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an update on
the work & progress at
IFDC—An International Center for Soil
Fertility and Agricultural Development

IFDC Participates in WSSD

Photo by Dr. L. L. Hammond

Michelle Anthony of the U.S. Geological Survey in the GISD booth at the Earth Summit in Johannesburg.

As Secretariat of the Geographic Information for Sustainable Development (GISD) project, IFDC was represented at the World Summit on Sustainable Development (WSSD) during August-September 2002. Representing IFDC at WSSD were: Dr. L. L. Hammond, Director, Resource Development Division; Dr. Walter Bowen, Leader, Soil and Nutrient Dynamics Program; and Dr. Paul Wilkens, Programmer.

Funded by the U.S. Agency for International Development (USAID), the GISD project aims to improve the quality, accuracy, and availability of data needed to better understand and monitor the environment and to harness science and technology in support of sustainable development in Africa. The long-term strategic goal is to make satellite imagery available to policy makers, scientists, and other users around the world so that they can get instant access to satellite photography, and these pictures will help them map watersheds, plan agricultural crop strategies, and trace urbanization trends. Linking that kind of technology to global positioning systems (GPS) provides all kinds of new avenues to increase productivity and to bring the power of technology to the most distant corner of the world. IFDC's efforts using geographic information system (GIS) tools focus on monitoring the depletion of nutrients from the soil. Data base management, map digitization, and computer-based geographic modeling are common tasks performed by the GISD project staff. At the moment, GISD serves as the umbrella for a total of 14 projects in various regions on the African continent.

"One of the main outcomes of the WSSD is the commitment to reduce global poverty and the proportion of people who suffer from hunger by one-half by the year 2015," says Dr. Hammond. "This is an ambitious challenge considering that one-half of Africa's population lives on less than US $1 per day. The world's growing population calls for not only a fight against poverty but also a fight against hunger. Monitoring and improving nutrient balances play an important role in this battle. Existing agricultural land must become more productive because slash and burn techniques result in a cascade of negative effects and have to be abandoned. The use of GIS methodologies can assist local decision makers prevent these effects and maintain a favorable level of soil nutrients."

Another positive outcome of the WSSD for IFDC is the fact that information was released indicating there is a renewed interest in agriculture among the donor community. It was specifically encouraging to IFDC that delegates to the Summit said new technologies in fertilizers and other agricultural sectors could help reverse the trend of land degradation and low productivity if shared with the developing world.◆

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IFDC is a public international organization (PIO), governed by an international board of directors with representation from developed and developing countries. The nonprofit Center is supported by various bilateral and multilateral aid agencies, private foundations, and national governments. IFDC focuses on increasing and sustaining food and agricultural productivity in developing countries through the development and transfer of effective and environmentally sound plant nutrient technology and agribusiness expertise.

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Rain Traps Make More Maize

Photo by Dr. Dennis Friesen

Ethiopian scientists at Melkasa Agricultural Research Center inspect drought-stress maize on flat (left) and tied-ridge seed beds in 2002.

For farmers in the dry mid-altitude ecology of eastern Africa, the old adage "it never rains but it pours" has special significance. Here, especially early in the season when the soil lies bare, the rains often come in intense storms that deliver water to the parched fields faster than the soil can absorb it. No gentle English drizzles here! Consequently, much of this precious resource flows off the fields into seasonal streams eroding the soil as it goes. If only the rain could be trapped on the fields and stored for the crops' future use when the season abruptly and unpredictably ends with unripened maize still on the stalks. Such a technology exists and has been practiced by farmers in the Sahel of West Africa for many years. It is known alternatively as "tied ridges" or "blocked furrows" (depending on your vantage point!) and involves the formation of ridges along the contours of the field spaced at the width of the rows of maize that are planted on their sides. The ridges are "tied" (or the furrows blocked) at intervals of 2 to 6 meters to form basins 15-20 cm deep that "harvest" water by impeding the lateral flow of excess rainfall from the field and encouraging instead its infiltration into the soil profile.

IFDC and the International Maize and Wheat Improvement Center (CIMMYT) are working with national agricultural research systems (NARS) scientists in the Eastern and Central Africa Maize and Wheat (ECAMAW) network to evaluate and adapt the tied-ridge technology to East African conditions and to combine it with new drought-tolerant maize varieties that CIMMYT and NARS breeders have developed to help poor farmers produce more under marginal rainfall conditions. Over the past four seasons, tied ridges and other soil moisture conservation technologies have been evaluated on-station and on-farm in northern Tanzania, eastern Kenya, and the Rift Valley region of central Ethiopia. In northern Tanzania, Mrs. Tuaeli Mmbaga, an agronomist at the Selian Agricultural Research Institute (SARI) near Arusha, has evaluated tied ridges on station and promoted the technology with farmers on their fields in an ECAMAW project near Hai, in the (rain) shadow of Mt. Kilimanjaro. During 'dry' years when rain was inadequate or poorly distributed, the extra-early maturing Katumani Composite maize variety produced twice as much grain on ridges than when it was planted on flat seed beds or adjacent pot holes, a traditional farmers' practice of water harvesting. Later maturing cultivars such as CG4141 and TMV-1 performed poorly, yielding less than half that of Katumani. During 'wet' seasons where moisture was sufficient, ridging (tied or open) gave an added advantage to later maturing cultivars, such as TMV-1 since water stored in the soil profile effectively allowed them to extend their growth later into the dry season, reach maturity, and achieve their inherently greater yield potential.

