreds of infective bites per year per person. Mosquito control does not work well, if at all, in such circumstances. It is in any event expensive.

Recent advances in biotechnology, including mapping the genome of the malaria parasite, point to a possible malaria vaccine. One would think that this would be high on the agendas of both the international community and private pharmaceutical firms. It is not. A Wellcome Trust study a few years ago found that only around \$80m a year was spent on malaria research, and only a small fraction of that on vaccines.

The big vaccine producers, such as Merck, Rhône-Poulenc’s Pasteur-Mérieux-Connaught and SmithKline Beecham, have much of the in-house science but not the bottom-line motivation. They strongly believe that there is no market in malaria. Even if they spend the hundreds of millions, or perhaps billions, of dollars to do the R&D and come up with an effective vaccine, they believe, with reason, that their product would just be grabbed by international agencies or private-sector copycats. The hijackers will argue, plausibly, that the poor deserve to have the vaccine at low prices – enough to cover production costs but

not the preceding R&D expenditures.

The malaria problem reflects, in microcosm, a vast range of problems facing the HIPCS in health, agriculture and environmental management. They are profound, accessible to science and utterly neglected. A hundred IMF missions or World Bank health-sector loans cannot produce a malaria vaccine. No individual country borrowing from the Fund or the World Bank will ever have the means or incentive to produce the global public good of a malaria vaccine. The root of the problem is a much more complex market failure: private investors and scientists doubt that malaria research will be rewarded financially. Creativity is needed to bridge the huge gulfs between human needs, scientific effort and market returns.

### **Promise a market**

The following approach might work. Rich countries would make a firm pledge to purchase an effective malaria vaccine for Africa’s 25m newborn children each year if such a vaccine is developed. They would even state, based on appropriate and clear scientific standards, that they would guarantee a minimum purchase price – say, \$10 per dose – for a vaccine that meets minimum conditions of efficacy, and perhaps raise the price for a better one. The recipient countries might also be asked to pledge a part of the cost, depending on their incomes. But nothing need be spent by any government until the vaccine actually exists.

Even without a vast public-sector effort, such a pledge could galvanise the world of private-sector  
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pharmaceutical and biotechnology firms. Malaria vaccine research would suddenly become hot. Within a few years, a breakthrough of profound benefit to the poorest countries would be likely. The costs in foreign aid would be small: a few hundred million dollars a year to tame a killer of millions of children. Such a vaccine would rank among the most effective public-health interventions conceivable. And, if science did not deliver, rich countries would end up paying nothing at all.

Malaria imposes a fearsome burden on poor countries, the AIDS epidemic an even weightier load. Two-thirds of the world's 33m individuals infected with the HIV virus are sub-Saharan Africans, according to a UN estimate in 1998, and the figure is rising. About 95% of worldwide HIV cases are in the developing world. Once again, science is stopping at the ecological divide.

Rich countries are controlling the epidemic through novel drug treatments that are too expensive, by orders of magnitude, for the poorest countries. Vaccine research, which could provide a cost-effective method of prevention, is dramatically underfunded. The vaccine research that is being done focuses on the specific viral strains prevalent in the United States and Europe, not on those which bedevil Africa and Asia. As in the case of malaria, the potential developers of vaccines consider the poor-country market to be no market at all. The same, one should note, is true for a third worldwide killer. Tuberculosis is still taking the lives of more than 2m poor people a year and, like malaria and AIDS, would probably be susceptible to a vaccine, if anyone cared to invest in the effort.

The poorer countries are not necessarily sitting still as their citizenry dies of AIDS. South Africa is on the verge of authorising the manufacture of AIDS medicines by South African pharmaceutical companies, despite patents held by American and European firms. The South African government says that, if rich-country firms will not supply the drugs to the South African market at affordable prices (ones that are high enough to meet marginal production costs but do not include the patent-generated monopoly profits that the drug companies claim as their return for R&D), then it will simply allow its own firms to manufacture the drugs, patent or no. In a world in which science is a rich-country prerogative while the poor continue to die, the niceties of intellectual property rights are likely to prove less compelling than social realities.

There is no shortage of complexities ahead. The world needs to reconsider the question of property rights before patent rights allow rich-country multinationals in effect to own the genetic codes of the very foodstuffs on which the world depends, and even the human genome itself. The world also needs to reconsider the role of institutions such as the World Health Organisation and the Food and Agriculture Organisation. These UN bodies should play a vital role in identifying global priorities in health and agriculture, and also in mobilising private-sector R&D towards globally desired goals. There is no escape from such public-private collaboration. It is notable, for example, that Monsanto, a life-sciences multinational based in St Louis, Missouri, has a research and

development budget that is more than twice the R&D budget of the entire worldwide network of public-sector tropical research institutes. Monsanto's research, of course, is overwhelmingly directed towards temperate-zone agriculture.

