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The making of an architect - where do we go from here?

Comment enseigner l'architecture demain?

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Architectural Education as a Survival System - Resource for Human Survival - Food, Fiber, Energy, Shelter

"Resource for Human Survival - Food, Fiber, Energy, Shelter" sounds a bit like a professional mantram, a prayer for architects and regional planners to be repeated over and over again in order to internalize a difficult meaning. Accordning to the literature and to many conference prodeedings, shelter has been the main topic for architects, internationally, since they appeared on the scene. The human settlement analysis in the 1960's and early 1970's was based on the premise that if we only understood this topic, we could promise new concepts for urban and rural areas. The reuse of old buildings, following shrinking economic resources in the 1970's and early 80's, was heavily dependent on energy savings concepts, and as far as we can see, we will have to repeat the more intensified form of the mantram "Resource for Human Survival" in the future if we are looking for ways out of the present stagnation and atrophy in architectural concepts.

Today, however, architecture must take on a new meaning. The direction is set by the energy crisis. But so far, architects have responded only in technical terms: better insulation, best buffer zones, more efficinet fireplaces, furnaces and heating systems and, therefore, lowering energy consumption. We propose that we must look at the energy crisis in a more fundamental sense, i.e. in finding ways in which architectural education can contribute to the survival of the next generation - directly in the better use of existing resources of which energy (in the sense of fossil fuels) is only a part.

We all know the way we live has no future. If we continue in this manner our schildren as grown-ups will find the rivers, lakes and seas without life, the soil and their male-friends without fertility and the air deadly to breath. We know that in our generation we have managed to deplete more resources which nature took millions of years to produce than any other generation before us and probably any other generation after us. We are the generation who have profited in terms of ever increasing comfort and at the same time we are the generation who can see the price we have to pay most clearly: increasing alienation between people and the work they do, between people themselves and between the natural and the man made environment.

Until a few years ago we had the comforting belief that science and technology would solve all our problems. Now we know that they are both part of our problem in that they have acquired a dynamic of their own. Technological change happens faster than our metabolism can adjust. The danger from nuclear, chemical and biological weapons and even so-called "peaceful" uses has multiplied beyond belief. 90 % of all Americans believe that they will not die a natural death; in Europe books which explain how to effectively commit suicide are bestsellers. In Berlin, recently, a poster has been printed for use in non-European countries with the heading "Book you trip to Europe, as long as there is a Europe!" In all parts of the world, we encounter the common feeling that time is running out and that we have got to do something.

Architectural education (at least) will have to contribute to solving these problems and this may in fact mean that the architectural concepts of the 1980's and early 90's will have to become "survival concepts". Not unlike the early miner's settlements in the Ruhr Valley, in Northern England or in West Virginia which provided shelter and food during times of economic recession and war, today's urban, suburban and rural settlements could provide a community model for survival in the difficult times ahead. Not unlike the community and production centers (which schools are in many developing countries), architectural educational facilities in highly developed countries may have to teach what to produce and how to use natural and man-made resources intelligently. Architects, administrators and community members who comprehend the present situation will be called upon to initiate and help this change to happen, to co-operate rather than harnass one another.

Many people have lost faith in educational co-operative systems and their capacity to deal with change. We don't think we have got a choice. Also in terms of institutions we must use the resources we have got. Co-operation between disciplines was, and in some places still is, the most important social service which exists in many universities all over the globe. Co-operation has acted, in the past, as an agent for change and it will do so in the future.

How then can we as teachers of architecture help to turn something like the interdisciplinary co-operative movement into a survival system or more simply into a model of good ecology, showing students and architects how they themselves may contribute in their own houses, gardens, fields and neighbourhoods to make better use of the resources that remain?

How could planning a settlement or a farm contribute to cleaner air, saving water and energy, recycling materials and improving the environment in a time when few if any new settlements or farms are being built, money for retrofitting is scarce and, last but not least, motivation for innovation is lacking?

After 15 years of planning, building and research, we have worked for the last 10 years as professor in a German University and researcher in a semi-government agency, trying to link ecological research to the projects of urban renewal in the very dense city of West Berlin, tackling just those questions. Some of the answers we have found certainly apply to built the environment. One of the best is that ecological planning and building can be done at reasonable cost.

Let's take the air as our most important resource first, polluted by industry, by motor vehicles and by heating and cooling exhaust from solid fuels. How are we as people who have to do with architectural education capable of improving its quality?