Farmers have also seen the benefits of tied ridges during drought years. On six farmers' fields near Hai, maize on tied ridges yielded an average of 50% more than maize planted on conventional flat seed beds. Kenya Agricultural Research Institute agronomist, Dr. Moses Siambi, works with farmers near Kibarani in Eastern Kenya evaluating drought- tolerant maize on tied ridges. Here too, farmers appreciate the effects of the technology and have seen yields increase by as much as 70% on some of their fields although on others the effects were negligible. Ethiopian farmers at Jijiga, in the Rift Valley of Eastern Ethiopia, have also seen maize yields jump by nearly 75%.

However, the benefits of "rain traps" are not always there. In seasons with well-distributed and adequate rainfall and in seasons with particularly severe drought conditions, tied ridges have had no effect on yields. Such variable experience hinders the adoption of the technology, particularly where there are added costs in its adoption. Moreover, while many farmers have seen the benefits, they have not had the appropriate tools to economically prepare the land. During 2002 farmers at Hai are comparing tied ridges with conventional land preparation on large half-hectare plots using a locally adapted ox-drawn implement and drought-tolerant maize varieties. Mrs. Mmbaga says, " We hope this plow will lead to greater adoption of the tied ridges. The farmers know the benefits, but it is too much work to do manually." Dr. Dennis Friesen, the IFDC/CIMMYT Regional Maize Systems Specialist who works with NARS agronomists in the ECAMAW network, sees wider benefits. In dry environments, fertilizer use is much riskier than in more favorable environments. However, use of water-harvesting practices, in combination with stress-tolerant varieties, potentially reduces risk of crop failure and makes investments in soil fertility improvement more profitable. If such synergy were to come together, our adage would indeed be "too much of a good thing!"◆

IFDC Develops a Phosphate Rock Decision Support System for Sustainable Crop Production

It is known that direct application of phosphate rock (PR) can be an agronomically and economically effective alternative to the use of more expensive water-soluble phosphate (P) fertilizers for crop production under certain soil, climate, and crop conditions, especially in tropical acid soils in developing countries. However, use of PR as a direct application P fertilizer is a very complex issue that needs to consider a host of factors ranging from PR characteristics, agronomic effectiveness, size of the PR deposit, cost of mining, grinding and distribution, cost/benefit ratio, social, economic and environmental impact, and governmental policy. Use of a phosphate rock decision support system (PRDSS) is probably the most effective approach to integrate all these factors in such a complex system.

IFDC developed and presented the first PRDSS at the IFDC-organized International Meeting on Direct Application of Phosphate Rock held in Kuala Lumpur, Malaysia, in July, 2001.This PRDSS was developed with limited field agronomic data from sub-Saharan Africa (SSA) to estimate the relative agronomic effectiveness (RAE) of PR with respect to water-soluble triple superphosphate (TSP) for initial maize response to PR. IFDC is planning to improve and expand the application of PRDSS to a wide range of soil, crop and agroclimatic conditions. Factors such as soil P-fixing capacity, exchangeable Ca, liming, soil available P status, and cropping systems (rotation versus monocrop) will be incorporated in the current version of PRDSS, which includes only PR reactivity, soil pH, texture and organic carbon. In addition, RAE of PR for annual application will be compared with a one-time application to study the initial effect, residual effect and the combined initial and residual effects.

In November 2002, the Netherlands Minister for Development Cooperation (DGIS) began to support a full-time Associate Expert from South Africa at IFDC Headquarters for 2 years to work on PRDSS. The International Atomic Energy Agency (IAEA) has provided funding to IFDC to compile a PR solubility database for PRDSS. In the future, IFDC and the Food and Agriculture Organization of the United Nations (FAO)/IAEA Joint Division plan to post web-based PRDSS for other users once the model has been adequately tested. A next logical step would be to incorporate the relationships developed for the PRDSS into the existing CERES-P model for dynamic prediction of crop growth and soil and plant P status as affected by PR application.◆

Regional Inputs Market to be Developed in West Africa

"The launching of the MIR (Promoting Agricultural Development Through the Creation of a Regional Agricultural Inputs Market in West Africa) project marks the beginning of the development of a macroeconomic and regulatory framework necessary for the establishment of an integrated regional inputs market," says Dr. Henk Breman, Director of IFDC's Africa Division.

Project funds for this collaborative project originate from DGIS. With implementation by IFDC, the project's other collaborators include the Economic and Monetary Community of West Africa (UEMOA), the Economic Community of West African States (ECOWAS), the Reseau des Organisations Paysannes et des Producteurs de l"Afrique de l'Ouest (ROPPA) and the Reseau des Chambres d'Agriculture de l'Afrique de l'Ouest (RECAO).

"This project will use regionalization as an instrument to strengthen the private sector, discourage monopolies, ensure quality control, facilitate dialog among key stakeholders, and tackle undisclosed interests that impede the success of development efforts in the subregion," says Dr. Breman.

The MIR project will set the stage for improved market efficiency and increased competition. It will result in conditions that will allow the benefits associated with economies of scale and thus lower transaction costs that flow from larger, harmonized regional markets and from private sector reinforcement. The project will foster sustainable intensified agricultural production and spur growth in rural incomes by increasing the quantity, efficiency, and accessibility of external inputs, particularly for family farming.

The main activities of the project will consist of reforming policies, regulations, and practices that constrain regional marketing and impede expansion of private sector trade and investment in agricultural inputs; nurture and train emerging private dealers in agricultural inputs to improve their skills; encourage the establishment of national and regional trade associations; promote throughout the region consistent fertilizer and seed policies and regulations including enforcement of consumer and environmental protection; and create a market and business linkage information system.

