University of Oregon

SOLAR INCIDENTS

The Newsletter of the Solar Information Center
Vol. 8 No. 2 WINTER 1998

Sunlight helps to produce the food we eat

Towards A Community Food System

By Maren Tomblin

Solutions to the growing global crisis must include aspects of sustainability. Sustainability has various definitions, broadly speaking it is descriptive of a whole closed system existing in equilibrium. Therefore, sustainability encompasses all aspects of human beings and our interaction with the environment. Any serious discussion of sustainability requires a hard look at agricultural and food systems.

The necessary transition to sustainable communities cannot be made without sustainable agriculture. As Kenneth A. Dahlberg states in his essay,"World Food Problems: Making the Transition from Agriculture to Regenerative Food Systems"[1], "The magnitude of this latter transition ranks with the other great transitions: from hunting and gathering to agricultural to urban to modern to industrial societies". Many problems have resulted from the development of our agricultural systems over the past two hundred years. Generally, current western agricultural practice relies on monocrops as a system of raising food. This makes mechanized care and harvest of the crop is very easy, An individual plant or animal can be treated just like its thousand neighbors. Hand in hand with monocrops is the practice of planting only a few varieties of each species over the whole production area. Another tendency is that out of all the possible edible foodstuffs nature provides, we choose only a few

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The Solar Page

What is the Solar Information Center?

It is a student run organization sponsored by the ASUO and EWEB. The purpose of the Center is to serve as a research, education, and information center on solar energy and alternative energies, and their applications in architecture and technology.

One of its vital functions is to sponsor a lecture series on local, regional and global energy issues to promote a higher awareness toward conservation and renewable energy. The Center also provides an in-house information source of books, periodicals, video tapes, abstracts, proceedings, topic-files, product-files and a World Wide Web site.

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We would like to heartily congratulate **Hannah Wear** for the citation she received "In Recognition of Outstanding Achievement in Design" in the 1997 Solar Energy in Architecture Kyongju High Speed Railway Station Competition. This was an international student competition sponsored by the Korean Solar Energy Society with 250 entries from thirty-four countries.

And to Ross Leventhal, whose tireless work, excellent potlucks and energetic devotion has blessed the SIC for over three years, "BRAVO!"

News from the *American Solar Energy Society*

Boulder, CO

*This year's **National Tour of Solar Homes** broke all the records of previous tours, according to the American Solar Energy Society. More than 12,000 people visited solar homes in 42 states from Alaska to Florida on October 18, 1997. The homes on the tour represented diverse designs, prices, and building materials, demonstrating how renewable technologies can be adapted to local climates and architectural styles. Hundreds of solar homeowners volunteered to open their houses to the public for the one day event.*

The Solar Information Center helped facilitate a tour of homes in Eugene. Thanks to those who opened their houses for the day to more than 100 participants. The tour included a number of examples from sun spaces to strawbale, showing us all how solar and sustainable design is used to provide pleasant, healthful, and economic dwellings.

Thanks for the great tour and we look forward to seeing you next year.

The **Solar Information Center** would like to thank all who returned the REPLY CARD for our mailing list in the last issue of Solar Incidents. Your positive comments and constructive criticism are both helpful and wonderful to hear. Furthermore, we would like to thank the following for their kind donations: **Wanda Balentine, John Koenig, Phyllis and Richard Ricketts, Ana Rivas-Scott and Alan Scott, and Lenora Sliman.**

NOTE: to continue receiving ***Solar Incidents*** please send the **REPLY CARD** in the back of the **Fall 1997 issue or contact us.**

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SPECIAL THANKS TO **EWEB** FOR THEIR CONTINUED SUPPORT!

Environmental Resource Center Column

The Project

The Solar Information Center has been working for two years on a Capital Construction proposal, entitled the Environmental Resource Center (ERC). The proposal was submitted to the University Planning Committee on November 10, 1997. This building will provide students and community members with a facility that will encourage cross-disciplinary activity in environmental research, education, and public service. The facility would serve as a demonstration building for sustainable design as well as an educational resource for healthy systems and appropriate technologies. This monumental project will become a model of sustainability for the University and for the Northwest.

