BUILDING ECOLOGY 3/1/80

Although strictly speaking, ecology has come to mean the relationship of living organisms to thier environment, it's origin is from the Grekk workd oikos meaning house or place. Thus, the concept of building ecology appears redundant. In fact the built environment is not essentiazlly composedc of living organisms (although there are a great many living organisms at the micorspopic scale inhabiting the built environment) we use the term building ecology to mean the study of the relationship between the built environment and its living inhabitants. This definition includ3es all aspect- of the building of the environemtn including the materials of which the built environmdnt is created which come from the natural environment, the construction of the built environemmrt, its habitation, maintenance, and ultimate disposition or decay. Thus, we are concerned with the relationship between the human animal and the habitat s/he ~~has~~ created creates.

concentrations increase toward the tops of tall structures. Urban noise levels and other pollutant levels have reached unprecedented proportions (with a small number of short-lived, notorious exceptions) in new combinations of which we lack any prior experience.

3. There is a potentially large magnitude, synergistic effect of combined stress agents. Our knowledge of such effects is extremely limited and suggests that commonly the combined effects of individual physiological insults will result in orders of magnitude multipliers on the known effects of separate stress sources. It is virtually impossible to understand all of the potential interactive effects; the combinations and permuatations are nearly infinite. Our limited knowledge suggests that extreme caution is warranted in the use of any most known carcinogens in combination with others or even with other stressors. Similarly, chemical toxins producing chronic symptoms often act synergistically. The most careful monitoring is lacking experience to be effective, and such monitoring is itself far beyond our capability in any but the most precious circumstances such as in space ships or submarines. Even in those two situations, medical counterindications abound and puzzle researchers.

4. There is a lack of information about the individual stressors in most cases which magnifies the difficulties in understanding subtle, long-term effects of separate

or multiple agents. The long lag time before carcinogenic effects appear, are recognized and attributed to the correct source, tested on laboratory animals and examined through epidemiological studies, and confirmed as hazards results in the widespread exposure of large populations as well as the contamination of potentially large proportions of indoor environments. The certainly much longer delays prior to the appearance of mutagenic effects raises the spectre of irreversible damage to the human species gene pool.

3/16/80
Bldg. Ecol.

1/2

Additional sections for paper

1. The Ecological Approach - what is it?
   a. Diversity and stability tendencies
   b. Ecosystems analysis - interconnections
   c. Dasmann prescription R.L. Smith 76 p. 28 - diversity
   d. Effects of bldgs on health over time
   e. Ecological costs: changes over time
   f. Design/analysis vs. Materials/regulations

2. Various audiences, various interests, various uses
   a. Architects, Engineers, Designers, Builders:
      1.) Better bldgs for users
      2) Liability - Responsibility - Future of professions
   b. Scientists
      1.) Import of recog. & address limitations of trad. approaches
      2.) Areas of necessary basic & applied research
         a.) Indiv. and Interactive effects/relations
         b.) Principles of interactive effects (laws, guidelines)
         c.) Suspected hazards
         d.) Technique/method for epidemiology
         e.) Risk analysis/Tech assessment/invest strategies
         f.) Monitoring approaches, programs
   c. Policy-makers
      1.) Provision of basic protection: Energy/Vent'n/Health
      2) Short/long-term issues approaches: energy, industry, health, economy
      3.) Burden of proof shift
      4.) Cost of damage - liability, responsibility

d. Legislators

1.) Encourage research, innovation, provide min. health protn
2.) Perf. standards for healthy envts - broad. legisl.
3.) Establish info/monitoring program immediately
4.) Develop strategy for focusing liability/resp.

e. Manufacturers

1.) Assume resp.'y, liability - econ. self-defense
2) Develop "safe" products
3.) Provide full disclosure of products' contents/compositions
4.) Expand test programs

f. General Public

1.) Learn basics
2.) Remove greatest hazards
3.) Mitigate known & susp. hazard effects not removed
4) Basic health program - general - food, sleep, exercise, etc.
5.) Vent., nat. light, no toxins (geno-tox) limited chron. toxins
6.) Trust senses, instincts - organoleptic techniques
7.) At home:
    a.) check gas appliances: operation, ventilation
    b) install and use proper vent hood at cooking appliance
    c.) remove chemical hazards - cleansers, hobby, etc.
    d.) install good ventilation system if not already there
8.) At work:
    a.) require adequate ventilation
    b.) obtain comfortable lighting, preferably daylight w/ desk supplement
    c.) avoid toxic chemicals