A focus of the project will be the cotton sector, specifically to create and encourage implementation of a cotton inputs emergency plan. Emphasis will be on pooling of inputs for agriculture in general.◆

Training Program on Integrated Soil Fertility Management (ISFM) in the Tropics Conducted in Togo

The first training program on Integrated Soil Fertility Management (ISFM) in the Tropics organized by IFDC in cooperation with Soil Management Collaborative Research Support Program (SM-CRSP) was held in Lomé, Togo, during October 7-12, 2002. The program was attended by 22 participants representing Cameroon, Ghana, Guinea, Malawi, Niger, Rwanda, Togo, Zambia, and Zimbabwe. The program will be presented in French in the near future.

In collaboration with international, regional, and national agricultural centers, IFDC has been at the forefront in developing, testing, and promoting ISFM strategies in developing countries, particularly in countries of sub-Saharan Africa such as Benin, Burkina Faso, Ghana, Nigeria, Togo, and Zimbabwe. In addition to a range of soil fertility-enhancing methods, such as improved crop management practices, measures to control erosion and leaching, and measures to improve soil organic matter maintenance, ISFM strategies include the combined use of soil amendments, such as organic materials and phosphate rock, and mineral fertilizers to replenish soil nutrient pools, and improve the efficiency of external inputs. The ISFM approach aims to:

- Improve the efficiency and profitability of external inputs
- Reduce nutrient losses to the environment
- Maximize on-farm recycling of nutrients

The program consisted of formal presentations, group discussions, a field trip to an ISFM field site and phosphate rock processing factory, and hands-on exercises on ISFM. The participants were exposed to participatory approaches and their use for promoting ISFM, strategic site-selection for successful implementation of trials, and use of decision support tools, including NuMaSS, NUTMON, PRDSS, and Decision Support System for Agrotechnology Transfer (DSSAT). Overall the participants rated this training program as very good.◆

IFDC Nurtures a Strategic Alliance for Agricultural Systems Research in Ecuador

The National Agricultural Research System in Ecuador (INIAP) and IFDC are partners in a strategic alliance designed to improve agricultural research in Ecuadorian institutions. Like other agricultural research systems in developing countries, INIAP is facing the challenge of producing more food with less impact on the environment but being asked to do so with declining resources. To be successful in meeting this challenge, INIAP recognizes that it needs to place greater emphasis on the efficient organization of research and the knowledge that it generates. One approach to improving efficiency is through the integration of research activities with the development and application of dynamic simulation models.

The strategic alliance that IFDC has formed with INIAP aims to train a multidisciplinary team of Ecuadorian scientists in the use of a systems research approach and systems analysis tools such as GIS and simulation models. The team is made up of 12 scientists from INIAP, the Ecuadorian Institute for Meteorology and Hydrology (INAMHI), and the Natural Resources Program (DINAREN) of the Ecuadorian Ministry of Agriculture. Disciplines represented on the team include soil science, agronomy, plant breeding, plant pathology, entomology, and economics. Activities are being partially funded through Ecuador's Agricultural Services Modernization Program (PROMSA; http://www.fondocompetitivopromsa.org/), which is financed by the World Bank. The Project Leader is Victor Barrera, Head of Technology Transfer at the INIAP Santa Catalina Experiment Station in Quito. Dr.Walter Bowen, Leader of the Soil and Nutrient Dynamics Program, is coordinating input from IFDC.

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Photo by Dr. Walter T. Bowen

Ecuadoran collaborators (INIAP staff and farmers) gathered beneath the towering Mount Chimborazo.

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The ultimate goal of the training is to form a team that works well together and is proficient in the development and use of simulation models. The emphasis on modeling is due to the fact that models of soil and plant systems have become increasingly valuable instruments for assimilating knowledge gained from experimentation. Their use within a research program has the potential to increase efficiency by emphasizing process-based research, which helps to better define what needs to be measured and when to measure. Consequently, a modeling approach lends structure to a research program by helping to focus on the quantitative description of soil and plant processes. This information can then be used to better understand the interaction of weather, soil, plant, and management factors in predicting outcomes for different scenarios. A modeling approach also provides a dynamic, quantitative framework for multidisciplinary input.

The team is also being trained in how to integrate experimentation with simulation. To increase the efficiency of research, the modeling process must become a truly integrated part of the research process. Experimentation and model development need to proceed jointly, with experimental data being used to refine and improve models. A continual process of experimentation and model evaluation helps to identify gaps in the understanding of soil and plant processes, thereby helping to set research priorities. To be most effective, the modeling approach requires a regular evaluation of progress and continual refinement of objectives and priorities. It also requires a commitment to the development of software and data standards that facilitate a quantitative understanding of how soil and plant systems work.

The team is initially working with existing crop and soil models that belong to the DSSAT family (www.icasa.net) of models. To test these models under Ecuadorian conditions, the team is collecting experimental data from earlier experiments. They are also designing and conducting new experiments to obtain better data for a more rigorous evaluation of the present models, which may also result in improved versions of the models. Soil, weather, and field experiment data bases are being assembled according to the standard formats suggested by the International Consortium for Agricultural Systems Applications (ICASA). To obtain a better understanding of how the DSSAT models simulate soil and plant processes and to share this understanding with regional colleagues, the team is also developing a comprehensive documentation of these models in Spanish. Before the end of the project, the team will use its understanding of the models to develop an application designed to address productivity and sustainability issues surrounding the potato-pasture rotation systems commonly practiced in the Ecuadorian Andes.◆

Dr. Paul Wilkens assists a participant in the DSSAT workshop.

Photo by Richard Ogoshi/University of Hawaii

Scientists Use Software to Plant, Grow, and Harvest Crops on Their Computers

Two IFDC scientists, Dr. Walter Bowen, Leader, Soil and Nutrient Dynamics Program, and Dr. Paul Wilkens, Scientist, attended a workshop on DSSAT Version 4 during December 9-18, 2002, at the University of Georgia's Griffin campus. A team of researchers from IFDC and the universities of Georgia, Florida, Hawaii, Guelph, and Iowa State created the latest DSSAT software.

