

IN THIS ISSUE:

Using GIS for P-E Work: Alex de Sherbinin, IUCN/Geneva, offers tips, insights, and software recommendations for those interested in exploring the potential of Geographic Information Systems (GIS) in population-environment work.

WWF's Population Dynamics and Resource Conservation Initiative, Part II: Amy Weissman discusses her host agency's efforts to address women's empowerment and migration within a population-environment framework.

New Fellows: Since the last newsletter, two new fellows have been placed – with the Packard Foundation in California and with the Alistar Foundation in Nicaragua.

World Neighbors-CEMOPLAF OR Study Available: Preliminary results from several projects in Ecuador suggest that integrated programming has the potential for greater impact on family planning acceptance than a purely sectoral approach.

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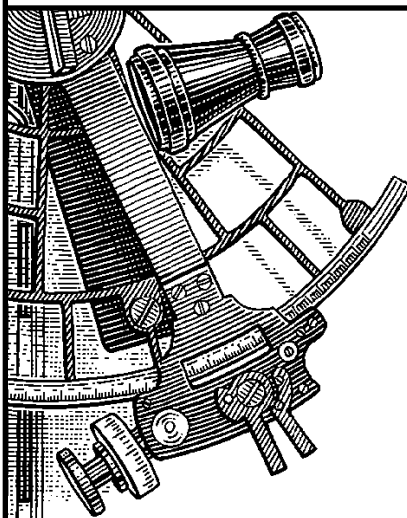
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*The PEFP is administered by the University
of Michigan and funded by USAID.*

POPULATION-ENVIRONMENT FELLOWS

N e w s l e t t e r



Geographic Information Systems for Conservation and Development

by Alex de Sherbinin

As with any new technology, there are many exaggerated claims about the potential for geographic information systems (GIS) to solve the world's problems, environmental or otherwise. Beyond the rhetoric, however, there is a very real potential for GIS to contribute to conservation, *provided* the system is planned properly and sufficient time and resources are dedicated to its development. Among other things, GIS can help to monitor human impacts on ecosystems and to assist with land-use planning that reconciles human needs with conservation objectives. The purpose of this article is to provide a brief account of my own explorations of GIS at IUCN interspersed with some tips for fellows who would like to apply the technology to their own work.

One definition of GIS is "a computerized system for storing, managing, manipulating, and analyzing spatial data." Most of us are familiar with the attractive maps produced by current GIS packages, but this is just the tip of the iceberg. A true GIS links maps to extensive data sets and incorporates highly sophisticated spatial analysis capabilities. Part of the power of GIS lies in its ability to conduct overlay analysis involving different *layers* of data (also known as *themes* or *coverages*). For example, protected areas and vegetation maps can be overlaid on coverages of population density and infrastructure (roads, utilities, schools, health services). This could be useful for identifying areas of high biodiversity that may be under pressure in the future. Alternatively, if population distribution and infrastructure maps are available, then it should be possible to calculate average travel times to health clinics.

There are two spatial data formats, *vector* and *raster*. The vector format resembles the maps we are most familiar with, including points, lines, and polygons, which makes it the preferred format for map production. Raster (or *grid*) data is made up of rows and columns of equal-sized pixels, much like the pixels of a computer screen. For overlay analysis, it is useful to convert vector coverages to raster format so that all the grid cells in each coverage

align with one another. The GIS can then create an *output* grid based on the values of the underlying cells. For example, an output grid could show areas suitable or unsuitable for development based on various criteria such as slope, soil quality, distance to watercourses, forest cover, etc. Raster format also facilitates certain statistical operations (e.g., percentage land cover by class for a given area).

One of my goals for the P-E Fellowship has been to develop IUCN's capacity to use GIS. Upon arrival at IUCN in 1996, I discovered that next to nothing was being done in this area, which is in part a reflection of the technology lag in Europe *vis à vis* the United States. Early on I set up a meeting with Kevin Grose, head of IUCN's Information Management Group, who quickly saw the interest in raising awareness about GIS applications. In the first year I organized a seminar series that brought representatives from UN agencies and other conservation groups to illustrate uses of GIS in conservation, environmental health, and development. Kevin and I also organized a "GIS for Conservation" workshop at the World Conservation Congress (Montréal, October 1996) which included presentations by TNC, WRI, CI, IDRC and two developing country NGOs, Development Alternatives (India) and the Fundación Pro-Sierra Nevada de Santa Marta (Colombia). This workshop was attended by about 150 people and included cutting-edge presentations on uses of GIS and Global Positioning Systems (GPS) for biodiversity hotspot mapping, working with indigenous peoples, and developing management plans for environmentally sensitive areas. The seminar series and the workshop helped to sensitize staff to the potential of GIS to assist in achieving IUCN's mission.

In the second year I began conducting hands-on training in Map Maker, a shareware package that was initially supported by IUCN. I first met the software developer, Eric Dudley, at a 1996 training workshop in Zimbabwe, and was quite impressed by Map Maker's ease of use and powerful mapping capabilities, not to mention its low cost! Eric, an architect turned rural development consultant, developed Map Maker with the needs of participatory mappers and development field workers specifically in mind. He also has an excellent understanding of spatial geometry and surveying, which assisted him in developing the package. Map Maker's major features include:

- Ease of digitizing new maps on the fly using an array of graphic editing tools.
- Overlays of vector and bitmap layers.
- Support for gray-scale bitmaps, as from aerial photographs and scanned maps. (Note: Map Maker cannot handle raster data formats, only digital images.)
- User-defined style sets, symbols, and lines, and

production of thematic maps from databases.

