GLOBAL LIVESTOCK CRSP

Building Human Capacity to Solve Ecosystem-Health Challenges in Developing Countries

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Health for Animals and Livelihood Improvement Project

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The Envirovet Summer Institute is an established, yet unique and annually adapted opportunity to train the next generation of professionals in the rapidly emerging area of ecosystem health. In 2008, the GL-CRSP sponsored Health for Animals and Livelihood Improvement (HALI) project partnered with Envirovet to design and direct the Envirovet Summer Institute Developing Country Session in Tanzania. From July 17th through August 5th, 2008 twenty-four veterinary professionals and exceptional veterinary students from six nations studied cross-cutting themes relating to health at the wildlife-livestock-human interface, conservation, zoonotic diseases, and freshwater and marine ecosystem health at multiple locations in Tanzania through a combination of hands-on activities, field visits and presentations. Linking ongoing research from the HALI program with Envirovet created a win-win partnership, enabling HALI to fulfill the goal of increasing local capacity for disease diagnosis and surveillance, and expanding each organization's impact by helping to create a cadre of scientists working on issues relevant to improving health and livelihoods in developing countries.

Background

There is a paucity of veterinary educational and training opportunities in wildlife and ecosystem health that facilitate the application of veterinarians' comparative medicine and problem-solving skills to benefit wildlife and ecosystems. In developing countries, veterinary training is basic and emphasizes food animal medicine. However, veterinarians in these countries who assume responsibility for the health of free-ranging wildlife within and outside protected areas generally have very little opportunity for training and education in diseases at the domestic animal-wildlife interface, zoonoses, environmental toxicology, land and water management, conservation, and other key components of ecosystem health.

Since 1991, the Envirovet Summer Institute has been providing knowledge, skills, and mentors necessary to catalyze environmentally-focused careers for veterinarians. Envirovet illustrates many ways by which veterinarians can contribute to improvement of ecosystem integrity across a spectrum of landscapes, with special attention to the interface between wild areas and areas intensively managed by humans. The course is designed to guide participants towards matching their aims and resources to an educational plan and career in wildlife and ecosystem health. Because of careful selection of its faculty members, including specialists from academia, industry, government, non-governmental organizations, and the private sector, Envirovet students gain exposure to a broad range of perspectives and guidance from world-class role models.

The goal of the Envirovet Summer Institute is to create a force of scientists with unique perspectives, knowledge, skills, and expertise required to implement an efficient approach to ecosystem repair that will enable synchronous gains in wildlife, domestic animal, human, and economic health. To meet this goal, Envirovet provides seven weeks of intensive lecture, laboratory, and field experiences to approximately 25 veterinarians, veterinary students and wildlife professionals in terrestrial and aquatic wildlife and ecosystem health, addressing both developed and developing country issues.

The Envirovet course is divided into two sessions. The first session is entitled "Terrestrial and Aquatic Wildlife and Ecosystem Health Issues and Techniques for the Developed World with Outreach to Developing Countries." Components of this session take place in Florida and Georgia. The second session is entitled "Terrestrial and Aquatic Wildlife and Ecosystem Health Issues and Techniques for the Developing World" and takes place in a developing country. Because of the zoonotic disease and ecosystem health research activities comprising the Global Livestock Collaborative Research Support Program's (GL-CRSP) Health for Animals and Livelihood Improvement (HALI) project, the resulting network of local partnerships, and commitment to training and capacity building, team members from the GL-CRSP HALI project were offered the chance to design the curriculum for and direct the 2008 Envirovet developing country session for the first time in Tanzania.

Principal Outcomes

From July 17th through August 5th, 2008, Envirovet participants studied cross-cutting themes in ecosystem health through a combination of hands-on activities, field visits and presentations at various locations throughout Tanzania. Envirovet participants explored the first theme, "Health and Conservation at the Wildlife-Livestock-Interface" by discussing case studies presented by researchers who are actively working to mitigate these problems. They visited sites of wildlife-human conflict and spent an afternoon talking with pastoralists living near a wildlife-protected area. They actively participated in ongoing HALI project research activities, learning how to test cattle for bovine tuberculosis and sample river water for pathogens in order to evaluate risks of zoonotic diseases at the interface between populations of humans and their domestic animals, and wildlife.

During a visit to the Sokoine University of Agriculture's Faculty of Veterinary Medicine participants toured the veterinary school and participated in activities focused on the second theme, "Challenges with Diagnosis, Surveillance and Control of Zoonotic and Emerging Infectious Diseases in Developing Countries". During hands-on laboratories, participants learned how to properly handle, test, and necropsy chickens in the case of a highly pathogenic avian influenza outbreak; how to assess toxicoses in fish using biomarker assay methods; and were familiarized with methods for characterization of water-borne disease agents and tuberculosis. Lectures and discussions focused on Rift Valley fever and climate change, bovine tuberculosis in animals and people, animal welfare in the developing world, the role of private and public veterinary medicine in Tanzania, and the complex issue of bushmeat. Research and locally appropriate methods being developed in Tanzania for disease diagnosis and surveillance were highlighted with a visit to the Apopo Project, which uses giant Gambian rats for detection of tuberculosis.

Envirovet Tanzania Goals

- Produce globally aware wildlife and ecosystem health professionals able to solve problems in diverse cultural contexts.
- Develop participant understanding of the conditions and constraints relevant to addressing health and conservation issues in developing countries.
- Allow participants to develop a professional network of colleagues and exchange ideas in a supportive environment.