"DSSAT, a computer model, allows a user to simulate a crop's growth, yield, water, and nitrogen requirements as affected by soil type and weather," Wilkens says. "The fourth version of the software will be released in early 2003."

The IFDC scientists were among 40 researchers and graduate students from around the world who met at the University of Georgia experiment station campus to check out the latest DSSAT software. The purpose of the workshop was to train participants in the use of the system. However, the developers of the software caution that the results obtained from the software are not ultimate truths and are not intended to replace real experiments, real data, or critical thinking. Yet, the computer model provides researchers with a valuable tool that is less expensive than the trial-and-error approach. The model can be used to make predictions, which can be tested in real experiments.

The newest DSSAT software allows the user to simulate the growth of peanuts, sunflowers, sugarcane, wheat, soybeans, rice, tomatoes, sorghum, millet, barley, potatoes, corn, cowpeas, and dry beans. Cotton will be added soon.

"The information generated by the model will be shared with farmers in the developing world," says Bowen. "The goal is to train the people who work with farmers directly—extension agents, agricultural industry representatives, and others—so that they are prepared to disseminate the information to farmers."◆

IFDC Receives Grant from USAID for Ghana Project

Photo by Patrice Annequin

A typical agricultural inputs dealer shop in Ghana.

In September 2002 USAID awarded IFDC a grant for a project to develop agricultural input markets in Ghana. The 1-year project, entitled "Technical and Business Training for Agricultural Input Dealers and Importers in Ghana," will set the stage for the development of a competitive agricultural inputs marketing system, which will improve smallholder access in Ghana to affordable, appropriate, and improved quality seed and fertilizers through entrepreneurs both at the procurement and distribution levels.

In particular, the project will provide needs-based localized training programs and workshops targeted to upgrade the business acumen and technical knowledge of private sector agricultural input marketers, bankers, and officials of the Ministry of Food and Agriculture. The project staff will also provide direct technical assistance to private sector entrepreneurs on such matters as strategic planning, demand forecasting, dealer-farmer advisory services, safety issues, procurement, and credit.

Upon learning of the new grant to IFDC to further its work in market development in Africa, U.S. Senator Jeff Sessions (R-Alabama) had this to say: "Over the years I have worked closely with IFDC, and I am pleased that USAID has recognized the critical need they meet. IFDC has a long history of improving the quality of life for rural populations across the world, and I know that the citizens of Ghana will benefit from their work."

In 2001 IFDC, with funding support from USAID, DGIS, and Sasakawa Global 2000 (SG 2000), completed an "Action Plan for Developing Agricultural Inputs Markets in Ghana." The action plan recommended a holistic approach to strengthen the functioning of the inputs markets by focusing efforts on policy environment, human capital development, improved access to finance and information, and effective enforcement of regulatory systems. Based on the action plan, USAID/Ghana agreed to fund the 1-year project activity, which will focus on the development of human capital and lay the foundation for the long-term project on market development.

The need for agricultural advancement in Ghana is critical. The country needs to boost its agricultural productivity in order to increase rural incomes, meet the growing demand for food, and reverse the rapid soil nutrient depletion that degrades the environment. Currently, about 29% of the Ghanaians live below the national poverty line. The most affected are the rural poor and women. This undesirable situation is partly due to the low agricultural productivity arising from the inherently low fertility of Ghanaian soils and a low fertilizer use (3.1 kg of nutrients per hectare). IFDC staff members and Ghanaian counterparts who are involved in the new project hope to rectify this situation.◆

AFAMIN Web Site is Launched

The official launching of the web site—www.afamin.net—for the African Agricultural Market Information Network (AFAMIN), took place on December 4, 2002, in Lomé, Togo. AFAMIN is a network and a web site, which provides a structure capable of locating, collecting, processing, and disseminating agricultural information in Africa and the entire world. AFAMIN now covers six countries—Benin, Burkina Faso, Ghana, Mali, Nigeria, and Togo. Plans call for extending the network to the West and Central Africa zones in the near future.

AFAMIN provides vital information including local and world prices, production, stock levels and movements of agricultural inputs and outputs. It also contains directories listing various actors—importers, producers, suppliers—and sales points, local tenders and other announcements, market trends, information, and publications. AFAMIN also serves as a forum for self-promotion for associations, networks, and interested institutions.

Approximately 180 stakeholders including farmers, the private sector, and the public sector attended the AFAMIN launching. Some of the participants have already realized the benefits of AFAMIN. The Managing Director of Alheri Seeds, Nigeria, Ltd.—Stephen Danjuma Yakubu-Atar—had this to say about the merits of AFAMIN, "The main constraint in my situation is cash flow. Access to credit is hindered by a 35% interest rate. Through the AFAMIN network, I was contacted by an international agricultural inputs dealer who made an interesting offer: he agreed to supply on loan the chemicals that I need to produce seeds; I will pay the loan off in 6 months." Through the AFAMIN network, several businessmen from Greece and India have contacted Hamidou Diallo, the Manager of Comptoir Agricole, S.A., from Guinea. "They are interested in the production of potatoes, which has become a staple food in Guinea over the past 5 years," says Diallo. "This gives me the opportunity to diversify my activities, for which I am grateful."◆

IFDC Researcher Investigates Climate Variability, Seasonal Climate Forecasts, and the Agricultural Sector of Southeastern South America

Photo by Dr. Walter E. Baethgen

Effects of drought on Uruguayan maize crop.

Planning agricultural production by governments, farmer associations or individual farmers can be an extremely challenging activity. Minimum planning requires information on the expected production costs, product prices and yields. In the increasing scenario of globalization, free market conditions, and subsidy elimination, prices and costs depend on the international markets, grain stocks, and the global financial conditions. Consequently, for most farmers in the developing world prices and costs are "given" pieces of information to which they need to adapt.