Cross-disciplinary collaboration in research, innovation and public service is essential to sustain the current momentum of interest at the UO in ecology and environmental issues. Bringing together groups from different areas of environmental study under one roof will strengthen the University's commitment to environmental issues, as well as draw public attention to a highly visible, built example of sustainable technologies.

Current Activities

The Solar Center is coordinating with Polly Welch from the Department of Architecture, a Winter term "feasibility study" for the ERC. This will be an group research course looking into programming issues, possible sites, sources of funding, encouraging student support, and appropriate technology and materials. The results of this course will be presented as guidelines for a charette during the 1998 HOPES conference (April 17-19).

We need your help! Your support for this project is crucial. If you would like to can lend your support, please give us a call.

Geothermal Applications in Greenhouses

by Eric Navickas

Direct use of geothermal energy for heating agricultural greenhouses is an attractive alternative to systems that rely on gas or electricity. Greenhouse heating has become a significant cost in agricultural production. The use of low temperature geothermal sources to meet these heating demands is gaining popularity where availabile due to its low impact and cost.

Geothermal heat originates from both geological and hydrological conditions that allow water to circulate deep into the earth, where the water is heated. A potential geothermal resource results when this heated water is carried back to the surface through a zone of faults and fractured rock. The two types of utilization available are electrical generation and direct use. Common greenhouse heating techniques take advantage of a direct use system.

Geothermal electrical generation, though a rich source of energy is often surrounded with controversy because of its environmental impact. It also requires very specific conditions that only exist at a limited number of locations. However, presently in Italy where geothermal energy was first converted to electricity, approximately one quarter of the electrical energy is supplied by geothermal plants. In the United States, The Geysers, a geothermal electrical generation plant outside of Clearlake, California, produces enough power so that it could supply all of San Francisco's electricity needs. This plant is presently working on a system to re-use waste water effluent from the community's sewage system to recharge their steam fields.

In comparison, direct use of geothermal energy has several advantages. Resource locations are common, especially in the western United States and do not require exceptionally

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Geothermal Applications in Greenhouses

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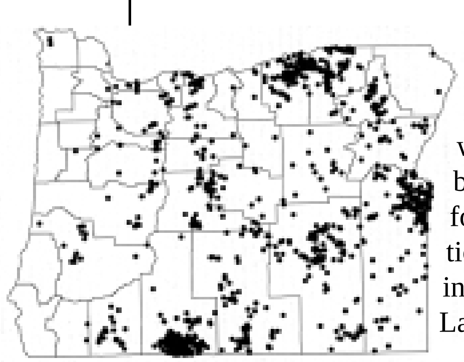
high temperatures; installation costs are relatively low and simple with minimal environmental impact; the resource can be transported with minimal heat loss, 0.1 degree C per kilometer; and the conversion efficiency is from 70% to 90% whereas geothermal electricity generation is only 5% to 25% efficient. Direct use systems tap the energy by drilling into a source of geothermal effluent. The effluent is either used directly to produce heat or is run through a heat exchanger. Many systems require little more than common well-drilling equipment.

Beyond agricultural uses, direct use has other applications including space heating and industrial applications including timber drying, milk pasteurization, and food dehydration. Direct space heating is taken advantage of in many places around the world. In Reykjavik, Iceland over 15,600 homes or 97% of the population receives heat from a centralized direct use system. In Klamath Falls, Oregon over 500 homes are heated geothermally utilizing single well systems to heat individual residences. Klamath Falls also uses a centralized system to heat much of the downtown, including a sidewalk snow melt system.

Greenhouses heated by geothermal means, though only utilized at a small fraction of their potential, are found around the world. Hungary boasts over 13 million square feet of greenhouses heated with direct use geothermal energy and Japan over 157,000 square feet. Both produce flowers and vegetables. A survey of geothermal greenhouses in the United States showed a total of 37 commercial operations active in 1997. The largest of these is owned by Geoproducts Corporation outside of Susanville California. The complex includes 30 greenhouses for the hydroponic production of tomatoes and cucumbers.

