AGRICULTURE RESEARCH

A Bold New Program at Berkeley Runs Into Trouble

Last summer, the College of Natural Resources at the University of California (UC), Berkeley, had a major renovation, in which the faculty tore down old disciplinary walls and regrouped into new, broader departments. Their goal was to bring ecological perspectives to bear on the agricultural and resource issues facing society at the end of the 20th century. But the restructuring may mean the program won't be around to see the century out. Last month, arguing that state funds used by the new departments are more urgently needed for other types of research, the UC vice president for agriculture told the Berkeley faculty he planned to divert up to half of this money away from the college. And that, say the Berkeley faculty, will leave their new house in ruins.

At issue is a fundamental debate over the best use of government money intended for agricultural and natural resources research. Berkeley is one of many agricultural colleges across the country that are rethinking their use of these funds, responding to changes in agriculture, land use, and resource issues. "People are worrying about the big questions, [such as] how agriculture will fit into a political climate in which the environment and urban areas have as much call on resources as agriculture does," says Berkeley plant biologist John Taylor. But focusing on these questions means diverting funds from so-called production agriculture research, which focuses on solving the crop-related problems of farmers. That diversion, some traditionalists argue, is improper. And the debate, like the money, affects the future of agricultural science.

"There are resources [at] Berkeley...needed to address applied agricultural research problems [elsewhere]."
—Kenneth Farrell

Berkeley's College of Natural Resources, like other agricultural colleges, gets the majority of its funds from the Agriculture Experiment Station (AES) program, a combined state and federal plan launched by federal land grant legislation more than a century ago to provide research support for the nation's farmers. But for several decades, the Berkeley faculty have been shifting their research away from traditional topics such as pest control and improving crop yields, toward broader questions such as management of water and other resources.

Addressing those big questions requires an interdisciplinary effort, says Wilford Gardner, dean of the college. "If you are going to look at forest ecosystems or organic farming, or wetlands, you really have to have a lot of the disciplines talking to each other." While such collaborations can arise out of traditional department structures, those structures can have a conservative influence on hiring and teaching, says Gardner, and so work against more modern interdisciplinary goals. "The people doing the most exciting work are those who are between disciplines," he says. So last July, Berkeley melded four of its seven departments—plant pathology, soil science, entomology, and forestry—into one new, 90-member department of environmental science, policy, and management (ESPM).

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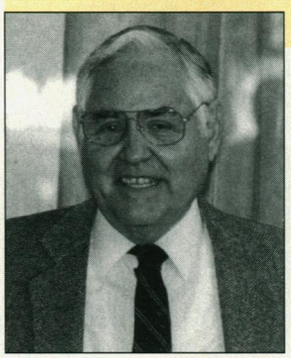


Berkeley is not alone in this approach. The University of Illinois, for example, is currently undergoing a similar reorganization; the University of Wisconsin has been adding environmental research to its traditional agriculture research for years; and Michigan State University's college of agriculture and natural resources is placing more emphasis on the environment and public policy than it used to. "There might be something almost approaching consensus that however you define a college of agriculture, it has to take production agriculture in a broader context than it has before," says Susan Offutt, director of the board on agriculture at the National Research Council.

But shifts in context can produce conflict, and the shift at Berkeley certainly did. UC vice president Kenneth Farrell, who heads the university system's Division of Agriculture and Natural Resources, thought Berkeley had moved too far away from mainstream agricultural research. In a 17 December 1993 letter to UC chancellor Chang-Lin Tien, Farrell, who oversees the three agricultural colleges in the UC system, proposed to remove from Berkeley the AES support for all the faculty positions in four of the college's original seven departments. "In my judgment there are resources on the Berkeley campus that are more critically needed to address the applied agricultural research problems and needs of the state than to address the ecological proposals of the [Berkeley] college," he told *Science*. The net result of his plan, which he reiterated in his presentation to the faculty last month, would be a shift of about $7.5 million in funds—and up to 55 faculty positions—away from Berkeley to the other two UC agricultural colleges at Riverside and Davis. The reason for the shift, says Farrell, is that several budget-driven rounds of voluntary early retirement have taken a toll on faculty in traditional production agriculture at all three campuses.