4/11/80

REPEATED MISTAKE OF UNDERESTIMATED HEALTH RISK INVOLVED IN BLDG PRODUCTS, SYSTEMS

DESIGN OF UBC SPEC PERIMETER FOUNDATION ASSUMES POOR QUALITY CONTROL AND CHEATER/PROFIT-MOTIVATED SHORTCUTTING

HOW TO MEASURE-DESCRIBE NEG HEALTH IMPACTS OF BLT ENVT

THEORY OF BLT ENVT/ANALYTICAL FRAMEWORK – WHAT ARE THE MAJOR PARAMETERS? HOW DIFFER INDOOR-OUTDOOR? HOW DIFFER NATURAL-MAN-MADE? BASIC/ESSENTIAL DIFFERENCES DESERVE SCRUTINY.

ENVIRONTAL DESIGN IN AN ECOLOGIC FRAMEWORK: SUSTAINABLE ARCHITECTURE

HUMAN ECOLOGY IN THE BUILT ENVIRONMENT: MAN AND THE BUILT/MAN MADE/WORLD-WIDE ENVIRONMENT; DESIGNS FOR HUMAN HABITATION (PHYSIOLOGY, PSYCHOLOGY).

PROPOSE A JOINT PROGRAM UC CED CPDR W UCSC ES

INVOLVE CURRY/REPPER/SINSHEIMER/BANHAM/HOOPER W/ HEYMAN/BENDER/HERSHEY/HOLDREN CHRISTIANSEN/DUHL

ENVIRONMENTAL SCIENCE/DESIGN/STUDIES: WHAT ARE THEIR COMMON INTERESTS? MAN/ENVIRONMENT ECOLOGY

ENERGY/RESOURCES/ENVIRONMENT

ENVIRONMENTAL DESIGN SCIENCE: ENVIRONMENTAL BIOLOGY/CHEMISTRY/PHYSICS STRUCTURAL/MECHANICAL/ELECTRICAL/ENERGY

TAKE A TACT W/ ALL THE NEW PROGRAMS COMING TO UCSC

ENGINEERING, ECO-DEVELOPMENT A-T, ENVIRONMENTAL DESIGN/PLANNING, LANDSCAPE ARCHITECTURE, TOXICOLOGY, ENVIRONMENTAL PHYSICS

4/12/80

The difficulty with human intervention through massive technology in natural, biological systems, or with introduction of synthetic or non-natural organics or other devices, is the lack of self-limiting ecosystem controls or their eradication can lead to ecological disaster as illustrated by atmospheric nuclear testing, insecticides such as DDT, or detergents. (Commoner, 1967) pp 18 ff.

A major mistake in evaluating fallout hazard was reliance on average values of fallout exposure since such reliance can conceal areas in which special circumstances combine to intensify danger. V_{13}, in arctic, lichens absorbed dust, caribou ate lichens, eskimos ate caribou (Commoner, 1967, p. 18)

Difficulty because of wide disparity between physical and biological sciences.
Commoner, 1967, p. 25

Nuclear test is more than experiment in physics and engineering; Also test in env'l biology.
(Ibid)

Well-established principle in environmental biology: anything which reduces complexity (diversity) of nat'l biological system renders it less stable and more subject to fatal fluctuations. (op. cit p. 26)

Modern science and technology are simply too powerful to permit a trial and error approach
(Commoner '67 p. 29)

PARADIGM OF BUILDING - DIVERSITY OF COMPETING BUT SELF-REGULATING SPECIAL INTERESTS - MUST BE RETHOUGHT. POWER OF BUILDING TECHNOLOGY TO IMPACT BIOLOGICAL SYSTEMS CONTAINED WITHIN THEM (PARTICULARLY HUMAN

PHYSIOLOGY) HAS GROWN SO RAPIDLY AND REACHED SUCH MAGNITUDE AS TO REQUIRE SCRUTINY OF OTHERS. BUILDING ITSELF, BUILDINGS, & THE HAZARDS IN THEM HAVE GROWN SO RAPIDLY AS TO PRESENT AN ALMOST ENTIRELY NEW, UNKNOWN SET OF PROBLEMS WITH VERY FEW PRECEDENTS IN RELEVANT EXPERIENCE.