- Instructions and tools for field surveying and utilities for conversion of survey data into maps.
- Ability to import spatial data from a variety of formats, including x-y coordinates, ArcView Shape files, WHO boundary files, and GPS units (using a GPS utility program).
- Support for different map projections.
- Three-dimensional digital terrain and data maps and the capacity to produce contours.

IUCN-MesoAmerica's Forestry Program has used Map Maker to produce beautiful full-color maps showing project sites, protected areas and biodiversity corridors, all printed on inexpensive ink-jet printers (such as the HP Deskjet 500C). Maps can also be saved as Windows metafiles and inserted in word processed documents such as proposals, reports, and brochures. Map Maker comes in two versions, a shareware version and a more sophisticated commercial version (MM Pro). Both are available from the following Web site: <www.ibmpcug.co.uk/~MapMaker/>. Fellows without Web access can e-mail me, and I will send the 1.4Mb zip file containing the shareware version. (Although MM Basic is shareware, Eric requests that organizations with sufficient means donate \$50 to subsidize its use by developing country NGOs.)

The only drawback of Map Maker is that it is not really a fully fledged GIS, and has limited spatial analysis and data management capabilities. Realizing that many IUCN field projects would require more sophisticated GIS capabilities, we looked at other packages on the market and determined that ESRI's ArcView, when combined with Spatial Analyst (its raster-based extension), was one of the few packages that would provide the necessary functionality. With a 30 percent market share, ESRI dominates the GIS industry, which means that ESRI products and ArcView-compatible data sets can be found almost everywhere. Just as important, there are networks of users in many countries who are able to provide free advice and consultation to new users. After a year of discussions, we eventually developed an international mentoring agreement with ESRI's Conservation Program, which enables us to obtain software packages at a fraction of list price. (For more information, point your browser to <conservation.esri.com> or send an e-mail to <ecpform@esri.com>; note that this program requires a U.S.-based office.)

In June 1998, I organized a training workshop at IUCN headquarters for six staff members who were interested in learning or further refining their skills in using ArcView and Spatial Analyst. The workshop was conducted by Earl Bell, a retired professor of regional planning at the University of Washington who offered to provide *pro bono* services to IUCN for GIS development.

Earl has extensive experience using ARC/INFO (ESRI's highly sophisticated GIS) and ArcView for conservation and land use planning. For this training workshop, we were assisted greatly by the Desktop Technology's

Conservation GIS that includes a number of conservation-related GIS exercises. The exercises enable one to cover a lot of ArcView's functionality while working on real world conservation problems. (For more information or to order the Starter Kit, point your Web browser to <www.desktop.org/cgiscf/startkit/intro.htm>.) We also found that many operations that used to be restricted to ARC/INFO, such as clipping, buffering, and combining objects, are now available in ArcView through the shareware extension called X-tools (download from <www.odf.state.or.us/sfgis/>, or I can send you the 266Kb file by e-mail).

Following the training workshop, I was fortunate to be able to attend the Society for Conservation GIS annual meeting in Idyllwild, CA, in which many U.S.-based groups and a few developing country NGOs presented GIS applications for conservation. There were also a number of training sessions and lots of opportunities for informal discussions among the 120 or so participants. Immediately following the SCGIS meeting, participants made their way to the annual ESRI Users' Conference, a major event with 8,000 ESRI product users from around the world. There were a number of workshops at this conference relevant to conservation efforts and one or two sessions that provided tips to GIS programs operating on a limited budget. This conference was a real eye-opener, as I witnessed first hand the enormity of the GIS industry and the huge range of user groups, from defense to utilities to local governments. These two meetings gave me a good sense of "the lay of the land" and provided useful contacts for further development of IUCN's own program.



Above. 14,000-ft. (4,320-m) Mt. Elgon in Eastern Uganda. An extensive vegetation survey covering Mt. Elgon National Park's 1,145 sq. km was carried out in 1996 and entered into ARC/INFO coverages. Population density outside the park averages 500 persons per sq. km.



Above. Mt. Elgon Conservation and Development Project staff member Sean White holds an ArcView-generated map that illustrates survey data on district environmental concerns.

About this same time, we sent word to IUCN regional and country offices concerning the availability of low-cost GIS packages through the ESRI mentor's program. We received responses from six different field projects and country offices and have made arrangements for delivery of these packages. As part of the mentor's program, we agreed to provide some training to recipients of these packages. Thus, in October I traveled to eastern Uganda to work with the Mt. Elgon Conservation and Development Project, a project that is developing collaborative management arrangements with communities surrounding the Mt. Elgon

National Park (a 14,000-foot volcano). The project already had extensive data sets (or coverages) which were digitized in ARC/INFO as part of a vegetation survey in 1996. The project works closely with an environmental planning project for surrounding districts that has its own data sets, including population counts by village, results of

a survey of priority environmental concerns, and infrastructure coverages. Together, these data sets are a potential gold mine and will provide a good base for longitudinal studies of vegetation cover (using ground surveys, GPS, and satellite imagery) and creation of multiple-use zones, among other things.