### **People, food & the environment**

Public health is one of the two distinctive crises of the tropics. The other is the production of food. Poor tropical countries are already incapable of securing an adequate level of nutrition, or paying for necessary food imports out of their own export earnings. The HIPC population is expected to more than double by 2030. Around one-third of all children under the age of five in these countries are malnourished and physically stunted, with profound consequences throughout their lives.

As with malaria, poor food productivity in the tropics is not merely a problem of poor social organisation (for example, exploiting farmers through controls on food prices). Using current technologies and seed types, the tropics are inherently less productive in annual food crops such as wheat (essentially a temperate-zone crop), rice and maize. Most agriculture in the equatorial tropics is of very low productivity, reflecting the fragility of most tropical soils at high temperatures combined with heavy rainfall. High productivity in the rainforest ecozone is possible only in small parts of the tropics, generally on volcanic soils (on the island of Java, in Indonesia, for example). In the wet-dry tropics, such as the vast savannahs of Africa, agriculture is hindered by the

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terrible burdens of unpredictable and highly variable water supplies. Drought and resulting famine have killed millions of peasant families in the past generation alone.

Scientific advances again offer great hope. Biotechnology could mobilise genetic engineering to breed hardier plants that are more resistant to drought and less sensitive to pests. Such genetic engineering is stymied at every point, however. It is met with doubts in the rich countries (where people do not have to worry about their next meal); it requires a new scientific and policy framework in the poor countries; and it must somehow generate market incentives for the big life-sciences firms to turn their research towards tropical foodstuffs, in co-operation with tropical research centres. Calestous Juma, one of the world's authorities on biotechnology in Africa, stresses that there are dozens, or perhaps hundreds, of underused foodstuffs that are well adapted to the tropics and could be improved through directed biotechnology research. Such R&D is now all but lacking in the poorest countries.

The situation of much of the tropical world is, in fact, deteriorating, not only because of increased population but also because of long-term trends in climate. As the rich countries fill the atmosphere with increasing concentrations of carbon, it looks ever more likely that the poor tropical countries will bear much of the resulting burden.

Anthropogenic global warming, caused by the growth in atmospheric carbon, may actually benefit agriculture in high-latitude zones, such as Canada, Russia and the

northern United States, by extending the growing season and improving photosynthesis through a process known as carbon fertilisation. It is likely to lower tropical food productivity, however, both because of increased heat stress on plants and because the carbon fertilisation effect appears to be smaller in tropical ecozones. Global warming is also contributing to the increased severity of tropical climatic disturbances, such as the "one-in-a-century" El Niño that hit the tropical world in 1997-98, and the "one-in-a-century" Hurricane Mitch that devastated Honduras and Nicaragua a year ago. Once-in-a-century weather events seem to be arriving with disturbing frequency.

The United States feels aggrieved that poor countries are not signing the convention on climatic change. The truth is that these poor tropical countries should be calling for outright compensation from America and other rich countries for the climatic damages that are being imposed on them. The global climate-change debate will be stalled until it is acknowledged in the United States and Europe that the temperate-zone economies are likely to impose heavy burdens on the already impoverished tropics.

### **New hope in a new millennium**

The situation of the HIPCS has become intolerable, especially at a time when the rich countries are bursting with new wealth and scientific prowess. The time has arrived for a fundamental re-thinking of the strategy for co-operation between rich and poor, with the avowed aim of helping the poorest of the poor back on to their own feet to join the race

for human betterment. Four steps could change the shape of our global community.

First, rich and poor need to learn to talk together. As a start, the world's democracies, rich and poor, should join in a quest for common action. Once again the rich G8 met in 1999 without the presence of the developing world. This rich-country summit should be the last of its kind. A G16 for the new millennium should include old and new democracies such as Brazil, India, South Korea, Nigeria, Poland and South Africa.

Second, rich and poor countries should direct their urgent attention to the mobilisation of science and technology for poor-country problems. The rich countries should understand that the IMF and World Bank are by themselves not equipped for that challenge. The specialised UN agencies have a great role to play, especially if they also act as a bridge between the activities of advanced-country and developing-country scientific centres. They will be able to play that role, however, only after the United States pays its debts to the UN and ends its unthinking hostility to the UN system.