- Firstly, by seeing to it that architectural schools are plannend in a decentralized manner. Thereby, we reduce the need for vehicular traffic, encourage pedestrian and bicycle links. We may even integrate the production of food into the architectural school with other community and neighbourhood uses.

- Secondly, by adding trees and shrubs or plants which cover horizontal and vertical surfaces of university and polytechnic buildings, thereby, contributing to binding dust, balacing the moisture content of the air, contributing oxygen and filtering excess water before it reaches the ground.

- Thirdly, we may use better zoning in our buildings in combination with ecological patterns which preserve or construct a new biotope that allow students to work with, rather than against, natural cycles.

- Fourthly, by combining every saving measure with the production of foodstuffs, e.g. by choosing productive rather than ornamental plants and adding solar heated glass houses for year round growth of vegetables, salads and fruits to south-facing facades on our architectural school buildings. In this way, we begin to look at energy savings in a wider sense - orientation to the sun in site planning and energy saving natural devices in zoning regulations to be incorporated into land use policies. Alone the combination of greenhouses to the south and trellises for food production to the north of a building - thereby creating shade and lowering air temperatures - introduces a heating and cooling system which works without energy all year round as well as a considerable contribution to our nutrition - and that on the site where the students live or work.

One of our most endangered industries through increasing centralization and large scale mechanized monoculture production is the agricultural system. Already we have lost 50 % of our arable land globally which has become a complete desert and on the remaining land overall productivity has dropped dramatically. Conservative estimates show that traditional farming methods produced 300 units of energy output for 100 units of energy input. "Modern" methods hardly reach 10 units of output with the same input (1). In addition to that figure, 95 % of the energy used to bring the food onto our tables is lost in storage, transport and packaging and a large percentage of our rainforests today are cut for packaging materials which serves to keep our food in an edible state.

More important than exact figures here, is the fact which holds everywhere, that any system which uses up more energy than it produces is going into a state of chaos.

To add the producton of food to open spaces in institutes of higher learning, on walls, on roofs, and in some rooms (with added glass houses) of educational buildings, etc. will help the students and staff to become part of the survival system in the next stage of the energy crisis which is going to be the food crisis. In "Global 2000", the report

prepared for President Carter, the threat of world hunger is supported by all the evidence collected - not only the industrially developing countries will be effected, but also the higly industrialized countries. A recent article in the German magazine NATUR with the titel "Final Destination Hunger", summarizing the stituation in Europe, concluded with the following statement: "No continent is threatened by hunger to quite the same degree as Europe. The present excess of milk and butter do not change this bitter truth. Quite to the contrary" (2).

Producing nutrition in architectural educational buildings as a model for what can be done in every house, office and factory not only presents a solution to revising the uphill trend in food prices and the downhill trend in the quality of food. It also means respecting and understanding the earth as a working partner. Understanding its rules we may also demonstrate a new combination of existing (but soldom integrated) labor saving methods of production.

- poly-culture rather than mono-culture;
- the use of mulch (a covering of leaves, twings, straw, hay and/or organic waste) rather than bare earth for growing plants;
- perennial rather than annual plants.

Taken together, all three reduce the work of planting, watering and weeding to a mere trickle and eliminate at the same time the need for costly garden equipment, insecticides and artificial fertilizer - another high energy item. Today all atomic power plants in Germany produce less energy that is used in the production of the necessary artificial fertilizer (about 8 tons/hectar).

Without energy consuming fertilizers and insecticides, however, the new hybird seeds which are replacing regionally developed and adjusted seeds will not produce their optimum yields. These costs are seldom if ever mentioned in comparisions between new and traditional yields. Neither is the loss in the quality of food nor the threatening depletion of genetic resources nor the ever increasing dependency on the few multinational firms which dominate the seed business globally. Only 8 - 10 seed multies, for instance, control the wheat business and determine who gets what for which price when. In other words they decide who has to eat and who can strave (3).

Taken together we have all the data we need for wanting change and better still all the methods and technologies we need for implementing it. Examples all over the globe show that systems fo small scale production and recycling work:

- Ruth Stout, self-sufficient in New England up 80 years of age before she died, provided the experience and techniques for "no work gardening" (4)
- Masanobu Fukuoka in Japan shows how several harvests may be acquired from a small piece of land without digging, plowing, artificial fertilizer and pesticiedes or mechanized equipment (5);
- Sonia Wallman, Bruce and Sarah Kaufman have proven that the year round production of vegetables, salads, herbs and fruits for a four-person-family is possible in a 20 square meter glasshouse and with 15 minutes work per day in New England (6);
- Bengt Warne's Nature House (7) in Sweden and the Farallones Institute in California (8) show the possibilities of autonomous one-family-houses also in terms of water and energy in suburbia as well as innercity areas;
- the New Alchemists in Massachusetts (9) and the Permaculture Institute in Tasmania, Australia (10), both demonstrate how the integration of plants, animals, water energy and architecture results in systems in which an overall maximum yield may be achieved through very much less work and energy input than in traditional systems.