In November, I trained technicians for two West African wetland management projects, IUCN-Senegal's Saloum Delta Project and IUCN-Mauritania's Diawling National Park ecosystem rehabilitation project. The Saloum Project wishes to develop a GIS for decision-making, management planning, and ecosystem monitoring through the utilization of data sets developed at the *Centre de Suivi Environnemental* (CSE) based on 1997 SPOT satellite imagery. Prior to the workshop, we spent two days in the Saloum Delta National Park and Biosphere Reserve to get a feel for issues at the interface of human activities and the environment. The primary issues in and surrounding the park are water management for agriculture and the environment, especially

the heavily cultivated valleys leading into the park. Inadequate fresh water-flows into the park due to persistent drought, barriers such as the paved road from Kaolack to the Gambia, and cultivation of water-intensive crops such as cashew have helped to increase the incursion of saline water, thereby damaging mangroves. For its part,

development at IUCN, we will seek funding from an internal fund for innovation. However, through this project we hope to convince others of the utility of GIS so that the next generation of conservation and development projects will integrate GIS into work plans from the outset. This is already happening in the Congo Basin.



Above. The Saloum Delta National Park contains extensive mangroves that are vital breeding grounds for heavily exploited coastal fisheries.

Right. Malick Thiaw and Ibrahim Mat Dia of IUCN Mauritania and Senegal (respectively) at work on a GIS application for the Saloum Delta National Park.



Lessons Learned

The major lesson that has come out of IUCN's experience is that GIS program development takes time and resources. Other organizations wishing to develop GIS capabilities would be well advised to do some strategic planning and identify the real needs, and the real capacity of GIS to meet those needs, before embarking on an ambitious program. Charles Convis, Director of ESRI's Conservation Program, made it clear to us early on that the availability of low-cost software packages is not, in itself, sufficient justification for developing a GIS. In fact, organizations must be prepared to dedicate sufficient resources to GIS, and ideally hire full-time GIS technicians to manage operations. One good tool for planning is a tutorial prepared by the Conservation Technology Support Program (CTSP), which can be obtained by sending an e-mail message to <ctsp@ctsp.org>. Some colleagues and I went through this detailed tutorial in early 1998, and found that it posed some excellent questions and helped us to develop a realistic strategic plan.

the Diawling project will soon have detailed land cover data sets through a university in France. It is expected that the GIS will assist in ecosystem rehabilitation efforts in the lower delta of the Senegal River Basin, where the Diama dam all but destroyed a once-thriving estuary. Sluice gates were constructed in 1995 to feed water into Diawling from the reservoir behind the dam, and slowly the ecosystem is recovering, with benefits to local fishermen and reed collectors.


Given project managers' heavy workloads, perhaps the greatest constraint for future GIS development is actually finding sufficient time to explore the data sets and develop applications. As an incentive for these managers to use GIS, I have developed a proposal with four ecosystem management projects in Africa that will fund further information exchange and capacity building in 1999. Each project will be expected to develop some demonstration applications, and a short report will be produced to share the lessons learned with other IUCN constituencies. In the year 2000, the project staff will convene at the World Conservation Congress in Amman, Jordan, to share experiences. At this early stage of GIS

Fortunately, many fellows are based in organizations that already have well-developed GIS programs, and it may be sufficient for the fellow to simply link up with an existing program in order to develop applications at the local level. In addition, WWF and some other U.S.-based conservation organizations have also developed mentor programs with ESRI, which can facilitate software acquisition. If you are looking for a one-time grant of hardware and software to get started, you may wish to investigate CTSP's grant program, which channels Hewlett Packard hardware and ESRI software to eligible organizations (see <www.ctsp.org>; as with the ESRI conservation program, requests need to be submitted by registered U.S. non-profit organizations, though these groups can forward the grants to developing country groups).

As you may have gathered from this article, there are a wide variety of Internet-based resources for GIS data, information, and advice. The Society for Conservation GIS (<www.scgis.org>), ESRI Conservation Program, and the Map Maker Web sites (listed above) provide some

useful links to Web sites containing GIS data sets, articles on conservation GIS, and advice for novices. I have been a member of the Conservation GIS listserv since 1995, and have found that it provides a great forum for GIS trouble-shooting and an easy way to learn helpful tips. (To subscribe, send an e-mail message to <listserv@uriacc.uri.edu> with a blank subject line and the message "subscribe consgis.") Many members of the SCGIS are active participants in online discussions, and their collective experience is a real treasure trove should you run into problems. There are also a number of data sets on CD-ROM. One useful set is the Africa Data Sampler from the World Resources Institute, and ESRI has a full catalogue of data sets from various organizations (see <www.esri.com>). Lastly, the Biodiversity Conservation Information System (BCIS) represents a consortium of major conservation organizations (IUCN, TNC, CI, Wetlands International, among others) that have agreed to pool data resources. This will offer a mechanism for member organizations to share spatial data, such as data related to species and habitat distribution or biodiversity hotspots. If you are collecting your own field data, it may be worth the extra investment in time and equipment to georeference the data using a standard GPS unit, as this will greatly facilitate their entry into a GIS down the road.

