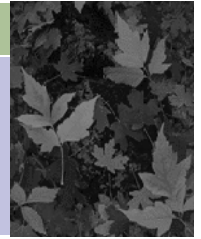


CONSERVATION AT UCSC

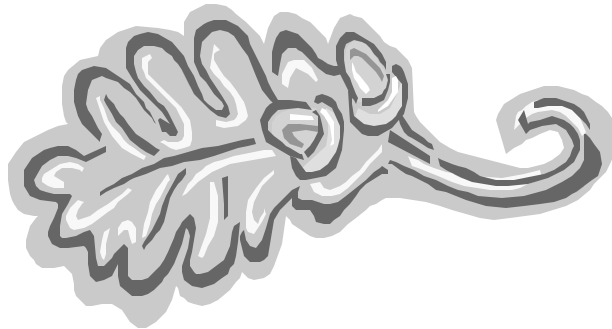


*Physical Plant's role in preserving our
natural resources
and how you can help.*

To Access Physical Plant on-line—<http://ucscplant.ucsc.edu>

*“In every deliberation, we must
consider
the impact of our
decision on the next
seven generations.”*

~Great Law of the Six Nations Iroquois Confederacy



Acknowledgements:

Many thanks to the following publications, web-sites and organizations for providing conservation information and quotes for this brochure: UCSC Building and Utility Services; UCSC Energy Management Services; UCSC Grounds Services; UCSC Grounds Services Landscape Management Plan; Eco-Merrill Newsletter; State University of New York, Buffalo (UB Green Office) Web-site; The University of Colorado Environmental Center; The Green Seal Organization; The Alliance to Save Energy; The Rocky Mountain Institute; US Department of Energy; The Environmental Protection Agency; Earth 911 Organization; California Integrated Waste Management Board; and the California Department of Conservation.

UC Santa Cruz is often referred to as “The City on a Hill.” With over 13,500 students in addition to 5,500 faculty and staff, this nickname is appropriate. There are over 600 acres of developed land, 1400 acres of undeveloped land, and over 500 buildings on this unique and beautiful campus. As we go about our day learning, teaching, and supporting university functions, each of us, whether student, staff or faculty, consumes resources. How often do we consider the source and true cost of these materials? Daily, we need resources such as energy, water, land, paper, metals, wood, plastics, and fabrics to function in our varied roles. As the California energy crisis made more evident, our resources are limited. In light of this, how do we best care for our valuable natural resources and how can we learn how to leave a smaller impact on the natural world around us?

UC Santa Cruz’s Physical Plant is responsible for the care and maintenance of the diverse campus building and grounds. We at Physical Plant believe that our responsibility extends beyond maintenance and operations into the preservation and stewardship of the campus. Universities have both the unique opportunity and the responsibility to teach through example. Author and Professor David Orr states in *Earth in Mind*, “I propose a different ranking system for colleges based on whether the institution and its graduates move the world in more sustainable directions or not. Do four years at a particular institution instill knowledge, love, and competence toward the natural world, or indifference and ignorance? Are the graduates of this or that college suited for a responsible life on a planet with a biosphere?”

Conservation is not a task that one particular unit on campus can achieve alone, but rather is successful only through a unified effort of the entire campus community. We need your help! In this pamphlet we will outline tips you can use to conserve resources in your college, department, and residence and also outline some of the projects Physical Plant is undertaking. Working together we can make a difference!

~Ilse Kolbus, Director

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ENERGY



Rolling black-outs might not be in the forefront this year as they were in the past; however, the energy crisis is still leaving its mark on California residents. Energy conservation is as important as ever to pursue. Physical Plant is researching new avenues of energy reduction, as well as working to educate the campus population on what they can do. Read on to find out how you can help!

Why Conserve Energy?