4/13/80

BUILDING SCIENCE (ARCHITECTURE, ENGINEERING) ARE BASICLY APPLIED SCIENCES WHICH LACK FOUNDATIONS IN A BASIC SCIENCE COMPLETE WITH LAWS, THEORIES, METHODS, TECHNIQUES, ETC. THERE IS HEAVY RELIANCE ON PHYSICS AND SOME CHEMISTRY, BUT VERY LITTLE ORGANIZED BODY OF KNOWLEDGE. MEDICINE HAS MEDICAL SCIENCE WITH ROOTS IN BIOLOGICAL AND, MORE RECENTLY, BIOCHEMICAL RESEARCH.

4/19/80

It appears a reasonable assumption that current building construction, operation, and maintenance trends will result in an escalating deterioration in the health of building occupants. Initially effects will be increased respiratory illness. Other effects will not be quickly recognized and correctly attributed to their building sources due to a lack of experience with the effects of building hazards. Inexperienced medical doctors, public health scientists, and public health hygienists will not quickly recognize the environmental sources of familiar symptoms. Lengthy delays between chronic exposure and the appearance of cancers as well as a likely delay in the widespread attribution to indoor environmental sources followed by the usually slow process of demonstrated causality will result not only in a very large number of cancers but also in a widespread distribution of carcinogens in the built environment prior to their recognition as carcinogenic. It is possible that the probable increase in teratogenic effects will alert scientists and regulators sooner, but even at the most rapid pace imaginable, a very large number of mutagens will also have been introduced and exposures will have irreversibly taken place.

In indoor environments with controlled low ventilation rates (under 1.5 ach) even the release of small contaminant quantities results in large concentrations due to the ~~low amount~~ small mixing volume available. (WHO Working Group, 1979)

NOTES ON SUSTAINABLE ARCHITECTURE

PRINCIPLES

1. MUST BE STABLE AND DIVERSE : ECOSYSTEM
2. MUST NOT OVERTAX (Define) EARTH RESOURCES: CONSTRUCTION MATERIALS, ENERGY, LAND, AIR, WATER
3. MUST NOT DESTROY STABILITY OF ENVIRONMENT
4. MUST NOT THREATEN HEALTH OF HUMAN OR OTHER SPECIES
5. MUST SUPPORT NOT SUBVERT HUMAN PURPOSES/IND. SATISFACTION

CURRENT TRENDS AWAY FROM THE ABOVE RULES

1. INCREASING HOMOGENEITY (INDUSTR. TECH, MASS PROD., NAT'L & INT'L DESIGN, CONSTR. MANUF, DISTRIBUTORS, RULES/LAWS/CODES
2. WASTEFUL USE OF RESOURCES: MATERIALS - CONCRETE PERIMETER WALL FOUNDATION, PETRO-CHEMICAL MATERIALS (PLASTICS); GLASS NOT FOR LIGHTING; PLUMBING/ELECTRICAL OVERDESIGN FOR CODES/UNIONS/ INDUSTRIAL LOBBIES

   ENERGY - PASSIVE/ACTIVE VS MECH HVAC; ARTIFICIAL VS. DAYLIGHT; NAT. VS FORCED VENTILATION; EXPENSIVE (ENERGY) WATER SUPPLY, WASTE DISPOSAL, SEWAGE TREATMENT; CONSTR. METHODS; OPERATION; MAINTENANCE; DEMOLITION.