Here in Oregon, where the potential is all but limitless, there are four commercial operations in existence. These include The Greenhouse in Lakeview, Oregon that produces vegetables and potted plants in 1.2 acres of greenhouse; Liskey Greenhouses in Klamath County which produces mainly potted plants and some vegetables in 1.5 acres of greenhouse; Cove Hot Spring Greenhouse in Union County which produces tree seedlings in 0.2 acres of greenhouse; and Jackson Greenhouses in Ashland which produces potted plants. Research greenhouses also exist at the Oregon Institute of Technology in Klamath Falls where heated water is cascaded into ponds for the production of marketable giant prawns that require warm water to survive.



Geothermal Sites in Oregon

The largest of these operations in Oregon, is the Liskey Greenhouses. This greenhouse complex is located about ten miles South of Klamath Falls and was designed by Balzhiser and Colvin Engineering, Inc. of Eugene. The main greenhouses were originally built in 1978 to raise trees for reforestation. They are presently used mainly for the production of bedding plants, perennials, and tomato plants for sale in the local market. The main well used for the greenhouse heating is 300 feet deep with a water surface 40 feet below the ground. It can produce as much as 1000 gallons per minute of 195 degree F water. The water is pumped up to a tank buried atop a hill above the greenhouses. Water from the tank flows to the greenhouse by gravity at a temperature of about 180 degrees F. The houses are heated by a system of finned tube pipes below benches which hold the plants. A metal shield is placed over each heating tube to better distribute the heat under the benches. Additional heating is provided by fin-tube pipes around the perimeter of the houses. The effluent from the heating system is used to heat thirty-seven shallow tropical fish ponds. Eighty-five varieties of cichlid fish which are raised for pet stores in the San Francisco Bay area and Portland. The outflow from the ponds is then cooled in a large storage pond and finally used for cattle watering. This is an excellent example of maximizing the use of geothermal water by cascading it through a series of different uses.

The potential for similar operations in the western states is enormous. A survey done in 1994 found 2,193 geothermal wells with potential for direct use in Oregon alone. Costs and nonrenewable resource consumption could be greatly reduced in agricultural production or other applications, such as space heating and industrial drying, . It is apparent that we live in a region rich in renewable resources that are too often overlooked for much more costly and environmentally damaging energy sources.

Towards A Community Food System

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varieties of a fraction of the species available and plant them en masse over large areas of land. This practice dramatically reduces the diversity of life and food available to us.

A second problem with our current agricultural system is pollution. More visible and also more damaging than monocrops is the overreliance on petroleum products. This is one of the largest problem associated with agriculture today, “fossil fuel for food transportation produces 1/3 of global CO2 emissions and global trade accounts for 1/8 of global energy use.” [2] This figure does not take into account production or processing, but only energy used for transportation. The structuring of farms and processing centers further from their markets requires that food be transported long distances. It is estimated that the average mouthful of food travels 1,300 miles from farm gate to table. [3] This inefficient system uses so much energy as a whole that it is estimated that for every one calorie of food produced ten calories had to be used to produce it.[4]

Western agriculture is also negatively impacting our sense of community. Community’s importance to sustainability is difficult to measure, however without people willing to cooperate with each other there can be no hope of healthy functioning neighborhoods. Our farming population and communities are suffering as we rely less upon human power and more upon machinery to farm. Farming communities are becoming increasingly rare as small farmers sell out to large companies. “Only 2% of the population (U.S.) owned farmland in 1988, and 44% of land owners leased out rather than worked the farm...only 1.3% of the population farm.”[5] This figure shows how divorced most Americans are from the production of food they eat. Large agri-business firms operate huge farms throughout the U.S., thus discouraging smaller operations which could more easily handle diversity and lower impact farming. Family farms also give people more contact with food sources in their communities. Increased feeling of involvement and ownership often lead to a higher quality product, as people are invested more deeply in their work. Building more connection to food production within communities, through urban farming or community gardens, could only lead to a more sustainable lifestyle. (For this paper community garden and urban farm will mean any food production within city limits or its immediate surroundings.)