Participants learned about the third theme, "Challenges to Wildlife Health and Conservation in Protected Areas," by participating in projects addressing disease issues in Mikumi and Ruaha National Parks, including a giraffe immobilization (see picture below) and disease field survey. Additionally, participants learned about new initiatives that have created community-based wildlife management areas and worked on wildlife tracking, plant identification, and fish sampling field exercises inside the newly created Pawaga-Idodi community-based Wildlife Management Area. The pros and cons of community-based conservation initiatives were addressed during lively discussions. Challenges and recent success in the conservation of Zanzibar's indigenous forests and mangroves were highlighted in a visit to Jozani Chakwa Bay Conservation Area.

Finally, "Threats to Tropical Marine and Freshwater Systems" were addressed. Participants closely studied the 15-year conservation crisis of the Great Ruaha River. The history and consequences of the drying of the Great Ruaha River were presented in a detailed case study, and participants visited various sites along the river and its tributaries to: 1) see examples of irrigation and water diversions, 2) assess fish species diversity, and 3) sample

Working with a team of Tanzanian wildlife veterinarians, Envirovet students monitor and collect vital samples from an immobilized giraffe as part of an ear disease investigation in Mikumi National Park. By linking Envirovet with the HALI project, students were able to gain hands-on experience in research focused on ecosystem health. Photo by Elizabeth VanWormer.

Table 1. Output and impact of the Envirovet Summer Institute in Tanzania.

Output	Impact
A total of 180 hours (average of 9.5 hr/day for 19 days) of training in the form of lectures, laboratory exercises, field experiences, group discussions.	Veterinarians versed in the complexities and multidisciplinary nature of wildlife and ecosystem health through immersion training.
24 veterinarians and veterinary students who have new knowledge and mentors to facilitate focused careers on wildlife and ecosystem health.	Greater capacity among veterinarians at institutions worldwide for addressing wildlife and ecosystem health challenges.
A cohort of like-minded veterinary professionals with mutual awareness and the shared experience of Envirovet.	A true network of global animal health and conservation professionals addressing ecosystem health challenges with the greater synergy and cooperation that such networks make possible.

for pathogens in the water. Pollution problems and the latest research in freshwater and marine ecosystems were emphasized through discussions and field exercises at Sokoine University of Agriculture and the Institute for Marine Sciences on Zanzibar. Coral health and innovations in mariculture were also highlighted through lectures, and field visits to women's cooperatives for sustainable seaweed farming and half-pearl jewelry production.

Practical Implications

In just 19 days, Envirovet Tanzania provided approximately 180 hours of instruction, laboratories, and field activities from 38 instructors at six sites across Tanzania and the island of Zanzibar. By linking HALI and Envirovet, students assisted in ongoing research projects, gaining first-hand experience in problem solving when faced with the challenges of health research in a developing country.

Additionally, participants had access to areas not frequented by tourists, enabling them to hear unique perspectives from pastoralists and village leaders in addition to non-governmental organization staff, academicians and government employees. Christina Ploog, an Envirovet participant and veterinary student from the University of Illinois with a background in social work commented, "It [Envirovet Tanzania] was truly amazing and it really changed my perception of veterinary medicine, myself, my world, my country. I knew veterinary medicine was powerful before Envirovet, but the work all of you are doing is truly inspiring to me and more than ever I am thrilled that I will soon be a part of it all."

Directing Envirovet in Tanzania has also expanded the HALI project's collaborative relationships within Tanzania. Five organizations (Sokoine University, Tanzania National Parks, University of California Davis, Wildlife Conservation Society Ruaha Landscape Program, and the Institute for Marine Studies, Zanzibar) worked together as hosts and instructors for the course. Bringing instructors from different organizations together for the course also fostered new research collaborations.

To date, the Envirovet Summer Institute has trained 339 individuals from 38 nations, including: Canada, the United States, Mexico, Costa Rica, Panama, Colombia, Bolivia, Brazil, Argentina, Nigeria, Ethiopia, Kenya, Tanzania, Uganda, Zimbabwe, Botswana, South Africa, the United Kingdom, France, Norway, Italy, Hungary, Germany, Lithuania, Pakistan, India, Thailand, Mongolia, Japan, Taiwan, Sri Lanka, and New Zealand. Many Envirovet alumni are working to help wildlife, domestic animal, and public health around the world each day. Most of these individuals have some role at the interface of domestic animal-wildlife-public health, with many serving in prominent positions in government, academia and non-governmental organizations.

Dr. Ayebazibwei Christostom, veterinarian and GL-CRSP supported Envirovet participant from Uganda wrote, "I take this opportunity to thank you for the support to attend Envirovet 2008. I have really benefited so much, beyond my expectation. The course exposed me to a new arena of ecosystem health, encompassing livestock-wildlife-human beings and environment in any aspect of research and development. The training has exposed me to a number of professionals and colleagues who can help me to network and collaborate on a number of issues. I have conviction that the knowledge I have gained will further support development in my country and over the globe."

Further Reading

Beasley, V.R. 1993. "Ecotoxicology and ecosystem health: Roles for veterinarians; goals of the Envirovet Program." *Journal of the American Veterinary Medical Association* 203(5): 617-628.

Envirovet Summer Institute (Online). Available from: http://vetmed.illinois.edu/envirovet/

HALI Project Web log (Online). Available online: http://haliproject.wordpress.com

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The Health for Animals and Livelihood Improvement (HALI) project was established in 2006 and is a stakeholder-driven research and capacity-building program to assess the effects of zoonotic disease and water management on animal health, biodiversity, and livelihoods in the Ruaha ecosystem, Tanzania. The project is led by Dr. Jonna Mazet. Email: jkmazet@ucdavis.edu.

The Global Livestock CRSP is comprised of multidisciplinary, collaborative projects focused on human nutrition, economic growth, environment and policy related to animal agriculture and linked by a global theme of risk in a changing environment. The program is active in East and West Africa, Central Asia and Latin America.

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