We will also need new and creative institutional alliances. A Millennium Vaccine Fund, which guaranteed future markets for malaria, tuberculosis and AIDS vaccines, would be the right place to start. The vaccine-fund approach is administratively straightforward, desperately needed and within our technological reach. Similar efforts to merge public and private science activities will be needed in agricultural biotechnology.

Third, just as knowledge is

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## GL-CRSP Principal Investigators Participate in BASIS CRSP Workshop

papers on how to “move research to policy and program action” were presented and there was abundant discussion on identification of joint areas for improving collaboration and communication between researchers and on formulation of policy.

The agriculture sector dealt mainly with food crop production, and the presence of livestock as an important agricultural input was largely absent, as were some livestock oriented NGO's that have some

excellent projects integrating livestock production and human nutrition improvement on a community and household level.

Workshop proceedings containing the talks of the invited speakers will be forthcoming. All in all the workshops were extremely educational as to what is in place in the Horn of Africa and Eastern Africa and the problems encountered. The workshop hopefully will stimulate further integrative activities among

researchers, programs and policy implementers as well as among agriculture and human nutrition and well-being. Livestock needs to be clearly identified as a very important component of agriculture. The workshop was large, and small group discussions were at times difficult. However, there was ample opportunity for informal networking and exchanging ideas and information. Dr. Bwibo and I were appreciative of being invited as participants. 🙏🙏

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## Sachs on Development: Helping the World's Poor

becoming the undisputed centrepiece of global prosperity (and lack of it, the core of human impoverishment), the global regime on intellectual property rights requires a new look. The United States prevailed upon the world to toughen patent codes and cut down on intellectual piracy. But now transnational corporations and rich-country institutions are patenting everything from the human genome to rainforest biodiversity. The poor will be ripped off unless some sense and equity are introduced into this runaway process.

Moreover, the system of intellectual property rights must balance the need to provide incentives for innovation against the need of poor countries to get the results of innovation. The current struggle over AIDS medicines in South Africa is but an early warning shot in a much larger struggle over access to the fruits of

human knowledge. The issue of setting global rules for the uses and development of new technologies – especially the controversial biotechnologies – will again require global co-operation, not the strong-arming of the few rich countries.

Fourth, and perhaps toughest of all, we need a serious discussion about long-term finance for the international public goods necessary for HIPC countries to break through to prosperity. The rich countries are willing to talk about every aspect except money: money to develop new malaria, tuberculosis and AIDS vaccines; money to spur biotechnology research in food-scarce regions; money to help tropical countries adjust to climate changes imposed on them by the richer countries. The World Bank makes mostly loans, and loans to individual countries at that. It does not finance global public goods. America has systematically squeezed the

budgets of UN agencies, including such vital ones as the World Health Organisation.

We will need, in the end, to put real resources in support of our hopes. A global tax on carbon-emitting fossil fuels might be the way to begin. Even a very small tax, less than that which is needed to correct humanity's climate-deforming overuse of fossil fuels, would finance a greatly enhanced supply of global public goods. No better time to start than as the new millennium begins.

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■ *Jeffrey Sachs is director of the Centre for International Development and professor of international trade at Harvard University. A prolific writer, he has also advised the governments of many developing and East European countries.*

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## IMAS in Transboundary Ecosystems Workshop Focus

wildlife, and livestock, and field assessments that provide the information required to conduct integrated assessments. The IMAS portrays the likely ecological and economic outcomes of current trends and alternative scenarios of policy and management among local, national and international stakeholders. During the initial three years of the GL-CRSP study, the IMAS has been implemented at two sites – Ngorongoro Conservation Area (NCA) in Tanzania and Kajiado District, Kenya.

In the NCA, the IMAS is being adapted to simulate historic and current patterns of land use by the Maasai and by wildlife, to represent the degree of competition between livestock and wildlife for forage and habitat, and interactions involving animal diseases. Changes in livestock and wildlife abundances, human land use, and climate utilization are being simulated, along with their combined impacts on the vegetation and soil.

At the workshop, participants were shown how IMAS has been used to address ecosystem management and policy issues in the NCA. This provided a framework for further discussion and exploration of the possibilities of using IMAS for strategic coordinated management of transboundary

ecosystems, in general, and the Greater Serengeti-Mara, in particular.