By the year 2025 it is projected that 84.8% of North Americans will live in cities.[6] If the goal of sustainability requires that food be brought closer to the consumer in order to lower energy use, foods will need to increasingly be grown in the cities. Urban farms decrease the need for transportation, because they are located in cities, near most consumers,. Food arrives at the market the same day it was harvested, reducing the need for processing and packaging, while increasing nutritional value. Because urban farms are typically small, they do not need as much machine-dependent labor to be kept up and rely instead on human labor. This decreases energy consumption and pollution. City Farmers, an organization to promote urban farming based in Vancouver, B.C., estimate that food produced near the markets could cut the energy used in the food system by two thirds , and that in Canada, the food system as a whole now uses 15% of energy used in that country.[7] Diversity is also increased by growing many different crops in more areas, and more individual decisions about varieties to use in planting. Simply encouraging the growth of food in cities could have a significant impart towards reducing energy consumption.

The impact of urban farming could be felt in the social realm, as well. Many Americans garden for pleasure. If these people were able to come together and organize urban farms in their neighborhoods, they would be able to increase a sense of community and share their garden’s products. This strengthening of bonds between neighbors would improve communities during a time when cities have become more sprawled and people feel anonymous or alienated. To quote Bob Woodsworth and Michael Levenston of City Farmers, “Ideally we believe that simply by changing from suit to jeans, digging up a bit of lawn, and planting vegetable seeds, the city person will begin asking

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A NETWORK OF GATHERING PLACES

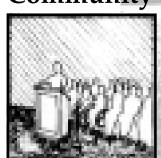
Strategies To Reclaim a Sense of Community Through Universal and Inclusive Design

Prashant Gaba, Todd Matthes, Sophie Robitalle, Jason Wilkinson

This group project was submitted to the "Universal Design for the 21st Century" international competition. The purpose of the project was to look at ways of increasing density in a typical Eugene neighborhood, while increasing the sense of community.

Tool Kit
for Community Empowerment

Community Involvement



Provide opportunities for broad discussion and decision making

Safety

Use site specific guidelines that allow community members to feel "safe" at all hours

User Involvement

Provide flexible design allowing individuals To readily manipulate/ change and interact with the environment

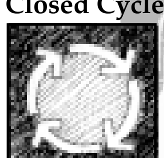
Universal Accessability

Create opportunities that allow equal access to services by a great spectrum of people

Community Sharing

Set stages that encourage the free exchange of goods and services

Closed Cycles



Encourage the awareness and additions of "whole systems", within the neighborhood - systems that use available materials and energy, and do not export waste products

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Boulder, CO

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The Solar Information Center helped facilitate a tour of homes in Eugene. Thanks to those who opened their houses for the day to more than 100 participants. The tour included a number of examples from sun spaces to strawbale, showing us all how solar and sustainable design is used to provide pleasant, healthful, and economic dwellings.

Thanks for the great tour and we look forward to seeing you next year.

The design focuses on creating opportunities for people to change and engage there built environment, rather than establishing a master plan. There are six boards: #1 is the existing neighborhood, #2 is the Goals, #3 is the proposed community resources, #4 is the possible centers of activity, #5 looks into future block designs, and #6 deals with houses and meeting the needs of people.

Intension
Universal Design must exist at many scales. It should consider not only ability but also race, income, gender, culture, sexual orientation, and life circumstance. In providing flexible responses to serve people's needs, Universal Design can become the social aspect of sustainability.

Goals
To provide a stage for building solidarity by treating opportunities for people to come together, and share at many scales.

To create a self-sustaining neighborhood by providing as many local services as possible, and reducing the export of waste materials.

To respond to and enrich the immediate context.

To encourage inclusive design meeting many of the needs of people of all income groups, cultures, and abilities throughout their lifespan.

* Solidarity . . . "Is a broader term than community. Solidarity implies mutual concern and responsibility on the part of people who may be socially or geographically distant"
S.M. Miller and Karen Marie Ferroggiaro - "Poverty and Race Action Council"

Canoe and Kayak Manufacturing Facility

Project:

To design a small canoe club with manufacturing capabilities to produce and repair wooden canoes and small rowing shells. The site is on the millrace in the Riverfront Research Park, next to the University of Oregon.