Farrell's plan could rob Berkeley of roughly half of the positions in the College of Natural Resources, says Gardner, and would gut the new ESPM department. It also kicks sand in the face of those who engineered the reorganization, says ESPM biomathematician Wayne Getz. "The message is that Berkeley got it wrong," he says. "We've been punished for coming up with a solution."

The message is also that UC is a servant of agribusiness interests, says Berkeley plant biologist Russell Jones. He and others point out that in January, just a month after Farrell's letter to Tien, Farrell's office issued a press release publicizing a report by the California Commodities Committee, an influential crop industry lobbying group. The report echoed Farrell's call for a transfer of AES money away from Berkeley and toward production agricultural research at the other campuses. It also called for Farrell's office to be given more control over exactly how the AES money is spent on each campus; control that has been in the hands of deans and department chairs. Farrell's press release said his office would take the report "very seri-

ously," and those words have caused Jones and his colleagues to see red. "We shouldn't have commodities groups with political muscle dictating what research we do at UC," Jones says.

Nor should Farrell's office be dictating such priorities, say others. "The faculty...feel that matters of academic policy—like moving programs from campus to campus—are something that falls under the authority of faculty review," says plant biologist Taylor. Even administrators at UC Davis, a campus that stands to gain resources in the rearrangement, are opposed to Farrell's proposed reshuffling of resources on those grounds. "We're talking about academic programs here," says acting Davis chancellor Larry Vanderhoef. "The plan has to derive from the deans and the faculty who do the work."

Farrell, however, counters that since the controversy concerns state-wide research funds, the decision about the way to spend them lies with the president's office. And Farrell contends that Berkeley stepped over the line when it undertook its reorganization without responding to his input on the process. "I gave input in a very careful, enlightening manner," he told the faculty at his meeting with them last month. But the college, he says, didn't respond. "Not one word of feedback ever, not one word of acknowledgement, not one opportunity for interaction was ever presented, to my knowledge."

Among Farrell's supporters is retired Berkeley potato pathologist Albert Weinhold, who opposed the Berkeley reorganization and served in Farrell's office shortly before retiring last year. Farrell's move, he says, addresses important agricultural concerns. "There are a lot of real serious insect problems, pest problems, weed problems [facing] just about any commodity you can mention," he says. "These need attention." Since Berkeley no longer focuses on such issues, says Weinhold, it has less of a claim to AES funds.

Some observers see the conflict as generational. "There is the old guard, which can see nothing but typical production agriculture research," says Robert Burris, a retired agricultural biochemist from the University of Wisconsin, who chaired a committee of scientists that reviewed—and blessed—Berkeley's reorganization. "You have to move with the times, and Berkeley is trying to do that."

But trying is no guarantee of success. Farrell has invited faculty input on his plan but has let it be known that the final decision will come from his office, probably sometime this spring. Farrell says that Berkeley may be able to negotiate for some unrestricted instructional funds to make up in part for the lost AES money. But beyond the outcome in this one case, the larger conflict over AES funds looms, and there's no simple resolution in sight.