   LAND - SPRAWL; EROSION; WATERSHED; AGRI POTENTIAL

contemporaneously have a higher potential for

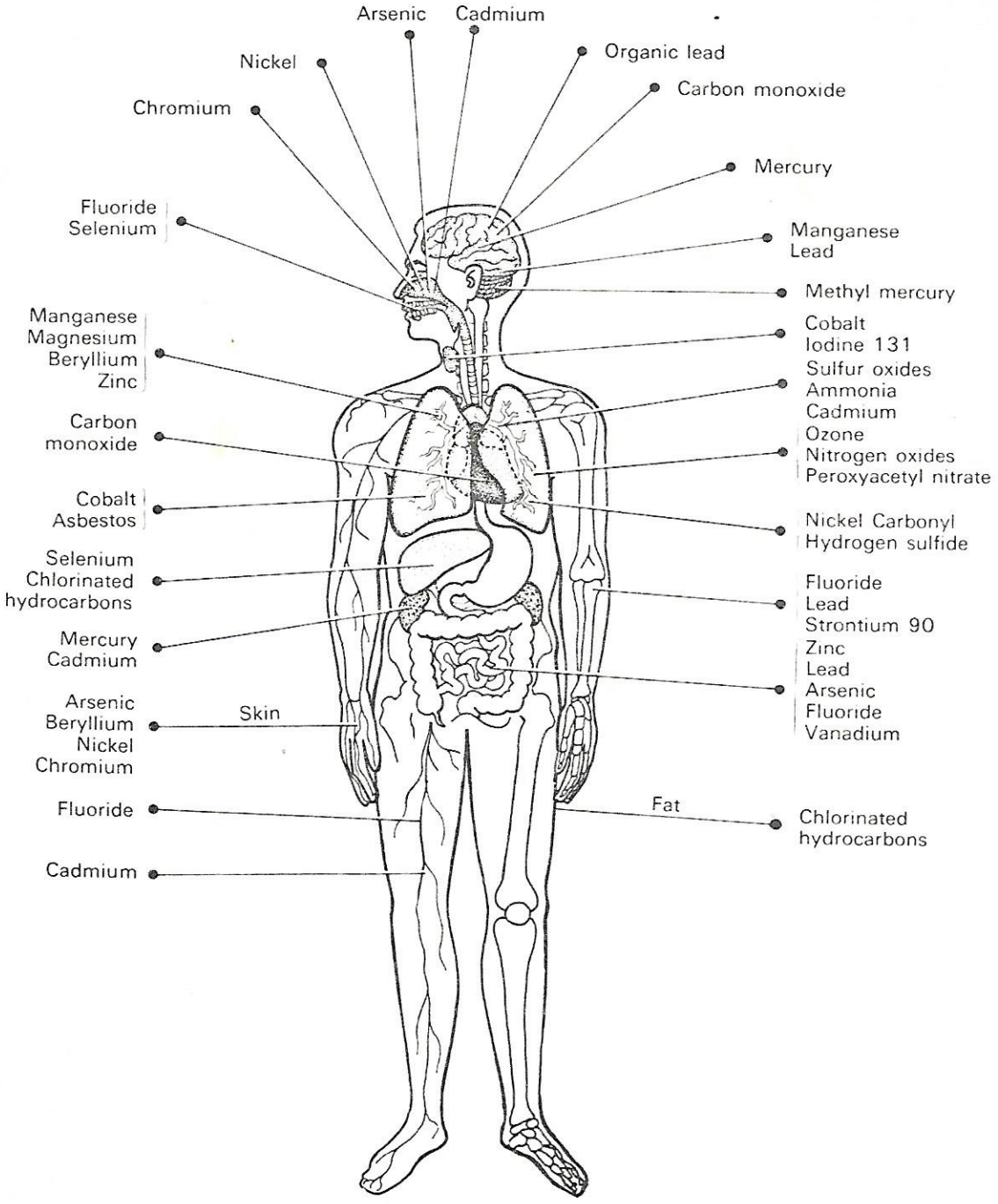

Fig. 6-18. Main targets of major air pollutants.

FIGURE 1

ENVIRONMENTAL CAUSES/SOURCES OF DISEASE/ILLNESS

(Conceptual arrangement for environmental design discussion)