Below are some of the impacts to the environment created by the production and consumption of energy from conventional sources (oil, coal, natural gas):

Global Warming

- Fossil fuel burning produces greenhouse gases, carbon dioxide and nitrogen oxides (25% increase in atmospheric CO₂ in the past 150 years) This leads to rising sea level and coastal inundation, drought, heat waves, tropical storms, damaged ecosystems, species extinction, and changes in agricultural productivity.

Air Pollution (Carbon monoxide, nitrogen oxides, sulfur oxides, hydrocarbons, ozone, smog)

- These pollutants can cause bronchitis and pneumonia, irritate the lungs, and cause childhood asthma.
- Nitrogen oxides cause the smog seen over many cities.
- Smog in the Ozone can cause permanent lung damage and reduce crop yields.
- Sulfur dioxide and nitrogen oxides contribute to acid rain, which causes harm to living creatures in lakes all over the world, including the Adirondacks and remote parts of Alaska.

Water Pollution

- Oil spills in the ocean kill marine life and destroy delicate ecosystems.
- Coal mining – causes acid run-off into waterways.
- Thermal water pollution is caused when water is heated to make steam for electrical generation. The heated water kills aquatic life when returned to the source (lake, river or ocean). An example is Moss Landing.

Land Destruction

- Hydropower dams flood and destroy forestland, native lands, and destroy fish migratory routes.
- Strip mining (coal) is a cause of deforestation, massive erosion, and often water pollution.

California's fuel mix is: 31% natural gas, 22% hydro-electric, 20% coal, 16% nuclear, and 11% renewable.

Campus Conservation Guidelines

Students, faculty and staff can help energy conservation efforts by fulfilling a moral obligation to use energy judiciously:

Lights

- Turn off unused or unneeded lights.
- Use natural lighting instead of electric lighting whenever possible.
- As an alternative, use task lighting instead of area lighting.
- If you have a desk lamp, make sure it uses compact fluorescent bulbs.
- Retrofit all incandescent light bulbs with energy efficient compact fluorescent (CFL) light bulbs.*
- Eliminate the use of halogen lamps above 50w as well as Halogen (300w) torchiere lamps.
- De-Lamp when overhead lights are more than what's needed.
- Keeping egress safety in mind, hallway lighting should be kept to a minimum.

**Units should broadly assess areas to be either de-lamped, or retrofitted for incandescent light bulbs. Call 9-4444 to place a work order with Physical Plant and an electrician will deliver and install CFL's or remove unneeded lamps in your area.*

Computers

- Keep computers off unless they are in use.
- Turn off printers, especially laser printers, when not in use.
- Use power strips to turn on all computer and desk equipment at once, which eliminates "sleep" power loss.



ENERGY



Campus Conservation Guidelines

Computers, cont'd

- When purchasing computers and peripherals, buy low wattage equipment certified by the EPA's "Energy Star" program.
- Minimize use of screen savers and enable power management features so your computer equipment will go into a low power (blank screen) "sleep mode" when not actively used.
- Use a Laptop, when possible. It draws 80-90% less energy. Ergonomic problems of laptops can be solved with simple stands and an external keyboard and mouse.

Other Equipment

- Purchasing decisions should consider energy demands (Energy Star approved).
- Eliminate the use of space heaters: substitute flat panel leg or foot warmers.
- If practical, turn off all energy consuming office and research equipment when not in use, e.g., copiers, refrigerators, environmental rooms, fume hoods (close sash) etc.
- Unplug water coolers that cool or heat. Use a microwave oven to heat water.
- Small refrigerators should be replaced with large energy efficient ones, in which staff can "group" lunches.

Note: If heating and/or cooling problems exist in the extreme, call the Physical Plant Work Order Desk at 9-4444, and a Heating/Ventilation/Air-Conditioning mechanic will be sent to your area to evaluate options and adjustments.

Heating and Cooling

- Dress appropriate to the season and keep thermostats at 68 degrees in the winter and 76 degrees for air-conditioned spaces in the summer.
- During cold weather, open blinds, drapes and curtains to let sun in or if no sun, close them to keep in the heat.

