**Water Problems in Northern California**

“There are many problems to work on in the Sacramento-San Joaquin-San Francisco Bay Delta system,” says UC Davis professor David Hinton. "Questions about the fate, transport and toxic effects of various compounds under actual environmental conditions need to be answered in order to protect the health of all wildlife, domestic animals and humans that depend on California water.”

Metals such as copper, cadmium, mercury and zinc, from old mining sites

*Mercury, for instance, can be taken up by aquatic organisms and incorporated into the tissues of fish that feed on those organisms—it can then be transferred to humans or other animals that consume the fish.*

*Chemicals such as organophosphate pesticides and some herbicides from urban and agricultural runoff contaminate streams and lakes.*

Diatom and chrysophytes are organophosphates that, because they have shorter half lives, replace DDT—but some waters of Northern California contain high levels of DDT. How do these compounds move in the environment? How do they affect biological systems? How do land use patterns change the fate of contaminants? These are the types of questions that Dr. Hinton and more than 30 UC Davis postdoctoral and graduate students are working to answer.

**Veterinary Medicine and Ecosystem Health**

Declining populations of fish, aquatic birds and other wildlife and the incidence of diseases in aquatic systems may be a reflection of the health of those aquatic systems, says David Hinton, director of the UC Davis School of Veterinary Medicine’s Aquatic Toxicology Laboratory.

The veterinary medicine of the future, he says, may address issues of environmental health by looking at the health of representative organisms that live within a particular environment.

Dr. Hinton and more than 30 UC Davis faculty members from a variety of disciplines, including School of Veterinary Medicine population health and reproduction professor and associate director of the Institute of Toxicology and Environmental Health, Bill Leslie, conduct studies of the Sacramento River watershed in all its aspects as a resource. Their investigations are funded through the UC Davis’s S. E. R. C. center for Ecological Health Research and the UC Davis Center for Superfund Basic Science Research and other agencies, such as the EPA.

*Bioaccumulation of selenium has been shown to lead to deformities and reproductive failure in February. In some wildlife species.*

**Exotic species such as the Asian clam, which is a filter feeder and a very effective accumulator of the metal selenium**

*Dr. Hinton, who also directs the UC systemwide Graduate Teaching and Research Program in Ecotoxicology, says, "We understand the toxicity of these substances, all of which add to the problems of fish populations already affected by habitat reduction and warming due to water diversion, takes a special type of consideration and approach."*

Dr. Hinton says, “Ecotoxicology addresses the variety of environmental variables, particularly transport and fate of compounds that could have a toxic effect, that impact organisms in the food web from the molecular level to whole organisms and populations.”

Ecotoxicology Research at the Aquatic Toxicology Laboratory

“The Aquatic Toxicology Laboratory is a campus-wide resource that resides in the School of Veterinary Medicine,” says Dr. Hinton. “Our PhD students come from three different graduate groups: Pharmacology/Toxicology, Ecology and Comparative Pathology. We’ve trained three graduate veterinarians (former residents in pathology) who specifically wanted to work with fish and aquatic systems.”

*The Aquatic Toxicology Laboratory program has outreach across the entire state of California. Our laboratory monitors surface water from the Klamath River to the Salton Sea, and the New River in the Border River’s Project with Mexico. In addition, Dr. Gary Marty in the lab has led a multiyear program of followup studies on the oil spill in Prince William Sound, Alaska.*

We conduct tests for various agencies to determine potential problem areas and times when toxic conditions exist in the rivers. If water samples taken at a given moment from waterways such as the Feather or Butte River are toxic, we begin a series of investigations to try to identify the agents causing the toxicity. We then conduct laboratory studies to get a better handle on the effects of specific agents.

*“I can’t think of a better place to be if you are interested in water,” says Dr. Hinton. “We have many problems that may affect the quality of drinking water for humans and livestock as well as wildlife habitat, and we hope to protect these valuable natural and cultivated resources.”*

“We now have tools such as computerized geographic information systems to know how much of what types of products are used on what kinds of crops. We can begin to see how compounds move and their fate in the environment; how compounds affect biological systems; and the impact of land use patterns as drivers of policy in a state where it is such a very important commodity and resource.”

**AQUATIC TOXICITY**

Viewing the big picture: Understanding problems affecting California watersheds by studying the health of fish, birds, mammals and other organisms that inhabit them.

**Sedimentation and Urbanization**

Water samples are tested for growth markers to determine exposure to toxicants in resident fish to see if serum enzymes, organics, and specialist in Integrated Pest Management— are aimed at developing alternative, environmentally friendly pest control practices.

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**Future Investigations**

“Veterinarians with interests in environmental quality, habitat, food safety and food production problems are vital to the study of important environmental issues,” says Dr. Hinton. “It’s a rallying call for investors with health awareness to create an environmental initiative.”

We need more knowledge about the following: how compounds move and their fate in the environment; the effects of toxicants on animal populations and communities as well as individuals; how to assure that food products are not pesticide laden; how complex mixtures affect biological systems; and the impact of land use patterns on water and wildlife habitat, and we hope to protect these valuable natural and cultivated resources.”

“We now have tools such as computerized geographic information systems to know how much of what types of products are used on what kinds of crops. We can begin to see how compounds move and their fate in the environment; how compounds affect biological systems; and the impact of land use patterns as drivers of policy in a state where it is such a very important commodity and resource.”

**Aquatic Toxicity: Current Investigations**

The laboratory plays an important role in answering questions about the environmental health of California watersheds.

**Environmental Protection**

Collaborative programs— with farm advisors in Cooperative Extension and specialists in Integrated Pest Management— are aimed at developing alternative, environmentally friendly pest control practices.