On the other hand, the expected farmers' yields are mainly dependent on the technology they apply and on the climatic conditions of the growing season. When farmers decide to plant any given crop, they consider expected climatic conditions based on long-term means. For example, farmers in eastern Paraguay or northeastern Brazil sow their crops during a season of the year when they expect to receive a certain amount of rainfall adequate to sustain their crop needs. The amount of rainfall they expect to receive is based on the long-term rainfall means for their region. However, it has been shown that climate is so variable, that the probability of having a growing season with rainfall values in every month that are similar to the long-term means is very close to zero. In other words, farmers plan their production systems based on events that will not occur.

Due to this huge climatic variability, the results obtained by farmers in different crop-growing seasons vary from excellent years in which commercial farmers can make profits and subsistence farmers produce adequate amounts of food to sustain their households to years in which yields are so low that famine, migration to urban centers, and huge economic losses result.

"The significant impact of climate variability on agricultural production is clearly seen in a recent IFDC study that analyzed farmers' data in Uruguay over a 30-year period of a maize-based production system," says Dr. Walter E. Baethgen, IFDC Senior Scientist—Soil Fertility/Biometrics, based in Uruguay. "On average in 9 years out of 30, farmers incurred economic losses, and more than 60% of the total income for the 30 years was generated in only 6 good years.

The elimination of subsidies, the dependence of prices and costs on the international markets, and the extremely high climatic variability resulted in a clearly increased vulnerability of agricultural production systems in the developing world. It is thus very clear that anything that can be done to improve the ability to estimate expected prices and yields would undoubtedly result in better planning ability and in less vulnerable agricultural systems for developing countries.

"IFDC has responded to this challenge by developing the Information and Decision Support System (IDSS) approach," says Baethgen. "This approach consists of taking advantage of modern information tools (remote sensing, simulation models, seasonal climate forecasts) to produce information that can be easily understood by agricultural stakeholders (governments, farmers, policy makers) and applied to improve agricultural planning. The IDSS approach is being developed and established in South America to provide useful information on price trends, to continuously monitor current climatic conditions and vegetation status, and to explore alternatives to reduce crop yield variability."

Specifically in the area of climate variability, IFDC is using the IDSS approach to develop applications of existing seasonal climate forecasts. For example, research conducted in the last 15 years in southeastern South America has revealed that a large portion of the observed climatic variability in the region is linked to El Niño/Southern Oscillation (ENSO) phases. Studies consistently show the existence of strong impacts of El Niño and La Niña on precipitation and on crop productivity. During the spring and/or summer months, rainfall tends to be larger than normal in El Niño years and lower than normal in La Niña years. As expected these influ-

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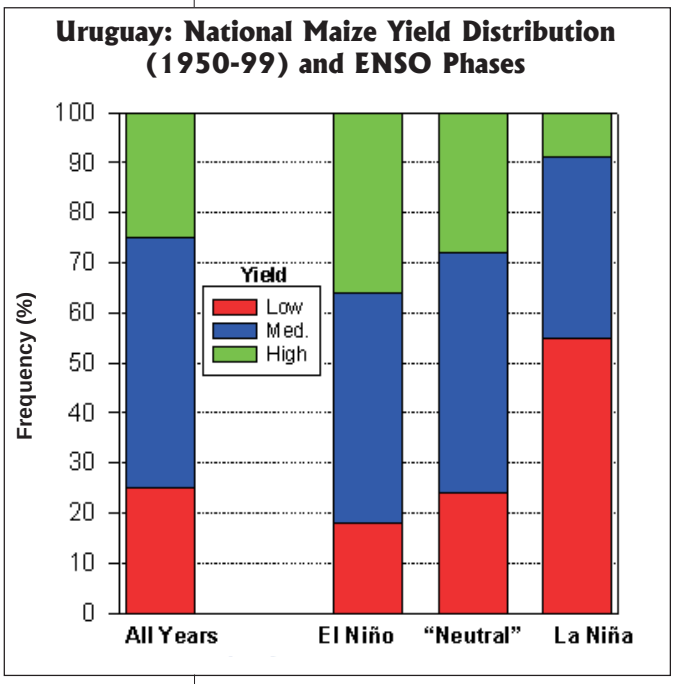
ences on rainfall also affect the summer crop yields. The chances for a Uruguayan farmer receiving a low corn yield during a La Niña year is more than twice that of an El Niño year. An important issue in this respect is that farmers can know what ENSO phase is present before planting their crops and therefore decide what type of crop has the best chance of doing well.

The effects of El Niño and other phenomena on the climatic conditions of different regions have stimulated a vast amount of work in the climate sciences to try to predict trends for the following season. Several international and national organizations are now producing probabilistic seasonal climate forecasts that report, for example, the chances for the following season to have "normal," "above normal," or "below normal" rainfall. This is a huge change compared to the situation described above, where planning is made under conditions that will not exist. However, the application of this type of information for improving agricultural planning is not simple. Farmers, policy makers, and governments are not used to formally considering chances and probabilities when making decisions. IFDC has been assisting national agricultural centers of the region in organizing meetings and workshops with farmers, advisers and government agencies to explain the seasonal forecasts and to discuss possible ways to apply them.