In using these ideas and examples for remodelling or building new houses, the recycling of water and solid wastes will become an integrated part of the design. Humus toilets, for instance, replacing water closets, save not only approximately 60 liters of water (of drinking water quality) per person per day but also recycle human waste which is turned into roughly one bucket full of the best fertilizer per person per year (11). Well functioning models don't smell at all as they guarantee an aerobic decomposing process, ventilating air through the material at all times and taking it out through a small chimney stack. This example shows that ecology and technology are by no means enemies, but may be married sucessfully. Each architectural school could in stall one more to provide experience with this device as well as to provide data on its use and efficiency.

Where humus tiolets are not acceptable, used water from washhand basins and showers, known as "grey water", may serve to replace drinking water for flushing toilets. Otherwise this water serves well in automatic drip watering systems for plants on facades, in glasshouses or gardens, bringing the moisture to where it is most needed, at the roots of plants. "Heat pollution", i.e. the energy contained in the warm water, may be recycled through heat exchangers which warm up water of lower temperature in the hot water system.

Architects can contribute to ecological improvements alone through the choice of materials. By using porous surfaces on yards, roads and parking areas instead of large sealed surfaces architects or civil engineers can allow rain water to be filtered through the earth before it reaches the ground water. Taken together, these measures return every bit of water used in any building, in a clean condition to the total system of ground water, streams, rivers, lakes and finally the sea.

The separation and recycling of wastes may be a first and most feasible step toward turning architectural schools into a model of good ecology. It is not only economically feasible, i.e. often cheaper than unseparated garbage collection but may actually add money and resources to special projects, i.e.:

- organic wastes, may be turned into soil, through composting or directly under mulch, thus supporting the production of food;
- paper recycling reduces the destruction of forests and some of it may be used in arts and crafts projects;
- aluminium recycling produces the highest "energy return" as only 0,18 tons of oil are necessary to produce aluminium for recycled waste while 8,8 tons of oil are required for the same amount from bauxite (the raw material);
- similarly, glass compared to plastic containers offer enormous energy savings, in the one glass bottle which holds 1 pint of liquid requires more than 1 half pint of oil in terms of energy inputs for ists production ;
- old or left over wood in the building process may be chipped and used for mulching or as a good resource for arts and crafts projects or for heating if you have an efficient stove;
- metal waste has long been sold as scrap metal;
- textiles and other second hand goods may be sold in jumble sales or recycled for new products such as carpets, dolls, upholstery, etc.; the natural textile material can be finally mulched or composted;
- plastics may become new plastic products of lower quality.

The separation of these materials reduces the amount of waste to about 15 to 30 % of the non-separated total vomume (12). In many countries such as Britain the separate garbage collection through students serves as an income producing venture for either social work or special programs. In Berlin (West), the separated collection of garbage by private firms is 10 % cheaper than the non-separated collection through the municipal removal service.

One argument against a more sensible use of resources is that people don't want to change. A second is that often good ecology is associated with returning to a subsistence standard of living. Both in fact are wrong.

Accordning to a study done by the Norwegian Institute of Nutrition in 1975, 76 % of all Norwegians think that their standard of living is too high and that they would rather live a simple life with what they need accepting limited income and career possiblilities (13).

In France a study of SOFRES for the journal "Elle" in 1974 showed that:

- 53 % of the population would accept a reduced level of consumption of it would mean a new way of life;
- 68 % would prefer classical hard wearing clothing to fashion clothes;
- 75 % look at one way packaging as a stupid waste (14).

In Germany the same trend has brought about steady gains in elections for the ecological alternative parties, especially the Greens.

In order to counter the second point, we would like to refer to André Gorz and his book "Ecology and Freedom" (15). His thesis is that goods which last, are simple to repair, and consume little or no energy and their production will result in a higher standard of living and fewer hours of work.

Instead of built-in obsolescence as for instance in the carpet industry which produces built-in faults through an extra production line so that carpets will wear earlier, we could have cheaper and longer lasting carpets which would take fewer hours of work for those who produce them and those who have to buy them. (Architects are those who often choose the carpets for their clients.)