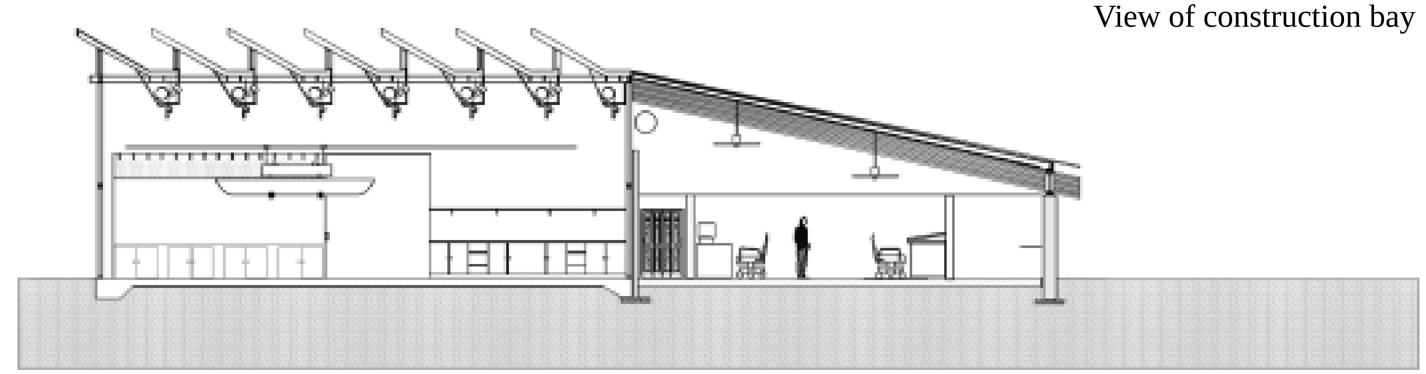
The South facing sawtooth roof allows natural light to provide efficient and high quality light for the construction bay. This reduces electrical costs and lowers heat gain at the same time. Overhangs prevent hot summer sun from entering the space and allow winter sun. This helps warm the thermally massive concrete floor.

The building tapers to the north, thus reducing inefficient northern exposure. Clerestories in the showroom provide neutral north light for optimal viewing conditions while also reducing electric costs and heat gain.

View of Entrance and Canal

Arch 584 Fall '96
Professor:Otto Potticha
Student: Ben Webb

View of construction bay

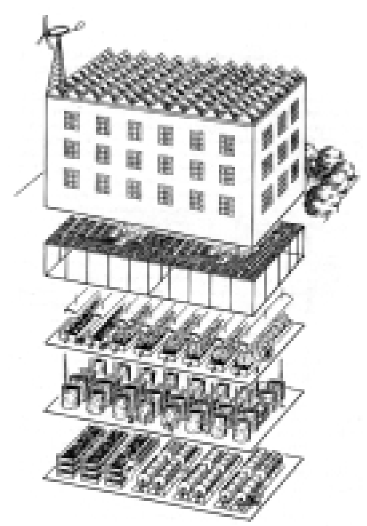


SECTION LOOKING WEST 1/8"=1'

questions about his environment and about his urban behavior and thinking patterns... By being outside he will see his neighbors, have time to chat about their common work, share some of the harvest and thus contribute to a less alienated community."[7] Being in closer contact with the earth, their food source, and their neighbors, would enable people in a community to lessen the feeling of alienation so prominent in cities. Makela Mangrich, who participates in a city-sponsored community farm in Dubuque, Iowa had this to offer when asked about her experience of community in gardens: "When people are surrounded by something beautiful, like a garden, it is very easy for acquaintances to become friends." She added that community gardens foster a sense of ownership, safety and common purpose between people.

In order to encourage urban farms, food production in cities should be designed to be both more efficient and appealing to a greater number of people. John and Nancy Todd of the Ocean Arks Institute, based in Cape Cod, Massachusetts, have come up with ideas for ways to incorporate farming into the cityscape. The Todd's designs often make use of vacant or underused areas of cities which could be easily converted to food production. If realized their designs could be attractive, healthy, productive, and bring organized food production into the cities, thus avoiding the issue of large scale transportation. Two spaces designed by the Todd's are particularly innovative. The first involves converting empty warehouses into multistory "food factories". The are slated to be covered in solar cells in order to provide electricity to grow lamps, for the crops inside. Currently the efficiency rate calculated by the Todd's for this energy transformation is about 10%,[8 9] which they calculated to be an acceptable rate of conversion. However it is possible that advancements in the area of solar energy could raise this to a higher rate and thus be more efficient. Another solution given for the problem of lighting the growhouse is to replace the roof with a translucent material to allow six times more light into the building than with a non-translucent ceiling. However, the Todd's do not give a solution to how the light is to penetrate all the different floors of the building. The problem of heat loss is discussed and solved by using insulating night curtains in the winter months.