Heating and Cooling, cont'd

- During hot weather, close blinds, drapes and curtains to block out the sun.

Windows and Doors

- Keep windows and doors closed in heated and air conditioned areas.
- Close vestibule doors.

At Home

- Insulate your attic, walls, floors and crawl spaces appropriately and fill leaks around doors and window sills with weather-stripping or caulk. Rebates are available from PG&E.
- When buying new windows, look for the Energy Star label and replace single pane windows with double. Rebates are available from PG&E (<http://www.pge.com>)
- Replace furnace/air conditioner filters once a month.
- Consider adding a programmable thermostat, which automatically coordinates the temperature of your house with your living patterns. Check PG&E for rebates.
- Set your water heater thermostat at 120 degrees (or "low").
- Use hot water sparingly.
- Use cold water for all rinses in your clothes washer.
- Keep pots covered to reduce the time needed to reach a boiling point.
- Defrost your freezer when ice or frost build-up is one-quarter-inch or thicker.

If you have any ideas on conserving energy or see an energy problem area, Contact the Energy Manager at 459-2579.

(content from SUNY-Buffalo, UB Green and Alliance to Save Energy)

BUILDING & UTILITY SERVICES— constantly works at providing greater energy efficiency to the campus by replacing old equipment with efficient HVAC equipment, lighting fixtures, lighting occupancy sensors, thermo-pane windows, and providing doors and windows with weather-stripping.

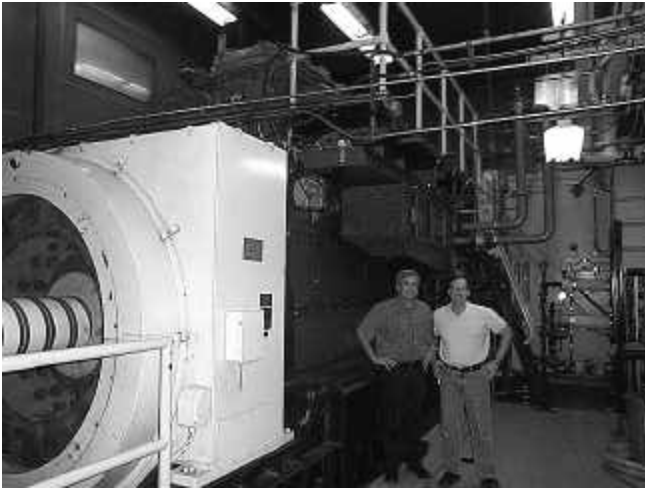




ENERGY



UC Santa Cruz Energy Management System



Co-Gen Engine in the Fackler Cogeneration Plant

The campus first installed an energy management system in the Central Heating Plant in 1975 after the first energy crisis. The original system, monitored by the Heating Plant Operator, added time clock start/stop functionality to control most of the core buildings heating, ventilating and air conditioning equipment and resulted in huge energy savings.

The system was upgraded in 1977 to add more intelligence. This smarter system could optimally choose when to start a building heating system based on outside air temperature as well as the interior zone temperatures in the larger buildings. The ability to control the outdoor campus lighting was added in the early eighties. The lights are controlled by a master photocell, located at the Fackler Cogeneration Plant in the center of campus.

The next upgrade was in 1985 when the Central Heating Plant was converted to a Cogeneration, (power and heating) plant. During this period of time, computer controllers were developed and installed at individual buildings rather than having all the "intelligence" lo-

cated in a central location. This resulted in even better control of heating, ventilating and air conditioning equipment, resulting in further energy savings.



The construction of Earth & Marine Sciences resulted in our first LAN based system. Since then we have added much more sophistication and ability to control our loads down to the room level. Over 9,000 points are now controlled or monitored on campus including critical freezers and environmental chambers in the science buildings. The system continues to be monitored from the "central point", (Fackler Cogeneration Plant), and is manned 24 hours a day, every day of the year.