A multidisciplinary team was formed in 1999 in Uruguay to try to improve the planning and decision-making processes in the agricultural sector by considering ENSO information and seasonal climate forecasts. The research team is lead by IFDC and by the National Agricultural Research Institute (INIA) of Uruguay. Research has been concentrated in three main areas: (1) understanding the observed climate variability and quantifying its impact on agricultural productivity; (2) tutoring farmers and agronomists (working in the public and private sector) on the nature and possible applications of probabilistic climate forecasts; and (3) incorporating seasonal climate forecasts to the IDSS, which is being developed for the agricultural sector of Uruguay. The IDSS combines existing databases and modern information tools (simulation models, remotely sensed information, geographic information systems) to establish drought/flood alerts, monitor the vegetation condition, develop crop yield forecasts, identify best agronomic practices, and define land use feasibility classes. The IDSS products are designed to provide agronomists, farmers, government agencies, and rural insurance programs with relevant information for improving their decisions.

An important lesson learned in the first 4 years of activities is that although the scientific community has identified large-scale phenomena that affect climate variability in the region, climate predictability at the seasonal scale is still often quite low. Consequently, significant efforts in the current IFDC research agenda are being placed on the identification of production systems that are most resilient to climate variability, i.e., production systems with the ability to adjust to negative impacts and take advantage of positive impacts of the current climate variability. One of the factors that contribute to decrease yield variability in agricultural systems is the identification of appropriate mixes of production activities. Examples of these mixes include: establishing crop/livestock mixed systems; using a mix of crop cultivar types and sowing dates; or combining less productive drought-resistant cultivars and species with high-yield water-sensitive crops. In other words, modifying the production systems by introducing two strategies: (1) **increased diversification**, i.e., including activities that are less sensitive to drought and/or temperature stresses and activities that take full advantage of beneficial climate conditions; and (2) **escaping sensitive growth stages**, i.e., establishing crop practices that avoid the concentration of sensitive growth stages in the same period of the year (e.g., different season lengths, sowing dates, etc.). Another pathway for increasing resiliency is by eliminating the climate-related factor that is most limiting to crop productivity.



Finally, research on seasonal climate forecasts in the region is quite new, and significant improvements are expected in the next few years. For that reason the IFDC-INIA research team continues to explore the best ways to include climate forecast information in specific activities such as rural insurance programs, crop yield forecasts, and drought/flood alert systems.◆

Pakistani Company Benefits From Technical Assistance

In mid-2002, IFDC Engineering Specialist, Jose Ramon Lazo de la Vega, conducted a mission to assist Engro Chemicals Pakistan Ltd. (Engro) in the production of NPK fertilizers. Engro is a major producer of urea, currently producing about 850,000 tons of prilled urea per year. At the end of 1999, a decision was made within Engro to diversify by developing a granulation plant to produce urea-based NPK granular fertilizers at Port Qasim, Pakistan. One of the lines of rationale behind this decision was that the local production of NPKs using locally produced urea would result in a saving of foreign exchange required for the importation of finished multinutrient products from abroad.

Based on Engro specifications and local climatic conditions, IFDC initially produced a basic process design package for a production facility that would produce 100,000 metric tons per year of urea-based NPKs. The IFDC basic engineering process design package was used by Engro and engineering firms to develop more detailed plans, prepare bids for services and construction, and ultimately was used as the basis for the design and construction of the granulation plant.

Construction of the plant began in 2000 and the plant was completed in approximately 1 year. Building, startup, and operation of any granular NPK plant and, in particular, a urea-based NPK plant, are rather complicated exercises and always result in challenges and learning opportunities. The production of urea-based NPK fertilizers was also distinctly dissimilar from Engro personnel's established expertise in producing prilled urea. Since mid-2001, IFDC has been providing Engro with technical assistance through e-mail, telefax, and telephone correspondence. IFDC has provided onsite technical assistance on two occasions. During the initial onsite technical assistance mission, IFDC personnel provided a training program for the operations and maintenance staff of the NPK plant.

Engro's efforts appear to have produced tangible results in improved maintenance and increased production. The results obtained thus far can be summarized as follows:

- Control of operations has improved and resulted in increased stability of operation.
- The operating reliability of most systems has improved and resulted in decreased downtime and increased production.
- An equipment upgrade program has been implemented that focused on further improving reliability.
- The dust control system and housekeeping have been improved, and safety has been enhanced.

It is expected that IFDC will continue working with Engro to further improve operations and product quality and to produce products that may better serve the local market and increase agricultural productivity in Pakistan.◆

Entrepreneurial Spirit Bears Fruits for Kyrgyz Agribusinessman

IFDC/Kyrgyzstan photo

The experience of Kyrgyz entrepreneur Hamidullo Hashimovich Dehkanbaev can be translated into the overall success of the 2-year pilot program IFDC is conducting in Kyrgyzstan. Dehkanbaev, a member of the IFDC-supported Association of Agribusinessmen of Kyrgyzstan (AAK), purchased a motorized backpack sprayer for crop protection products (CPPs) through the trade association. The technology was introduced at a safety demonstration for CPPs, which are included in the new technologies that IFDC is introducing to local farmers. The purchase of the apparatus was quite a big investment for Dehkanbaev, who could only hope for a quick return. If successful, his willingness to take a calculated risk could set a positive example for many other agricultural businessmen in the country, which was formerly part of the Soviet Union. The IFDC project, which is promoting an entrepreneurial spirit, is being funded by USAID.

Dehkanbaev started using the machine to apply CPPs on his rice fields at the Somi-Karimov Seed Farm in Uzgen. Rice, a staple food in the area, is very difficult to treat with CPPs because rice paddies are submerged in water during the growth process. However, his investment proved to be a success. First, he successfully treated his rice field by using the machine. Furthermore, one month after purchasing the sprayer, he had a waiting list of clients who wanted him to treat their fields. He quickly discovered that he would be able to completely pay for the apparatus within 2 months. This impressed other entrepreneurs, who are following his example and are thereby investing in Kyrgyzstan's agricultural future.