Instead of producing clothes dryer which depend on electricity (and use up practically the energy prodeced by all atomic power plants in the U.S. - i.e. about 13 %), we should design our clothes drying facilities in buildings in order to use the renewable energy of sun and wind. Nobody who has seen the moon vehicles run with solar energy can say - we haven't got the technology.

Looking at the problems and the opportunities we have today, it all boils down to the question: which future do we want? Do we want a techno-fashist-system in which a small elite determines our needs and holds us increasingly in an infantile state of dependency or do we want what Illich calls a "convivial" society with small scale autonomous social and economic structures?

The building site, as we know it now, is a place to learn that there is a specialist for everything. This was useful up to a point. It is not unreasonable to propose, however, that specialization has reached its limits and that we should learn during our studies how to integrate and recognize the interdependencies of the systems on which our survival depends - natural as well as social. In other words, we have to make a place to learn und grow ecologically, giving back where we have taken, producing where we want to eat, learning to live in harmony with nature and each other.

It will take a long time to revamp the architectural profession to think and act ecologically. Why don't we start with revamping the physical and didactical fabric of our own architectural school to allow the students to experience their building as a survival system?

The physical and sensual expeience of planting, growing, harvesting as well as cooking and preparing food is a holistic one, a communal and community building one. Competition becomes ridiculous but learning to wonder and accept wholeness will be inevitable. In search for this expeience we hit on the concept of Permaculture.

Permaculture is a design for a perennial agriculture for man and his domestic animals. It is not just a "tree-crop" system, but includes tree crops in consideration of a fully-integrated design for energy and all the essential needs of man, achieved by using perennial plants placed in specific design patterns, and a wide range of domestic animals and biological building materials. "The overall aim of permaculture design is to produce an efficient, low-maintenance, productive integration of plants, animals, structures and man, with the ultimate result of on-site stability, and, food self-sufficency in the smallest practical area ...." (16).

It is the first agriculture designed to interpenetrate all city environments - indoors and on building exteriors - as well as in open situations. Permaculture envisages the relocation of food production within settled areas, leaving broad-scale agriculture for the production of fibres, meat, fuel, and free-range animals, replacing annual grain cultures for that purpose with rational ground-plan principles for the control of energies within, and external to, the system.

Relevant environmental and micro-climatic planning is invoked, and every element is designed to serve more than one function; every function to operate in more than one way. Planning for fire, climatic change, and the integration of appropriate technology is allowed for. Permaculture should result in a stable man-made ecology with long-term stability and low energy inputs, but high yields. All wastes are returned to the system.

It is strongly recommended that public and private plantings are (in future) designed for productivity, and that planners and architects design for the provision of essential food species as part of any future developments in settled areas. Using a very complex array of as many as 3.000 species in suitable environments (fewer in deserts and on coastlines) provision is made for climatic and seasonal changes. Manpower alone is seen as the essential energy for establishment, control, harvest and processing, so that there need be no dependence on fossil fuels, but there would be some provision of renewable fuels such as alcohol and methane gas from the system itself.

Sophisticated local design, operating in a feedback mode, should result in great energy savings in any society, so that design alone decides the eventual yield, which is

Margrit & Declan Kennedy, Berlin - Germany

a combination of product yield, energy saved, and energy generated in the system. Biological control plus environmental design is intended to minimise pest and plague, and ways are given to utilise pest species in a positive mode. An established permaculture would greatly reduce the paronoia of cities, and make it possible for isolated settlements to achieve more regional independence, without great external energy subsidy.
The costs are no more than those of cosmetic planting and annual agriculture, but the benefits may be crucial to survival of large communities should transport energy falter or fade.

All people can contribute work, skill, and facilities to devlop a permaculture, but the system needs little input of energy after establishment. It es seen as a way to unify society for its own survival needs, and should generate a cooperative spirit. The concepts of unused land, buildings, and unemployment would become abselete in permaculture planning.

What we need is the art to demonstrate where things belong - so that they can be productive in relationship to other things. Everywhere we ignore this principle, we get into teouble. Each product which is placed where it is not needed, needs energy to replace it or causes disharmony within its system. Disharmony is made unnecessary by placing each element in its correct place, according to its needs and what it produces. It would be good to demonstrate this principle on the buildings of our architectural schools, experimenting until we find the right place for each element we need in our daily life. In this manner, our experimental learning process (incorporating staff and students in an ever ongoing process of learning) could contribute to the survival of humankind - which at present is endangered through our own unecological behavior.

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