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The Ecology of Buildings

By Regina Radford

Building Ecology: Hal Levin of the Santa Cruz, CA-based consulting firm Building Ecology Research Group first used that phrase in 1981 as the title of an article in the now-defunct magazine *Progressive Architecture*, where he discussed his early research on indoor pollution. Once people dismissed the notion of poor indoor air quality and its effects. The world of facilities management has certainly changed, as have the concepts regarding the relationship between the natural and the built environment.

"[When I was teaching], I saw that in buildings and in engineering research was very static," says Levin. A professor of architecture and environmental design at Berkeley and environmental studies at the University of California at Santa Cruz, Levin turned to the study of ecology to improve the design and management of commercial facilities. "It seemed to me [instrumental] to apply the principles from the field of ecology to better understand how buildings were affecting people and the larger environment and also how people and the environment affect buildings," says Levin.

Examine a standard ecology textbook. Basically, it is organized in two ways. Either the textbook discusses all the different components of an ecosystem, from the soil to the animals, and then details how these components work together as a system; or the textbook examines the growth and decline of populations and then breaks down into the individual components of the ecosystem. Adds Levin, "I think we need to see buildings as part of dynamic, interdependent systems. We can focus on components, but we need to keep in mind that interdependence on other parts of the system."

From opening windows and propping open doors to bringing in fans and space heaters, occupants adapt facilities to meet their temperature needs. Levin believes these adaptations are not neutral to the facility and must be understood and taken into account. Also, the way facilities and parking lots warm the outdoor environment is being researched in recent years.

By examining the whole system, for example, facilities managers can better respond to poor indoor air quality issues relating to mold. "Mold spores are everywhere, but you do not have mold growth everywhere. It is only when you have the right amount of moisture and certain temperature conditions," says Levin. By understanding when and where mold can grow, become stressed,

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> "My definition of building ecology is the study of the **interrelationship of buildings with their occupants and the larger environment.**"
>
> — Hal Levin, Principal, Building Ecology Research Group, Santa Cruz, CA

and produce toxic gases, facilities management departments can stop problems before they start.

According to Levin, over the last 20 years facilities management departments in government and upscale, commercial facilities devote the most focus on indoor air quality issues. The interest is slowly rising in the community at large because of three drivers:

- The threat of lawsuits from injured occupants.
- The increase in IAQ research proving the inherent dangers.
- Tenant amenities.

"There is the carrot and the stick. As vacancy rates go up and occupancy goes down, it becomes a more competitive market and building owners are looking for something to get the edge," says Levin. Increasingly, tenants are looking for lease provisions that allow them to react quickly and effectively to IAQ problems.

In educational facilities, the importance of IAQ is emerging. "Indoor air quality is a big, big deal in schools; no one is going to sit there and say I want my kids to have worse air quality. It is just not going to happen," says Quentin McArthur, McQueeny-Lock Co., Kansas City, MO, a HVAC manufacturer representative.

At Blue Valley #19, a middle school in a suburb of Kansas City, KS, McQueeny-Lock provided a York Flexsys underfloor air-conditioning system for the school's raised flooring. The highly energy-efficient facility is due to be completed in June 2002. School officials chose raised flooring for its flexibility in terms of cable management and technology readiness. However, the use of underfloor cooling allowed for the reduction of complex overhead ductwork, making installation cost-effective.

"Typically someone doesn't choose to go with raised flooring because of a superior underfloor air-conditioning system; it pains me but I have to admit it's typically the tail not the dog," says McArthur. According to McArthur, the underfloor air-conditioning system is more energy efficient than a traditional overhead system with the added benefit of ease of maintenance, greater user control, improved IAQ, and comfort. With underfloor cooling, occupants get the direct benefit of the coolest, freshest air in a space, while overhead systems mix fresh and used air at the ceiling level. Occupants can also reconfigure floor air diffusers. "Comfort and IAQ: Those two things lead to a much more enhanced learning space," says McArthur.

The upcoming Indoor Air 2002 is a scientific and professional conference for the international IAQ community to gather every three years to review their research, and will be held in Monterey, CA, June 30 - July 5 (**www.indoorair2002.org**). Levin, coordinator of the event, recommends the seminars on policy-making from around the globe.

A lot has changed since the 1970s, and with continuing education, facilities managers and building owners can create and maintain healthy environments.

Regina Raiford (**regina.raiford@buildings.com**) *is senior editor at Buildings magazine.*

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