Another service we provide is room permitting, where we can override the computer programs to activate heating/cooling as needed for scheduled after-hours events. This is particularly important for Theatre Arts presentations.

With the campus growing at a furious pace, new controls and algorithms are constantly being added. We are currently migrating to an enterprise based system which will allow access to the secured system from anywhere on the World Wide Web.



Cogen Plant Watchstander being attentive to the energy management system computers.



WATER



Grounds Services Assistant Superintendent, Roger Edberg, introduced a new system to the UCSC campus in January 2001 that is resulting in a significant reduction of water use on campus. The water saving Rain Master Evolution Central Control System began operating at the East Remote Sand Field. The result seen in 2001 was a reduction in water consumption by 22% compared to the same time period in 1999 and 2000. This is especially meaningful since there was an unusually dry spring in 2001. In March of 2001, the Sand Field used over 50 times as much water as it did in March 2000 and 1999, yet savings later in the season more than made up the difference. In Fiscal Year 2000, UCSC's water usage was approximately 0.2% greater than it's usage in 1987-88, a period during which enrollment grew by 25%. Despite student enrollment increases and the addition of a number of new buildings, UCSC's water conservation effort has resulted in average daily use that is the same as it was 14 years ago.

The Rain Master system involves a central computer, a weather station, and "satellite" controllers in the field, with a communication system linking the three components. The East Remote Sand Field is home to one of the satellite controllers (out of six currently in operation on campus). The new East Field irrigation system and field house irrigation system are controlled by one satellite, as is the Wellness Center, the Core West Parking Structure, and the College 9 and 10 Residence Halls. Satellite controllers are to be installed at Physical Sciences, Engineering Sciences and the infill apartments

The central computer communicates regularly with the satellite controllers, via radio, to update weather information, irrigation schedules, and check for irrigation problems. Satellite controllers can detect anomalies, such as leaks, and shut down appropriate valves to stop the flow. This will be reported to the central computer as an alarm condition with the exact location of the problem.

Electrical problems are reported in the same way. The central computer also monitors the weather station every hour to check the rain gauge and the wind speed sensor. Limits can be set for rain and wind that will shut off irrigation until conditions improve. Most importantly, the central computer downloads data from the weather station **evapotranspiration** sensor once a day. (Evapotranspiration, or **ET**, is the amount of water lost from the soil through plant transpiration and from direct evaporation.)

Tips to take home:

- Plant native, drought tolerant plants in your yard.
- Group plants according to their watering needs to reduce the need to water the entire yard.
- Plant trees—they provide shade and cut down on evaporation.
- Have less lawn—use ground cover, decks and walkways—use lawn where most needed.
- Mulching—3" layer of mulch looks good, reduces weed growth, moderates soil temperature, minimizes erosion, and helps retain soil moisture!

*Information courtesy of SW
Florida Water Management
District*

There is no irrigation program schedule in the traditional sense. Various factors for each irrigation station are entered at the central computer, such as soil type, slope, precipitation rate of the station, root zone depth, etc. and the computer generates a new program daily based on calculated soil water loss. It has many valuable features, such as automatically compensating for heavy soil or sloping conditions by running multiple short watering cycles to minimize runoff. Rainfall is subtracted from irrigation requirements.

The communications system at UCSC is composed of a radio transceiver at each satellite controller that communicates data to a central antenna. The central computer uses a modem to transmit data through the campus telephone system to the modem at the main antenna, where communications and data signals are broadcast to and received from the satellite controllers.

The initial elements of the system - the central computer, software, the main antenna, the weather station, and the East Field satellite controller — were purchased and installed in January 2000, using the utility savings fund. New satellites are added with new construction projects and as we upgrade existing controllers to the satellite system. Priority is given to the greatest water-use areas and those most practical to retrofit.