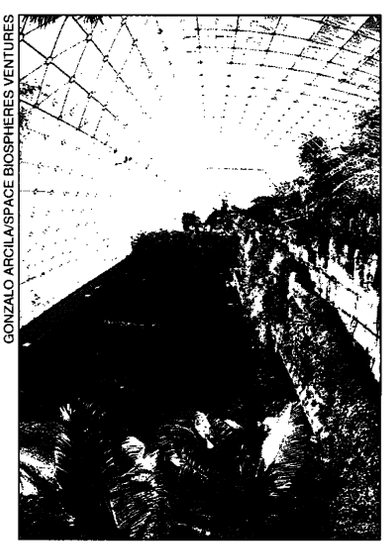
–Marcia Barinaga

ECOLOGY

Biosphere 2 Makes a New Bid for Scientific Credibility

To the believers, Biosphere 2 was the boldest ecology experiment ever. When the first crew of the self-contained ecosystem closed its airlocks behind them in late 1991, Biosphere organizers and a few outside scientists promised that the miniature world would nurture new insights into the workings of planet Earth. But many observers were skeptical from the start, and when the eight "biospherians" emerged from their 2-year sojourn last fall, they were greeted by grumbling that the $150 million, privately funded project in the Arizona desert had produced little of scientific value. Last Sunday, a second crew took its stations, and Biosphere's organizers promised that this time around, things will be different.

To accommodate more research, the project's managers have thrown open Biosphere's doors to outside scientists. During the first mission, researchers had to rely on the biospherians to collect samples and data—a restriction that limited the number and scope of the projects. But during the next 10-month mission, anyone wanting to pursue research approved by Biosphere 2's parent company, Space Biospheres Ventures (SBV), will be free to live and work inside the facility for anything from days to months. With that policy change, claims John Corliss, the project's scientific director, "Biosphere comes into its own as a powerful laboratory." He argues that the biospherians and their guests are now set to do serious scientific work on everything from the production of trace gases by plants and the soil to the factors controlling the buildup of leaf litter in mangrove swamps.

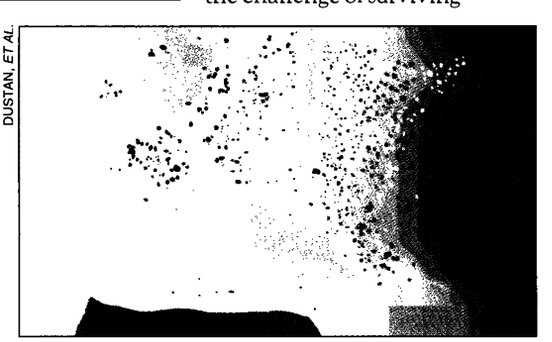


GONZALO ARCILA/SPACE BIOSPHERES VENTURES

Or are they? The new open-doors policy isn't mollifying scientists who feel that the Biosphere 2 managers are squandering the scientific promise of their facility, an engineering marvel that is the largest closed life-support system ever built. From the outset, these critics have complained that the project suffered from a lack of scientific planning, inadequate peer review, and excess secrecy. A low point came in February of last year, when the 11 members of a science advisory committee resigned en masse, claiming they had been left out of key decisions (*Science*, 19 March 1993, p. 1688). "It's a mini-supercollider that's being wasted," says Gerald Soffen, director of university programs at the NASA Goddard Space Flight Center, who was a member of the advisory committee.

Soffen calls the decision to accommodate visiting researchers "a step in the right direction." It's little more than a Band-aid, though, he and other critics say. "They can [now] get a lot of people to tinker in there," says geochemist Wallace Broecker of Lamont-Doherty Earth Observatory, who has directed some experiments at Biosphere and extols its potential for studies of how high carbon dioxide levels affect plant metabolism and soil composition. But he and others say the underlying problems are still there—and Soffen says they flow from a deeper malady. Biosphere's founders, he says, are "mixed up with theater," more eager to create an emblem of new-age environmental consciousness than they are to do science.

More sympathetic observers like biologist Harold Morowitz of George Mason University argue, however, that Biosphere shouldn't be expected to provide "hard-nosed, data-driven science." These observers point out that the biospherians and many of the scientists associated with the project have, as geneticist John Avise of the University of Georgia puts it, "a lot of things to preoccupy them other than cold, hard biology." Chief among them, they say, has been the challenge of surviving



DUSTAN, *ET AL.*

Ocean in miniature. Biosphere's 40-meter-long ocean *(top)* and a map of its corals.