"This is just one example of how IFDC's 2-year pilot project is making an impact on the country," says Chan Sieben, Chief of Party, IFDC/Kyrgyzstan. "The main goal of the project is to increase agricultural productivity through encouraging and supporting agricultural private sector enterprises."

USAID selected IFDC to implement changes like these in the Ferghana Valley. The project is breathing new life into the country's agricultural sector through the introduction of appropriate technologies, investing in marketing efforts and input supplies, and providing strong support for the young trade association. IFDC assists association members in obtaining credits, marketing their products, managing their businesses, and expanding their enterprises. The project is modeled after a similar and enormously successful project conducted by IFDC in Albania.

Many success stories similar to Dehkanbaev's can be found in Kyrgyzstan. These developments and the creation of the AAK, with an ever-increasing membership, provide a sound basis for the second year of the project and for further development initiatives. The challenge during the second phase of the project will be to increase even further local support for the AAK and to help change the delivery system for agricultural input products. This would result in improved productivity and profitability for Kyrgyzstan's agriculture. For farmers, agricultural businessmen like Dehkanbaev, and the general public, the results will be a reduction in rural poverty and an increase in the region's social stability. IFDC is striving to help Kyrgyzstan realize these goals.◆

Announcements

John M. Maschoff recently joined IFDC for posting to Accra, Ghana, where he is serving as Chief of Party on the agricultural input markets project. Maschoff previously worked with IFDC as a consultant on various projects in Ethiopia, Tanzania, and Venezuela. From 1990-1993, he served as Commercial Division Manager of Nitrogen Chemicals of Zambia Limited (NCZ), a USAID-funded project assigned to Nathan Associates. Maschoff received a B.S. degree in Agricultural Administration from Auburn University.

Dilshod Abdulhamidov accepted employment with IFDC as an Associate Expert Agricultural Economist in the Market Development Division with posting to Osh, Kyrgyzstan, effective September 19, 2002. While completing his degree from Tajik Agrarian University in Tajikistan, Abdulhamidov's undergraduate research was related to crop responses to crop rotation and fertilizers in the Asht region of the Ferghana Valley, where he was also raised. Abdulhamidov holds a Master's degree in agricultural economics from the University of Georgia in Athens, Georgia. Prior to joining IFDC Abdulhamidov worked with the Agency for Technical Co-operation and Development, Tajikistan.

Dr. Abdoulaye Mando accepted employment with IFDC as Project Leader, Sustainable Integrated Soil Fertility Management Project in the Africa Division with posting to Lomé, Togo, effective September 19, 2002. Dr. Mando completed his Ph.D. at the Wageningen Agricultural University, Netherlands, in 1997 in the area of soil and water conservation, soil ecology, and soil fertility. He previously served as a researcher at the National Agricultural and Environmental Research Institute of Burkina Faso (INERA) and Antenne Saheliénne. In this capacity he performed research and extension work on soil fertility management, agroforestry, and soil and water management; presented training programs for agricultural professionals on integrated land management; participated in the preparation and evaluation of soil management programs and projects; and participated in fund raising and research project management.

Seth W. Broadfoot accepted employment with IFDC on October 28, 2002, as an Associate GIS Specialist in the Resource Development Division. He is scheduled to graduate in May 2003 from the University of North Alabama with a B.S. degree in professional geography/GIS. His previous work experience includes serving as a summer intern with the South Central Alabama Development Commission in Montgomery and as an instructor in the Outdoor Leadership Program at Northwest-Shoals Community College.

Suzette A. Smalberger joined IFDC in mid-November 2002 as an Associate Expert Soil-System Modeler - Phosphorus Dynamics. She received an M.S. degree in soil science from the University of the Free State, South Africa. She has served as a soil scientist at the Agricultural Research Council's Grain Crops Institute's (ARC-GCI) Soil Science Section since 1996 and was asked to become part of the modeling team in 2000. Her main focus of research at the Institute was in the area of nitrogen and phosphorus calibrations combined with cultivar/soil fertility interactions.

Hiqmet Demiri returned to IFDC on September 1, 2002, as a private sector extension specialist (PSES) in the Market Development Division with posting to Osh, Kyrgyzstan. His duties will include serving on the USAID-funded Agri-Input Market Development in Azerbaijan (AMDA) project in Baku, Azerbaijan, and Kyrgyz Agri-Input Enterprise Development (KAED) project in Osh, Kyrgyzstan. Demiri served as Association and PSES Advisor to KADP in Kosovo from June 1, 2000, through March 31, 2002.◆

Symposium on the African Trade and Investment Program Conducted in Lomé, Togo

A symposium concerning a 2-year project—African Trade and Investment Program (ATRIP)—recently completed by IFDC was held in Lomé, Togo, during December 5-6, 2002. The symposium attracted 88 participants from 10 countries—Benin, Burkina Faso, Côte d'Ivoire, Ghana, Kenya, Mali, Nigeria, Senegal, Togo, and the United States. The participants represented agricultural producers, farmer-based organizations, government and nongovernmental organizations, local and international agricultural inputs trade associations, and private sector inputs dealers. Several international/bilateral aid institutions were also represented.

The ATRIP project covered six countries in West Africa—Benin, Burkina Faso, Ghana, Mali, Nigeria, and Togo. ATRIP's objectives were to facilitate access to good quality agricultural inputs, especially seeds and fertilizers; to promote national and regional trade associations and networks; and to develop market information systems.

His Excellency Komikpime Bamnante, Minister of Agriculture, Livestock, and Fisheries, Government of Togo, said, "No African country can develop itself without developing its agriculture and no agricultural development is possible without a well-developed inputs market. Togo will adhere to all strategies to alleviate constraints and solve the problems related to the development of the agricultural inputs market."