Workshop participants described their perceptions of the issues that would have to be considered to apply the IMAS to the Greater Serengeti-Mara. They identified some of the difficulties currently experienced in the management of this ecosystem at local through international levels, identified issues which could arise in the future, and the possible consequences for the ecosystem as a whole.

The Maasai-Mara Reserve, Serengeti National Park, Ngorongoro Conservation Area, and other administrative areas comprise a single Greater Serengeti-Mara Ecosystem, defined by the movements of large herds of migratory wildebeest, gazelle, and zebra. While the Maasai-Mara is in Kenya, the other management units are in Tanzania. These politically distinct units are ecologically and socio-economically connected by the movements of humans, wildlife,



The Serengeti-Mara ecosystem is the area used by the wildebeest (even dashed line). The Serengeti National Park is shown by the heavy solid line. Hills are shaded. Source: Serengeti II

plants, information, water, airborne materials, goods, and money. The migratory wildlife do not recognize international boundaries, and their fate is influenced by the independent policies of two different countries.

The significance of transboundary interactions is exemplified by potential secondary effects of land-use changes surrounding the Maasai-Mara. Increasingly, arable lands are being converted to cultivation, while the pastoral herds put increasing demands on the remaining grazing lands. These lands are also important grazing ranges for the migratory

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## GL- CRSP Year 2000 Conference to be Held in Mexico

regionally to address development issues. The role of spatial models in understanding ecosystem processes and in impact assessment as well as linkages between models of biological processes and GIS will be examined through presentations and panel discussions.

Conference participants will also receive an in-depth look at the work being done in Mexico. The

GL-CRSP project in Latin America, PLAN, is working with communities in forested mountainous areas of Ecuador, Bolivia and Mexico. The project aims to improve the quality of life for small landholders through land use and livestock management that is sustainable at the family level and the community level and

sustainable for the environment at the level of the watershed and the region. This year's conference will focus on the work being done in the region. 🌱

If you would like more information on the GL-CRSP Year 2000 International Conference, please contact the Global Livestock CRSP Management Entity at [glcrsp@ucdavis.edu](mailto:glcrsp@ucdavis.edu) or visit our web site at <http://glcrsp.ucdavis.edu>.

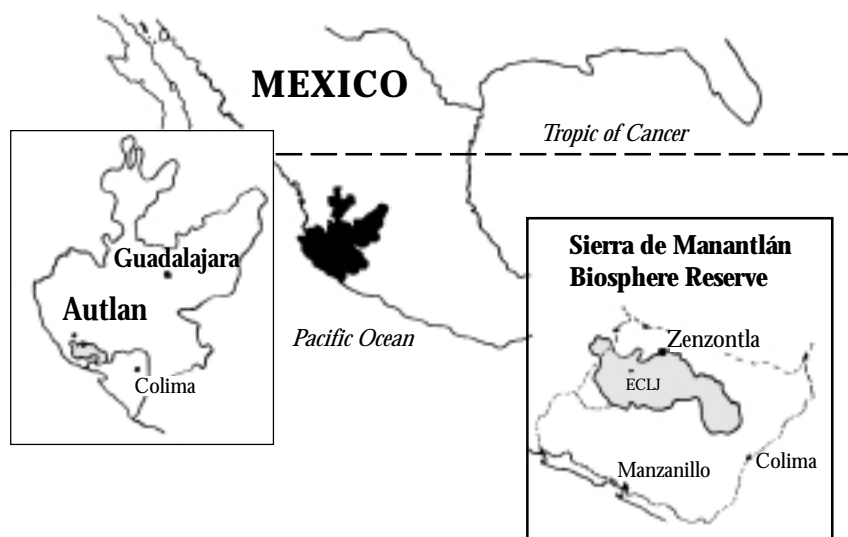
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### Sierra de Manantlán Biosphere Reserve

The Sierra de Manantlán is an outlying massif of the Sierra Madre del Sur located in southern Jalisco and the neighboring state of Colima. The Sierra de Manantlán rises above the Rio Purificacion valley at 400 meters above sea level to an altitude of 2860 meters at its highest point. This altitudinal variation and abrupt topographic relief provides for a great diversity of ecological conditions that vary from a hot subhumid climate at low elevations on the southern and western slopes to temperate climates in the higher elevations.

More than 2700 species of vascular plants have been identified in the Sierra de Manantlán. Of these at least 30 are endemic to western Mexico, and more than three species new to science are described on an annual basis. More than 108 species of mammals, 336 bird species, 53 of reptiles and amphibians, 16 of fish, 180 families of insects, six orders of arachnids and nine genera of crustaceans are known from this Sierra.