Remotely sensed (satellite) data are also extremely useful for conservation, either as a basis for land cover mapping, or for forest and wetland monitoring. Unfortunately, these data sets tend to be very expensive. IUCN may be developing an agreement with Eurimage, a satellite image distributor, in order to obtain discounted satellite imagery tailored to project needs. Other conservation groups undoubtedly have similar arrangements, and I know that some conservation projects are tied to research institutes or universities that have well-developed remote sensing programs. This is probably the best way to go if you are operating on a budget.

In summary, the potential for GIS in conservation is quite vast. As the world becomes more crowded, GIS will become an increasingly important tool for effective land use planning. One significant aspect of this technology, touched on briefly above, is its capacity to integrate socioeconomic, demographic, and environmental information. Creating baseline spatial data sets for subsequent monitoring is another important aspect. These applications are particularly relevant to the goals of the PEPF. Still, it is important to remember that although GIS may help to monitor ecosystem change or identify the driving forces behind habitat destruction, it is still up to humans to develop the institutional and legal mechanisms to address them. In my experience, collaborative management arrangements are a potentially promising means for reconciling human needs with conservation objectives (see article by Warren below, and *PARKS* Vol. 8, No.1). But this, *hélas*, is a whole other topic. 

Alex de Sherbinin is a program officer with IUCN-The World Conservation Union. His scope of work has included among other things, facilitating GIS development at IUCN through field-based training workshops, seminars, and strategic planning.

*He has also coordinated a water resources and population dynamics initiative; produced a handbook on integrated population-environment field-work; assisted IUCN offices to develop population-environment projects; edited a special population-environment issue of the journal *PARKS*; and developed guidelines for involving local communities in wetlands management. Having served as a P-E Fellow from 1996-98, he is currently on contract with IUCN through June 1999.*

RESOURCES

ESRI. *Getting to Know ArcView GIS*, Cambridge, UK: GeoInformation International, 1996.

Lang, Laura. *Managing Natural Resources with GIS*, Redlands, CA: Environmental Systems Research Institute, Inc., 1998.

Momberg, Frank, Kristianus Atok, and Martua Sirait. *Drawing on Local Knowledge: A Community Mapping Training Manual*. Indonesia: Ford Foundation, WWF, and Yayasan Karya Sosial Pancur Kasih, 1996. (Available from Ford Foundation-Indonesia at Fax: +62-21-739-5907)

Poole, Peter. *Indigenous Peoples, Mapping & Biodiversity Conservation*, Biodiversity Support Program Discussion Paper Series, Washington, DC: WWF-U.S., 1995.

U.N. Dept. of Economic and Social Information, Statistics Division, *Geographical Information Systems for Population Statistics*, Series E, No. 68, New York: United Nations, 1997.

Warren, Patrizio. "Collaborative Management of Human Development, Natural Resources and Population," paper presented at the Thematic Workshop on Population, Poverty and Environment, FAO headquarters, Rome, Italy, 26-30 October. (Contact Alex for electronic version.)

WHO/UNICEF. *Data Management and Mapping for Public Health – HealthMap*, 1995. (Booklet on GIS for epidemiology available from Isabelle Nuttall at WHO; e-mail: <nuttalli@who.ch>.)

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NEW

Fellows

Wendy Philleo • The Packard Foundation/California • <w.philleo@packfound.org>

Wendy Philleo has begun a two-year placement with the Packard Foundation in Los Altos, California. Sponsored by Packard, this is the first privately funded placement for the Fellows Programs.

The Packard Foundation is a philanthropic organization with domestic and international programs in the areas of population; children, families, and community; and conservation. The population component supports innovative programs with the potential for expansion and replication, including: programs for youth; education and awareness in international family planning; domestic and international expansion of reproductive choice; and leadership development. The conservation program emphasizes the protection of biologically rich sites along the west coast of North America and in the Pacific, including sustainable and healthy resource management and promotion of the role of conservation science in environmental policy development.

The foundation believes that the two components can collaborate more effectively on joint education programs and research studies on the connections between population growth and the environment. Wendy's role is to develop a joint population-conservation strategy. She will coordinate the budget allocation for joint projects, outline proposal guidelines, evaluate proposals, and make grant recommendations.

In addition, Wendy will foster internal collaboration between the population and conservation components, creating opportunities for dialogue, brainstorming, and strategic planning for joint activities. She will act as liaison among the foundation's conservation teams on the Western Pacific and Mexico and the population teams on the Philippines and Mexico, as well as those devoted to leadership and mobilization. Wendy will also represent the foundation's population-environment efforts at professional meetings and to the broader community of donors and grantees, creating partnerships with other grant-making organizations where appropriate.

Wendy has a bachelor's degree in political science with an emphasis in international affairs from the

University of Colorado, Boulder, and a master's degree in international relations from the Fletcher School of Law and Diplomacy at Tufts University. There she studied international environmental and natural resource policy and development economics and wrote her theses on *Forced Migration and Environmental Degradation in Africa* and *GATT, Globalization and Local Autonomy*.

At the WorldWIDE Network (Women in Development and Environment) in Washington, D.C., she researched, wrote, and edited success stories on grassroots projects in water, energy, waste, and environmentally friendly systems for a global conference on women and the environment. After analyzing these stories to create a model of successful projects, she worked to implement the model at the national level in Kenya, Barbados, and Nepal. As representative to the Boston Women in Development (WID) Group from the Fletcher School, she helped to organize the *Toward Beijing* conference in preparation for the Beijing Conference on Women.