We expect to see continued water savings and increasingly efficient water use as we add more satellite controllers, refine the parameters of the programs, and improve the water distribution in the field.



MATERIALS



The Four R's

Conserving Materials consists of four methods: Reducing, Reusing, Recycling and Buying Recycled.

Reduction ~ Limiting the amount of materials that we consume is the first step in reducing waste. Strive to buy only items that you truly need and also seek ways to share, rent or borrow items. Make double-sided copies and use e-mail whenever possible to reduce paper usage. Buying bulk items or items without excess packaging cuts down on materials used for packaging. Use white office paper over colored when possible—white is easier to recycle and to use in recycled content products.

Re-Use ~ Finding ways to re-use items can extend their life cycle. Bring a mug from home for drinks. Make scratch paper or print rough drafts on the back side of used paper. Use reusable food containers, and avoid “disposables”.

Recycle ~ Bring all recyclable materials to the nearest recycling bin. Prepare your recyclables according to directions listed—for instance, sort according to type and crush cans to reduce size, which allows for more materials per can and less trips for recycling crews.

Buying Recycled ~ Lastly, don't forget to purchase recycled materials. This creates demand for recycled products, keeping the recycling industry profitable. Look for high post-consumer waste content. Also, buy recycled paper

How much garbage will you generate in your lifetime? About 600 times your adult weight!

When you toss out one aluminum can you waste as much energy as if you'd filled the same can half full with gasoline and poured it into the ground.

According to the New American Dream website ~ if everyone in the world lived by the average American consumption pattern (what we call the “American Dream”)— we would need 4.5 worlds to support humanity. Check out your ecological footprint at <http://www.earthday.org/footprint/>

US pulp mills consume 12,430 sq. miles of forests around the world each year, an area almost the size of the states of Massachusetts and Connecticut combined.

The average employee uses approximately 10,000 sheets of paper per year, which is 700 lbs. or a height of almost 4 feet.

Why Recycle? *(quoted from SUNY-Buffalo, UB Green)*

- Recycling paper reduces tree cutting and spares our forests.
- Recycling metal, plastic and glass reduces resource extraction for raw materials and the ecosystem destruction associated with mining and drilling.
- It generally takes much less energy to produce new products from recycled materials than from virgin materials. For example, making a new aluminum can from recycled aluminum saves 95% of the energy required to make a new can from virgin aluminum.
- Recycling reduces mining and drilling, both of which cause air and water pollution.
- By saving energy, recycling reduces the air pollution associated with burning fossil fuels - which means less smog, acid rain and global warming.
- Recycling is also an alternative to incinerating waste, a procedure which can produce emissions containing heavy metals and dioxins as well as contributing to acid rain and global warming if not operated properly. The toxic ash produced by incinerating may also end up polluting ground water after being placed in a landfill.
- Existing landfills are filling up. By recycling we can slow that process.
- Reducing reliance on landfills is desirable because they have the potential to leak, polluting ground water.
- Landfills also produce methane, a powerful greenhouse gas, which contributes to global warming.
- As the market for products containing recycled materials grows, the market for recyclable waste materials will increase. Providers of these recyclables may be able to sell them or at least dispose of them for less cost than land-filling or incinerating. Recycling is labor intensive, thus creating local jobs. Recycling saves money and creates jobs!