The Sierra de Manantlán also plays a very essential role in local hydrological systems by protecting the headwaters of the Marabasco and Purificacion rivers and the numerous streams that form a part of the Ayuquila-Armeria watershed. The Sierra de Manantlán provides water to a region with about 400,000 inhabitants in southern Jalisco and Colima.



In 1979 researchers from the University of Guadalajara and University of Wisconsin discovered *Zea diploperennis*, a wild relative of corn that attracted international attention due to having the same number of chromosomes as cultivated corn and being immune of resistant to major corn diseases.

Stimulated by this discovery, the University of Guadalajara assumed the task of initiating a complete inventory of flora and fauna and a diagnosis of the peasant populations of the Sierra de Manantlán. This research program led to the creation of an interdisciplinary research center, the Manantlán Institute of Ecology and Conservation of Biodiversity (previously known as Laboratorio Natural Las Joyas), (ECLJ) which was charged with organizing and coordinating the University's scientific

endeavors undertaken in this area. Research conducted by the Manantlán Institute of Ecology revealed the Sierra de Manantlán to be one of the areas of Jalisco with greatest biological richness and one of the lowest standards of living of rural poor populations. Promotion by the University of Guadalajara led to the signing of the federal decree that established the 140,000 hectare Sierra de Manantlán Biosphere Reserve, on March 5, 1987. The following year this Reserve was incorporated into the Man and the Biosphere Reserve network of UNESCO. Since that time, the Sierra de Manantlán has come to be known as the most important protected areas in western Mexico.

The Global Livestock CRSP project, PLAN, is working in the "buffer zone" of the ecological reserve. The village of Zenzontla is the principle site for the project. 🌱

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## IMAS in Transboundary Ecosystems Workshop Focus

wildlife herds in their annual cycle of movement between Tanzania and Kenya. Conversely, increased land preemption and poaching on the western boundary of the Serengeti may increase migratory wildlife grazing pressures on the Mara. Resulting decreases in wildlife could have serious economic consequences for both countries, and changes in wildlife distributions could disrupt the ecosystem as a whole.

Pastoralists and their livestock do not necessarily recognize international borders either. Movements of livestock across the border area may be vital for pastoral welfare, including regular

movements among seasonal grazing ranges, and contingency movements to different grazing ranges during local or regional droughts. Animals may also be moved across the boundary to sell in markets in southern Kenya, or to replenish Tanzanian herds with animals purchased in Kenyan markets. At present there is very little information on such movements.

Wildlife and livestock movements across the boundary present a significant challenge in managing animal disease. Infectious and parasitic disease agents of wild animals within the Serengeti-Mara ecosystem not only affect the mortality, natality, and well-being of wildlife, but also can be transmitted between domestic animals and humans in the adjacent environment. Unregulated transboundary movements of livestock and wildlife means that lack of disease control in one country can have consequences for the other. Diseases of wildlife and domestic animals in the Serengeti-Mara ecosystem not only affect animal populations, but their occurrence and control also have economic, social, and political implications.

Clearly, the Greater Serengeti-Mara Ecosystem, inclusive of the Serengeti National Park and Maasai-Mara Reserve, must be managed as a whole, and there is a need for coordinated management by authorities on the Kenyan and Tanzanian sides

of the border. There is a danger of the independent authorities working at cross-purposes, with detrimental effects to both parties. Decisions made on one side of the border affect ecosystem components on the other side and the negative consequences may feed-back to where the original decisions were made. Thus, it is to the benefit of decision makers on both sides to recognize these transboundary interactions and develop a coordinated plan for natural resource management and food security development.

REDSO's Natural Resource Management program is addressing the challenge of managing natural resources in the face of increasing human population. REDSO is seeking to improve ecosystem and natural resource management by promoting effective collaboration between stakeholders and strengthening the capacity of the multiple agencies to make informed decisions. The GL-CRSP IMAS project is establishing working relationships with and among Kenyan, Tanzanian, and Ugandan organizations to apply the IMAS to East African regional ecosystems. In this way, the IMAS can be used as a framework for more informed discussions and negotiations among various stakeholders in a particular ecosystem. 🌍🌿

*For more information on the workshop or the IMAS project, please contact Mike Coughenour at [mikec@nrel.colostate.edu](mailto:mikec@nrel.colostate.edu) or visit our web site at <http://glcrsp.ucdavis.edu>. The proceedings from the workshop are available at the web site.*