The Coordinator General of the Conference of West and Central African Ministers of Agriculture—Baba Dioum—and also a member of the IFDC Board of Directors said, "The Togolese representation emphasizes the importance that the Togolese Government attaches to the issues at stake. This also is a promising signal for the support that IFDC needs for the implementation of the market development initiative in the subregion."

The project had earlier developed a set of proposals based on country reports assessing the current policy environment for seed and fertilizer trade in the six AFAMIN countries. Four working groups were appointed to treat the four priority areas: fertilizer and seed tariffs, duties and taxes; fertilizer quality assurance; intellectual property rights and variety registration; and seed certification and phytosanitary management.

During the Symposium several imperative conditions to be met were identified. They included the following:

- Creation of environments that are conducive to private sector investments in agricultural input production.
- Development of domestic production through the promotion and protection of local industries.
- Facilitation of importation of raw materials and equipment.
- Improvement of transport and other infrastructure.
- Access to capital/credit for farmers and input producers and dealers.
- Training in the areas of technology, analytical capacities, international standards, and regulations.◆

Agricultural Input Markets Development Project Initiated in Malawi

According to Malawi's Agriculture and Irrigation Minister, Aleke Banda, that country's agricultural input use indicators are very poor with 160,000 tonnes of nutrients being lost from the soil every year, and only 90,000 tonnes being replenished.

The Minister was the keynote speaker at the November 10, 2002, launching of the Agricultural Inputs Markets (AIMS) project in Lilongwe. He said that most Malawian farmers cannot afford to purchase fertilizer, and only 20% use improved seed varieties, which has a negative impact on food security and economic growth since agriculture is the hub of the economy.

The Agricultural Inputs Markets project, funded by USAID, is being implemented by IFDC to improve smallholder farmers' access to the agricultural input markets in Malawi. The duration of the project is 3 years.

"The project will strive to improve the policy environment for input suppliers and facilitate improved access to finances by agricultural input suppliers to increase the number of farmers using improved seeds, fertilizer, and CPPs," said Dr. Amit H. Roy, IFDC President and Chief Executive Officer.

The project is focusing on the following four "core" components of the Ministry of Agriculture and Irrigation (MAI)'s development program related to input markets:

1. Deepening of Policy Reforms and Policy Studies
2. Establishment and Implementation of Regulatory Systems
3. Developing Human Capital and Dealer Networks
4. Market Information Systems (MIS)

Herschel Weeks, Chief of Party, IFDC/Malawi, addresses the delegates to the launching of the AIMs project. Dr. Amit H. Roy, IFDC President and Chief Executive Officer is seated to his right. Malawian officials on the left and far right are: Dickxie V. Kampani, USAID Program Development Specialist (left) and His Excellency Aleke K. Banda, Minister of Agriculture and Irrigation, Government of Malawi (right).

Photo by Ludwig G.F. Schatz

The project goal is to improve smallholder farmer access to improved seeds, fertilizer, and CPPs through commercially sustainable agricultural-inputs marketing systems. The project is working to establish a vibrant private sector-led agricultural-inputs supply and marketing system. It will strengthen the institutional capacity of the government with regard to policy reforms, regulatory system design and implementation, and information collection, analyses and dissemination. It will develop and implement a program to "marketize" donor-funded input distribution programs. The project implements the core recommendations of the "Action Plan for Developing Sustainable Agriculture Input Supply Systems in Malawi."

Limited competition in the input supply chain, unfavorable input/output relative prices, an absence of an effective network of independent dealers downstream in the input supply chain, and a poor link of the domestic market with the regional and international markets have contributed to poor agricultural sector performance. IFDC proposes to address these constraints in a concurrent fashion through implementation of a project involving technical assistance and human capital development. In collaboration with the MAI and others, the project will design and operate an MIS on agricultural input market conditions. The project will provide direct technical assistance to entrepreneurs and bankers through training programs, workshops and study tours; design and assist in implementation of a regulatory system; and conduct policy analyses to deepen the policy reforms. Capitalizing on the synergies generated through a holistic approach to market development, the project will work to:

- Improve the policy environment for inputs suppliers.
- Enhance entrepreneurial skills of agricultural-inputs dealers and develop a cadre of dealers who could become technology transfer agents.
- Facilitate improved access to finance by agricultural-inputs suppliers.
- Establish a market information system.
- Establish effective regulatory systems.
- Improve dealer and farmer knowledge of appropriate input use practices.

The project will provide a stream of benefits critical to establishing efficient and well functioning AIMs in Malawi. Moreover, it will contribute to the achievement of USAID's strategic objectives and intermediate results dealing with agricultural growth and private sector development, such as critical private markets expanded and strengthened; more rapid and enhanced agricultural development and food security expanded; and access to economic opportunities for the poor expanded.◆

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IFDC
2003 Training Calendar

Training Program/Study Tour	Date	Location	Program Fee, US $	Late Program Fee, US $
1. Designing Policies and Institutions That Promote Competitive Agro-Input Markets in Transitional Countries	April 7-11	Azerbaijan	1,100	1,300
2. Agricultural Input Marketing (in French)	May 5-9	Cameroon	1,000	1,150
3. Agricultural Input Marketing	May 19-23	Malawi	1000	1,150
4. Nitrogen Fertilizer Production Technology Workshop (on behalf of IFA)	June 2-6	Belgium	3,500 (IFA) 4,000 (non-IFA)	3,800 (IFA) 4,300 (non-IFA)
5. Phosphate Fertilizer Production Technology Workshop (on behalf of IFA)	September 15-19	Belgium	3,500 (IFA) 4,000 (non-IFA)	3,800 (IFA) 4,300 (non-IFA)
6. Fertilizer Marketing Management	October 13-24	Vietnam	2,100	2,450

(Register online at www.ifdc.org)