Wendy also has intern experience with the Department of State/Office of Global Change and the White House Council on Environmental Quality. She has compiled and analyzed data on carbon dioxide reduction and researched and reported on such topics as energy efficiency, population dynamics, trade and the environment, China and energy, and forestry.

Prior to starting her placement with Packard, Wendy was a program officer for the Global 200 Initiative (The Living Planet Campaign) for the World Wildlife Fund. She acted as liaison to donor agencies, including the World Bank and USAID, advocating WWF's priority-setting strategy for global biodiversity conservation. She coordinated small grants funding to support campaign activities and developed conservation goals, strategies, and workplans with network and field office staff. Lobbying activities for the campaign were strengthened by a research project, which Wendy coordinated, on conservation threats to the Global 200 sites from extractive industries.

The Packard Foundation expects Wendy to develop her own papers on the connection between population

and environment. Plans for the second year of her placement include the formal presentation of her thoughts on future collaboration between the population and conservation components and the organization of an expert panel of consultants who will continue to develop joint

programming. For her part, Wendy expects to gain field experience through site visits to grantees, increased knowledge of monitoring and evaluation techniques and issues, and greater expertise in the population-environment field.

Nancy Vollmer • Alistar Foundation/Nicaragua • <vollmena@ibw.com.ni>

Nancy Vollmer has begun a placement in Nicaragua with the BOSAWAS Project, which aims to improve natural resource management in the Bosawas Reserve in order to conserve biological diversity. She is working with The Nature Conservancy as it phases out and will transition to the Alistar Foundation as it takes over the project. The Alistar Foundation is a Seattle-based environmental group that employs local residents as project managers to strengthen the conservation infrastructure of imperiled Central American parks and to sustainably integrate protected areas into the lives of local communities.

The Bosawas Reserve was created in 1991 to protect the natural resources and cultural heritage of the indigenous groups in the area. It supports large populations of endangered animals, including panthers, wild boar, monkeys, harpy eagles, and parrots. Some 13,000 indigenous people live in the park's river valleys, where they have traditionally maintained the environment through low-impact use of natural resources. The reserve joins with other parks and reserves to form the largest uninterrupted biological corridor in Central America.

Although the major threat to the biodiversity of the Bosawas Reserve has been from advancing logging, mining, and agricultural activities, it has become clear that there is environmental pressure on the area from increased resource use by indigenous park communities as well. Collaborating with the Nicaraguan Ministry of Natural Resources (MARENA), local conservation and development NGOs, and indigenous and mestizo communities, TNC has worked to develop, test, and implement protected area management policies and institutional arrangements that will provide the basis for sustained natural resource management. To date, baseline socioeconomic, land tenure, and resource use data have been gathered; land claims have been submitted for government approval; and an area management plan has been developed.

Nancy's placement will begin with the implementation phase of the plan. She will assist the local people in monitoring their use of resources such as wild game, in measuring the abundance of those resources, and in predicting the impact of their use over time. She will bring together environmental analysis – assessing the ecological sustainability of resource extraction – with demographic analysis – estimating the current growth rate of the population, including both natural increase and migration, and assessing its probable impact on

future levels of resource use. She will train indigenous researchers and assist them with analyses aimed at guiding community action and improving community management.

Nancy will also analyze gender issues related to resource use and will assess the need for family planning, reproductive, and maternal and child health education and services. She will respond to the community's need for greater access to health care by seeking local NGO partners with specialized skills in that field and by advocating for the provision of government-sponsored health and family planning services.

The scope of Nancy's placement will take advantage of her extensive background in both environmental and public health issues. Following her graduation from Duke University in May 1990, where she earned a joint degree in French and comparative area studies, Nancy became a policy intern with the World Wildlife Fund. At WWF, she was responsible for documenting conservation approaches and their impact on East African and Latin American communities. As a result, she developed an appreciation of the need for integrated management of population, health, and environmental resources. After her tenure with WWF, Nancy moved on to the Johns Hopkins Program for International Education in Reproductive Health (JHPIEGO), where she managed a reproductive health (RH) training program aimed at improving the pre-service RH curriculum in Philippine schools of nursing and midwifery.

Nancy then went on to pursue a Master's of Public Health from Yale, concentrating in program planning and evaluation for primary health care in developing countries, infectious disease epidemiology, and ecology. While at Yale, Nancy honed her skills in GIS and worked with the School of Forestry and Environmental Studies to assess the health impacts of development activities in Honduran watersheds.

Most recently, Nancy has worked at PLAN International, designing and evaluating community-based programs in reproductive health, adolescent reproductive health/sexuality, and child survival. She has also volunteered in former Nicaraguan war zones to form a local NGO (Manitas) to address community desires to help children integrate into the post-war society.





WWF's Population Dynamics and Resource Conservation Initiative: Lessons from the field

by Amy Weissman¹

In her previous article, Amy discussed two components of WWF's Population Dynamics and Resource Conservation Initiative: population dynamics and reproductive health programming. In this issue, she addresses the remaining components: women's empowerment and migration. She also explores how this type of programming helps WWF meet its goals of creating sustainable protected areas, linking conservation with human needs, and managing population pressure on areas of high biodiversity.