The Todd's call for at least three floors and a basement in order for the factory to function. The waste from one floor becomes nutrients for another and a balanced cycle is created. The basement contains fungi as well as compost to recycle all of the organic waste generated by the factory. The Todds have even designed bicycle powered rotating compost bins to speed the rate of composting. The first floor contains aquaculture tanks to raise a variety of high-protein fish as well as free-range chickens which forage in deep litter amongst the aquaculture tanks. Chicken waste feeds the compost, while vegetable waste from the higher floors feeds the chickens. The chicken population would need to be kept in check to avoid high ammonia levels from their waste. It would also be beneficial to incorporate the heat retaining features of the aquaculture tanks if possible, depending on the location and design of the warehouse. The nutrient rich water from the aquaculture tanks is pumped up to the next level and used to grow hydroponic climbing crops such as



The Todd's design for a food factory

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HOPES 1998
Eco Design Arts Conference 98

Join HOPES in the Fourth Annual Eco Design Arts Conference. The Conference is a student-run exploration into the issues of sustainability as the relate to the fields of environmental design and art. It includes lectures, panel discussions, plenary seminars, art exhibits, workshops, and demonstrations. Please join us on the University of Oregon Campus April 17, 18, and 19.

In Collaboration
the art and ecology of place making

Individual achievement as a measure of success has resulted in a culture where we often find ourselves living and working in isolation. This has led us to become increasingly disconnected from each other and the land. As we pursue appropriate and environmentally aware responses to meeting our needs, it is fundamental that we recognize humanity as an integral part of the earth's ecosystems. The fourth annual Eco Design Arts Conference will explore collaborative process in ecological design, community development, and the arts. Through presentations, discussions, and workshops we will investigate methods and examples of collaborative, sustainable place making.

Invited Speakers:

James Wines
Founder of SITE, author of *The Art of Architecture in the Age of Ecology*

Sim Van Der Ryn
Professor Emeritus, Berkeley. Author with Stuart Cowan of *Ecological Design*

Anne Whiston Spirn
Author *The Granite Garden: Urban Nature and Human Design.*

For More Information:

Contact HOPES at the University of Oregon, HOPES, School of Architecture and Allied Arts, 5249 University of Oregon, Eugene, OR 97403-5249. Phone: 541.346.0719. E-mail: hopes@laz.uoregon.edu.

Resquests for accommodations related to a disability should be made to Peggy Butler at HOPES no later than March 15, 1998.

April 17-19

Solar Information Center
Winter Lecture Series & Events Calendar

These events are free and open to the public

Solar Access Discussion Panel

January 21 , 7:30 - 9:00 PM, **Lawrence Hall room 177**

The Eugene Planning and Development Department is in the process of updating the city's Land Use Codes, included in this proposal is the elimination of solar access in most districts. According to staff the existing solar code is difficult to implement and conflicts with the city's desires to have a more compact downtown area and neighborhoods. The updated code draft limits solar access to the residential districts.

With the rise of the solar industry, and practical advances in solar technology we need to look at creative ways of protecting solar access in all districts and all buildings. Please join us for a discussion with representatives from Eugene's Planning Office, UO Architecture Dept, local solar energy professionals, Lane Co. Homebuilder's Assoc, and EWEB.

We hope to provide a wide-ranging discussion that will lead to possible solar regulations that can “work”. The Solar Information Center believes that there needs to be city laws that allow easy protection of solar systems while encouraging appropriate density. The panel discussion will be an opportunity for people with various views to collaborate and find a solution that can propel Eugene into the solar age.

Evolutionary Architecture
with Eugene Tsui

January 29 , 7:30 - 9:00 PM, **Lawrence Hall room 177**

This Bay Area designer, a graduate of the UO Architecture program, will discuss his vision of the future of architecture. He will present "nature" as a basis for design and show how his firm uses alternative materials, and energy efficiency in their projects. Eugene will also discuss individuality versus conformity, and evolutionary attitudes versus conventional attitudes. Please join us for this presentation from an exciting and controversial designer.