MATERIALS



RECYCLING Guidelines

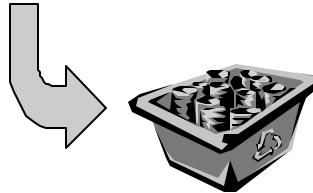
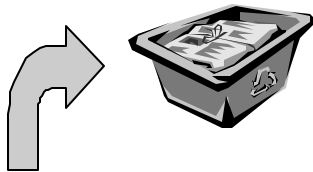
White Paper

Yes

- Letterhead
- Typing Paper
- Copier Paper
- Computer Paper
- Notebook Paper
- White Envelopes w/out windows
- Index cards
- Staples are ok

No

- Slick, glossy or coated paper
- Fax or carbon paper
- NCR or blueprint paper
- Copy paper ream wrapper
- Post-its or other tape
- Rubber bands or other fasteners
- Tissues or napkins
- Paper cups and plates



Colored Paper

Yes

- Heavily printed white paper
- Post-It notes, NCR, carbonless paper
- Glossy paper
- Letter size "junk mail" (open before recycling)
- Copy paper ream wrapper envelopes (colored, white with windows ok)
- File folders

No

- Astro-bright paper
- Fax paper
- Cardboard**
- Brown Paper bags
- Newspapers/Magazines*
- Paper with tape on it
- Blueprints
- Bound books*
- Paper with: metal fasteners, rubber bands, staples, plastic tabs, wire spirals.

UCSC recycles over 870 tons of materials a year!

If your bin is overflowing...call 9-3671 and please be specific about your location!

*Certain types of paper (i.e.-newspapers, phone books, magazines) may be recycled as separate grades. Please contact UCSC Recycling at 459-3671 for more information.

**CANS, GLASS, CARDBOARD, METALS, etc...

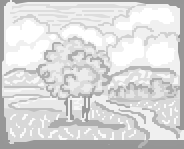
UCSC recycles glass, aluminum cans, cardboard, plastics type 1-7. We also recycle asphalt, wood waste and scrap metal from construction when possible. (Bins are located in all colleges and nearly every building. Call 459-3671 to find the location nearest to you!!)

Hazardous Materials - Reducing hazardous materials and substituting more natural and less environmentally harmful alternatives should always be attempted. According to SUNY's "Think Green" brochure - "One ton of hazardous waste is generated per person per year in the US." Buy with ecology in mind! If you have hazardous waste to dispose of, contact Environmental Health and Safety at 459-3086

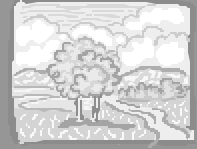
Composting program at UCSC:

UC Recycling collects food waste from meal preparation at campus food services to turn into compost. An example of foods collected are broccoli stumps, orange peels, and coffee grounds. When the compost is ready, it is put back into the landscape in the flower beds! Check out those flowers at Stevenson!





LAND



There are various ways Physical Plant maintains the diverse natural environments at the University and works to preserve our lands.

REUSING OUR NATURAL RESOURCES:

One way we conserve the campus's resources is to find new uses for displaced materials. For instance, the Grounds Services crew relocates, stores and reuses different soils, plants, trees and rocks from construction sites whenever possible. Boulders are used for landscape features and retaining walls, a full variety of plants are reused through transplantation, tree trimmings are chipped into mulch for use in campus gardens and different soils are kept for use in different types of landscaping projects.

PRESERVING NATIVE SPECIES:

Through time, non-native plants have been introduced into our area and often threaten to overtake our native species. In order to help the native plants thrive and also to help keep fire risk low, Grounds Services uses several methods of maintenance that include mowing, cattle grazing, weed removal, and native plant seeding/ planting. Mowing keeps grasses low, reducing the fuel for wild fire, allows for better auto visibility and provides aesthetic value. Grazing of cows continues in two areas on campus involving 120 acres for both fire prevention and grassland enhancement, helping the diversity of plant life and reducing the invasive weeds. The timing of the grazing is critical; having the cows graze in early spring allows them to eat the non-native plants before they seed and before the plants become too large for grazing. The cattle continue to graze into early summer reducing the fuel for potentially threatening wild land fires. We supplement mowing and grazing with weed removal and erosion control contouring/re-seeding for optimum results.

TREE INVENTORY:

Grounds Services has been undertaking the enormous project of identifying and evaluating all the trees in the developed areas of campus and entering the data into a specialized software program. This data can be used in many ways, but the primary use is to identify hazardous trees campus wide and prioritize work to reduce or eliminate those hazards, as well as to develop and track routine maintenance cycles for each tree.