IV. Women's Empowerment

Contributing to fuller participation in conservation efforts are programs aimed at incorporating women more intimately in the management of resources. For far too long, the role of women in conservation has been neglected by programmers and undermined by a lack of input into resource use decision-making. Rural women who live in and around protected areas interact daily with diverse natural resources to support their families – growing food crops and collecting water, fuel wood, and other forest products for food and medicine. Yet, despite women's central role in natural resource collection, most resource use decisions are made and enforced by men. Compounding this are several barriers to women's participation in traditional conservation programming designs: time-intensive family responsibilities that prevent them from attending conservation activities; discomfort in participating in public or mixed-gender meetings; and conservation messages provided to men that are not passed on to women (Larson, et al. 1996).

In addition, poor women have not had the same access to socio-economic resources as men, such as training, credit, and new technologies; and institutional barriers, such as formal and informal land tenure

arrangements, have also prevented women from being effective resource managers (World Wildlife Fund, November 1997). WWF is working to reverse the situation by promoting projects that empower women socially and economically and allow them to participate more fully in conservation efforts. One such program is a live fish collection project in the Philippines.

Economic Empowerment and Conservation in the Philippines

In an effort to protect the fragile coral reef and sea grass ecosystems of the Turtle Islands in the Philippines, Kabang Kalikasan ng Pilipinas (KKP), the WWF national organization, is implementing a live food-fish collection project. The aim was to help island fishermen maintain their livelihoods while protecting native green turtles and their habitat. Fishermen would be trained in ecologically friendly alternatives to the use of cyanide and dynamite, shrimp trawling, and turtle egg collection. They would also receive assistance with marketing (by being linked directly with the live fish consumer market), with the formation of a fishing cooperative, and with community-based protected area management skills.

The social analysis stage of the live fish collection project, however,

revealed that gender inequality was a significant problem in the area. Additionally, during the early social organizing activities for the project, women showed interest in participating. As a result, KKP applied to the Population Initiative's small grants program to incorporate women into the project, helping them generate new earning opportunities that would be linked to the project's conservation goals.

The first phase of the gender component began in April of 1998, when staff from the Mindanao State University Tawi-Tawi campus conducted a gender sensitivity and technical skills training. The goals for the training were to make women aware of their basic rights and responsibilities, propose that men could serve as partners in household duties, and provide women with skills in simple fish processing (smoking, fermenting, backyard salt making, sauce preparation) in order to boost their own household nutrition and prepare goods for market. This training will be followed up with a small business development and management workshop. Additionally, KKP will establish a small credit fund, which will be run by the community cooperative to provide low interest loans to women to support entrepreneurial ventures.

As a result of these grant activities, KKP expects that women and men will have more equitable access to resources, a majority of the community cooperative will be aware of the important role of women in decision-making, and women will be able to contribute to their families' incomes while encouraging sustainable resource use (KKP, 1997). Anecdotal evidence already suggests that the training was valuable. At the conclusion of the fish processing training, one participant indicated that her husband, like many fisherman, hunts shark – but only for its fin, as the fin is considered a delicacy and hence very valuable. The practice involves harvesting the fin, then throwing the shark in the water to die. After considering how she could play a role in resource conservation and income generation, the participant indicated that she would now ask her husband to bring home the whole shark so that she could make fish balls with the meat. In this way, she would boost her family's own meat consumption while generating a marketable product.

V. Migration

WWF integrated conservation and development projects (ICDPs) are generally located in relatively remote areas characterized by high biological diversity and low human population density. National parks and other protected areas are established in these places because the human impact on nature has generally been so light. From a conservationist perspective, human in-migration represents a pervasive and serious threat to the future of species, habitats and ecosystems because the land uses of the incoming populations are often incompatible with conservation objectives. New arrivals frequently lack knowledge of ecologically sound resource management techniques appropriate for the new area. Anecdotal evidence from field staff

associated with ICDPs and recent applied research illustrate how new arrivals to a resource-rich area, drawn by such factors as land availability for agriculture or employment in extractive economic activities, often rapidly degrade the resource base unless institutional mechanisms are in place to regulate land uses or entice people to employ sustainable land management practices.

An example from the Central African Republic illustrates the forces that drive migration into areas of high biodiversity and the challenges confronted by conservationists in slowing this process.

Addressing the Impact of Diamond Miners in the Central African Republic

For the past two years the Population Initiative has sponsored a number of participatory diagnostic studies around the Central African Republic's (CAR) Dzanga-Sangha Special Dense Forest Reserve to determine the impact of human migration on natural resources (Mogba, 1997; Mogba et al., 1996; Zana, 1997; Zana et al., 1996). The results of the case studies suggest that the most severe migration threat to the future of the reserve emanates from the diamond economy, which in recent years has had perhaps a much greater impact on natural resources than commercial lumber extraction.

The Central African Republic has long been an exporter of diamonds, which account for approximately 60 percent of the national export market. The southwestern corner of CAR, where the Dzanga-Sangha project is located, is known as a highly productive area for diamond mining. Throughout the forested regions diamond mining camps ranging in size from 50 workers to 5,000 are found along the streams where diamonds have been discovered, most often by the local Ba'ka and

other pygmy populations. The miners, young men and women from all regions of the country who have few cultural ties to the area, dig into the stream beds and along the banks to remove vegetation and top soil until they reach the layer of gravel that contains raw diamonds. Craters cut into the soil are sometimes 15-20 feet deep. The area excavated for diamonds often resembles a moonscape of craters surrounded by piles of sterile mud and clay. While the numbers of people living in and around the threatened northern part of the reserve fluctuate considerably from year to year, the size of the population engaged in diamond mining far surpasses those engaged by lumber companies in the areas. The village of Ndélengué, situated on the northern fringes of the reserve, is home to at least 4,000 people engaged in diamond mining and ancillary economic activities. In contrast, the town of Bayanga is roughly half the size and employs an estimated 500 workers in the formal sector (administration, lumber company, and conservation organization).