Dos and Don'ts of Thermal Mass in Solar Applications
with Dean Stills of the Aprovecho Research Institute

February 20, 12:00 - 1:00 PM , **Lawrence Hall room 206**

The Aprovecho Institute in Cottage Grove, Oregon hosts a diverse group of interns that conduct research in appropriate technology. Dean will present information on the latest projects including, studies of solar energy absorption into mass, cob as a building material, and much more. Please join us for a hands-on discussion.

For more information, please contact us at 541-346-3696

Towards A Community Food System
By Maren Tomblin

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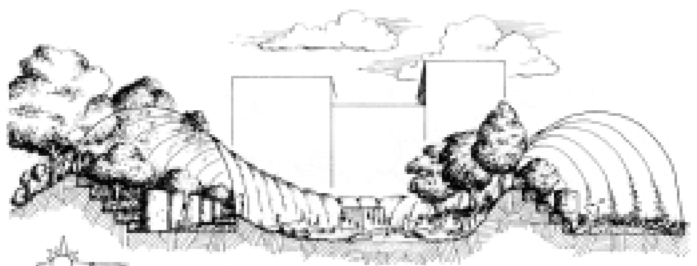
tomatoes, beans, and cucumbers. Carbon dioxide-rich air filters up from the first floor and basement to supply the vegetables of the upper floors. The third floor is used for leafy crops such as lettuce and spinaches. The Todds do not discuss water collection, but it may be possible to collect water on site from rain runoff or treated city gray water. If designed to include passive solar heating, this warehouse could produce food year round. Not only does this increase food production, but it also creates jobs. Skilled gardeners would be needed to operate the facility, they could be paid workers, or work voluntarily for shares of the crop.



Bioshelter food factory by the Todds

The other large scale food factory designed by the Todds is a bioshelter surrounding a public park. This would most likely be a community garden, perhaps sponsored by the city. The Todds suggest building these structures on vacant lots. The farm takes the form of a circular donut around a central park and wading pool. The shelter provides a safe, enclosed place for children to play, as well as providing a year round garden space for the neighborhood. The Todd’s bioshelter design usually includes flat crop space to the south of the space and multitiered growing space to the north to maximize the area lit by the sun. This seems like a positive step in community garden planning to encourage gardening by citizens. Parents could let their children play safely in the park while they work, as the structure would have good visibility of the park. Neighborhood markets could be located near or even in the bioshelter to allow gardeners to sell their produce to nonparticipating neighbors.

It is vital that these food producing areas be designed as an efficient and attractive addition to the community. Planners would want to work with people in the neighborhood to be sure the space suits their needs and environment. The goal of bringing food production into cities is to encourage sustainable systems and strengthen communities by allowing more people to reclaim their own food supply. This will not happen if urban farms are allowed to develop haphazardly. For these types of projects to function well, many skilled people will be needed to plan and run them. In addition, the general public’s involvement will also be vital. Through[10] a strong grass roots movement, these systems could gain mainstream support, and provide a more sustainable lifestyle within our cities.

1 Urban Agriculture; Food, Jobs, and Sustainable Cities. UN Development Program, NY NY 1996
2 Goldsmith, 1996, as quoted on the City Farmer Homepage
3 ”Lean Cuisine” Rocky Mountain Institute, Summer 1991, vol. VII, no. 11
4 Permaculture in a Nutshell. Patrick Whitfield
5 USDA, 1994
6 UN World Population Demographics
7 This figure includes energy used in production, transportation, processing, cooking and refrigeration.
8 ”1979 City Farmer’s Vision of Urban Agriculture” from the City Farmer Homepag

CALENDAR

Solar Access Discussion Panel
January 21 , 7:30 - 9:00 PM
Lawrence Hall
Room 177

Evolutionary Architecture
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Dos and Don'ts of Mass in Solar Applications
with **Dean Stills** of the Aprovecho Research Institute
February 20, 12:00 - 1:00 PM
Lawrence Hall
Room 206

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SOLAR INFORMATION CENTER

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