EROSION CONTROL:

Drainage maintenance and the avoidance of erosion is a cornerstone of preventive maintenance performed by Grounds Services. Repair of erosion-damaged areas is also a high priority. Erosion can alter habitats, structurally undermine plants, trees, and hillsides, and can pose a threat to the structural integrity of campus roads, paths and buildings. Physical Plant has been dedicating resources toward the repair of the worst cases of erosion on campus.

STEWARDSHIP PROGRAM:

Grounds Services created the Site Stewardship Program to organize campus community involvement and raise awareness of ecological restoration and guardianship of the undeveloped lands on the UCSC campus, including restoration work in meadows, forests and canyon corridors. A previous project of the Site Stewardship Program was to restore the campus population of coastal oaks by planting seedlings grown from acorns gathered on campus and planted in areas where oaks have died or were in decline. Other restoration projects have included meadow restoration, drainage and erosion repairs and makeshift path closures. Continued opportunities are available for students to be a part of this program.

HOW YOU CAN HELP

- **You can help prevent erosion by staying on bicycle paths with your bicycle and pedestrian paths when walking. Makeshift off-trail routes are often a cause of erosion.**
- **Our Groundskeepers spend a large portion of their time cleaning up cigarette stubs and other trash on campus. Help keep the campus beautiful and put your trash in appropriate containers.**



CONTACTS



ENERGY RELATED:

Energy Services Manager, Bob Dunn 459-2579
rldunn@ucsc.edu

RECYCLING RELATED:

Recycling Coordinator, Dave Wade 459-3671
dmwade@ucsc.edu

WATER CONSERVATION/ IRRIGATION RELATED:

Assistant Superintendent, Roger Edberg 459-3667
rjedberg@ucsc.edu

LAND CONSERVATION RELATED:

Grounds Superintendent, Dean Raven 459-3720
drraven@ucsc.edu

HAZARDOUS WASTE RELATED:

Environmental Health & Safety Programs, John Yap 459-3086
johnny@ucsc.edu

SERVICE REQUESTS:

Work Order Desk 459-4444
wodesk@ucsc.edu

SITE STEWARDSHIP PROGRAM RELATED:

Assistant Superintendent, Scott Loosley 459-2197
Sloosley@ucsc.edu

"Every aspect of our lives is, in a sense, a vote for the kind of world we want to live in!"



Frances Moore Lappe
Diet for a Small Planet



LINKS



California Natural Resources Conservation

California State Department— <http://www.ca.gov>
(Land/Natural Resources/Water Conservation links)

Ecological Living

New American Dream <http://www.newdream.org>

Energy

Alliance to Save Energy <http://www.ase.org>
SUNY, Buffalo - UB Green Office <http://wings.buffalo.edu/ubgreen/>
Rocky Mountain Institute <http://www.rmi.org>
US Department of Energy <http://www.eren.doe.gov>
Environmental Protection Agency <http://www.epa.gov>
Earth 911 <http://www.earth911.org>
Green Seal Organization <http://www.greenseal.org>
University of Colorado Environmental Center <http://www.colorado.edu/cuenvironmentalcenter>

Environmental/Conservation Organizations

Envirolink <http://envirolink.org>

Recycling & Composting

California Integrated Waste Management Board <http://www.ciwmb.ca.gov>
CA Department of Conservation <http://www.consrv.ca.gov/dor/index.htm>

Other

UC Santa Cruz <http://www.ucsc.edu>
UCSC Physical Plant <http://ucscfac.ucsc.edu/facilities/>
UCSC CUHS Facilities-Energy Conservation Prgm. <http://www2.ucsc.edu/cuhsfacilities>
California Student Sustainability Coalition <http://www.sdhouse.org/cssc>