The ecological impact of diamond mining on vegetation and wildlife is severe. The extraction of diamonds from large pits destroys the habitat along the streams and rivers and pollutes the waters, decimating fish habitats. Diamond mining also contributes significantly to wildlife poaching in both the Special Dense Forest Reserve and the national park. Poaching is prevalent because miners pay handsomely for wild meat. Meat from domesticated livestock is generally not available in local markets because tsetse fly infestation limits the expansion of goat and cattle production. While wildlife populations are likely declining around the diamond settlements, forest clearing for agriculture is expanding, which further degrades wildlife habitat.

Although diamond mining has severe negative impacts on the envi-

ronment, it also has harmful ramifications for the indigenous population. Miners are exploited by a complex market structure controlled by European diamond mining interests linked to a network of African merchants. At the bottom of the rung, young men and women miners receive low remuneration for their diamonds. Debt peonage is a common practice that condemns miners to work for a pittance in exchange for food, loans, and protection from debt collection from the merchant class. Prostitution, violence, and destitution are prevalent in the camps. Few community organizations exist outside of Protestant, Catholic, and Islamic religious institutions. No social services are provided to diamond camps by government and few non-governmental organizations work in the area. The highly mobile and ethnically diverse populations do not invest in building community structures necessary for community development initiatives. Instead, the wealthy merchant class invests profits in economically dynamic townships.

Based on the participatory case studies, the researchers suggest that responses to the ecological and social ills caused by diamond mining must be coordinated at the local and national level but also between the neighboring countries of CAR, Congo, and Cameroon. Policy and programmatic strategies are needed that promote co-management of natural resources by the state, conservationists, and economic stakeholders. Co-management would involve establishing agreements between government and local resource users to limit resource extraction to ecologically sustainable levels. At the local level, this implies the adoption of a "conditional exclu-

sion" strategy whereby long-term residents are granted the authority to establish rules, or tenure agreements, to limit entry into a community unless the appropriate behaviors toward natural resources and the community are observed. Local-level land use planning and village-level zoning currently being implemented by the Dzhangha-Sangha Project are first steps in this direction (Mogba and Freudenberger, 1998).

Conclusions

The WWF Population Initiative has supported a variety of activities to build a more sophisticated understanding of how population dynamics affect conservation programs around the world. Following five years of internal debate, applied research, refinement of strategies, and small-scale catalytic field activities, a series of lessons have emerged that are shaping the course of WWF's programs and projects. These lessons serve as a guide for future work:

New Tools for Demographic Analysis will Advance our Understanding of Population-Environment Linkages

The linkages between environmental degradation in areas of high biodiversity and population dynamics are complex and case-specific. Conservation organizations must act from a knowledge base that recognizes the complexities of population-environment dynamics in specific localities but also at a broader scale. Demographic analysis is needed especially at the ecoregional level (a large geographic region whose species and ecological interactions are critical for environmental sustainability) in order to identify the strategic points at which public policy advocacy and other macro-

interventions can have a significant impact. To this end the Population Initiative is launching a pilot project with support from the Summit Foundation to assess population dynamics at this level. The project will overlay social dynamics in an ecoregion, like natural growth rates or migration flows, onto maps portraying key ecological parameters as a way to generate further debate and discussion on appropriate interventions to take on population issues at both the ecoregional and local scales.

Measuring the Impact of the Population-Environment Link is an Upcoming Challenge

Over the past several years, environmental and population organizations have increasingly explored together how to strengthen linkages between their respective areas of expertise. These joint dialogues are premised on the assumption that coordination between population and environment programs result in greater impacts than if the organizations work separately. However, because measuring the impact of linked programs is difficult, little evidence exists to support this hypothesis. In collaboration with population organizations, the Population Initiative is working to develop appropriate indicators for measuring the social and ecological impacts of integrated population-environment activities. WWF will use these indicators to test the hypothesis that rural populations' increased access to reproductive health services will eventually lead to more sustainable natural resource use.


WWF Broadens its Understanding of Women's Empowerment



As many conservation organizations have realized, women can play an important part in natural resource conservation. However, from experience WWF has learned that a lack of attention to women's unique roles in natural resource management reduces the conservation impact and that a lack of access to resources prevents women from being effective resource managers. WWF also recognizes that women's participation in natural resource decision-making is linked to their empowerment in other areas, including control over earned income and reproductive health. Based on this understanding, the Population Initiative now plans to combine its reproductive health and women's empowerment components.

An Expanding Effort: Population-Environment Public Education and Policy

From its increasingly sophisticated understanding of the complexity of population-conservation issues, gained from practical work on the ground, WWF plans to expand its public education and policy activities into a more formal Population Initiative component. This component will be planned and imple-

mented in collaboration with WWF's Environmental Education, Congressional Relations, and Communications programs. Staff from these programs will draw on the results of WWF's fieldwork to synthesize key information and lessons, and develop WWF's "population-environment message" that will be used to educate the public and inform and influence public policy decision-making. 

Amy has spent much of her placement coordinating the Population Initiative's small grants program, providing follow-up and technical assistance to WWF's field and partner staff. She is now spearheading WWF's newly established Women and Conservation Program, which will work in environmentally sensitive areas to address women's reproductive health needs and to empower them to use resources in a manner that is both ecologically sustainable and conducive to their families' economic well-being. This assignment places Amy at the forefront of efforts to integrate health, family planning, economics, and environment.

Questions about Amy's article and her work with WWF can be directed to: <amy.weissman@wwfus.org>.

ENDNOTES

¹This paper was written in close collaboration with Mark Freudenberger and Patty Larson, Applied Social Scientists, People and Conservation Program, WWF.

REFERENCES

Kabang Kalikasan ng Pilipinas (KKP). 1997. Training on Gender Sensitivity and Micro-Enterprise Development for Muslim Women in the Turtle Islands, proposal to small grants program.

Larson, P. & M. Nzirambi. 1996. Gender and conservation issues in ICDPs in Uganda: A case study of Rwenzori mountains conservation and development project. World Wildlife Fund.

Mogba, Z. and Freudenberger, M.S. 1998. Les migrations humaines dans les aires protégées de l'Afrique Centrale: Le Cas du Réserve Spéciale de Dzanga-Sangha. World Wildlife Fund and Université de Bangui.

Mogba, Z. 1997. Migrations et enjeux d'une gestion durable des ressources naturelles dans la partie Ouest de la Réserve de Dzanga Sangha à Salo, République Centrafricaine. WWF-U.S. et SSE.

Mogba, Z., Freudenberger, M., Zana, H., Missoaso, M. 1996. Migrations humaines et leurs impacts sur la conservation des ressources naturelles dans la réserve de Dzanga-Sangha: Etude de case de l'économie de diamant à Ndélengué, République Centrafricaine. WWF-U.S. et SSE.

World Wildlife Fund-Galapagos Program. 1997. Migration and Differential Job Markets: Economic Factors Affecting the Migration Rate to the Galapagos Islands, proposal to small grants program.

Zana, H., Missoaso-Napali, M., Balanga, D., N'Gaima, N. 1996. Impacts de la dynamique migratoire à Bayanga. WWF-U.S. et SSE.

Zana, Henri. 1997. Impacts de la migration sur les ressources forestières et aquatiques à la périphérie du Parc Dzanga Ndoki à Bomandjoukou, République Centrafricaine. WWF-U.S. et SSE.

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World Neighbors-CEMOPLAF Operations Research Study Available

A study of 12 rural communities in Bolivar Province, Ecuador, is conceived as a first step in testing whether integrated community development leads to greater well-being and family planning acceptance than family planning interventions alone.

– Jethro Pettit, Director of International Programs, World Neighbors

World Neighbors photo

Six years ago, a small family planning clinic in the provincial town of Guaranda, Ecuador was on the verge of closing down. The clinic, established to serve rural Quichua Indian communities in Bolívar province, had too few users to justify keeping its doors open. Today, the same clinic provides more than 18,000 consultations per year – including more than 2,500 users of family planning – and is looking for a larger location to meet growing demand. Clinics in other provinces of Ecuador and in neighboring Bolivia and Peru are now setting up programs designed after Guaranda's successful approach.

Testing the Benefits of Integration

The key to Guaranda's success is to be found in a rather unique Operations Research project carried out from 1993-96. This study and the interventions upon which it was based were conducted collaboratively by the Ecuadorian family planning organization CEMOPLAF (Center for Medical Guidance and Family Planning), which operates the clinic in Guaranda, and World Neighbors, an international organization with experience in people-centered community development. The two groups began with a simple hypothesis: that an integrated approach to community development – which responds to local priorities such as food security, natural resource management and public health – will lead to greater well-being and higher acceptance of family planning than an approach focused on family planning alone.

Twelve rural communities took part in the study. Six were involved in an integrated community development program including sustainable agriculture, natural resource management, and public health activities, as well as reproductive health and family planning education and services. The other six communities received only the reproductive health and family planning component. The study compared the attitudes and practices of families in the two types of communities.

Promising Findings

Family planning acceptance in the six integrated communities grew more than three-fold, from 11.6% in 1993 to 41.1% in 1996. In the six communities receiving health and family planning only, family planning acceptance dropped from 25% to 22.2% during the same period. Many other findings from the study point to strong links between the integrated development approach and acceptance of family planning and clinic services in general. Project and clinic data since the study was completed further underscore this relationship.

Want to learn more? Request the report.

This report was presented at USAID's January 1999 meeting, *Developing a Strategic Framework for Population and Environment*, which was coordinated by the Population-Environment Fellows Program. The paper was conceived as a starting point for an in-depth discussion aimed at:

- developing a more coherent set of goals for population-environment interventions;
- devising an appropriate evaluation methodology for such interventions; and
- developing an innovative research and policy agenda for the field.

Should you wish to receive a copy of the full report, please send your request for *Integration of Population and Environment II: Ecuador Case Study* to the Population-Environment Fellows Program by e-mail at <popenv@umich.edu> or by phone at 734-647-0222.