

CCAT Wash 'n' Flush
An
ENVS 410 Project

By:
Annie Welbes
Jeff Steuben
Tim Dower

Spring 2008

Table of Contents:

Problem Background and Statement.....	1
Goals and Objectives.....	3
Weighing Alternatives.....	4
Implementation Strategies.....	6
Monitoring and Evaluation.....	7
Time Sheet.....	8

Appendix A: CCAT Wash 'n' Flush Interpretive Sign

Appendix B: CCAT Wash 'n' Flush Appropedia Web Page

Appendix C: CCAT A.T. Transfer Spring 2008, p.8, Fix your flusher- a DIY
By: Jeffrey Steuben, CCAT Co-Director

Problem Statement:

Clean, potable water is being used to flush human waste down toilets. This action is both environmentally and socially irresponsible.

Problem Background:

Water scarcity is an issue that plagues many people of the world. An increasing world population has led to an increased demand for water and water-dependent resources.

The source and quality of water that flows out of kitchen and bathroom faucets is the same for the water that is used to fill toilet bowls after each flush. Toilets comprise 27% of an average American household's water consumption. That typical American household toilet consumes 18.5 gallons per capita per day. In a household with low-flow, water-efficient toilets, water consumption decreases to 8.2 gallons per day. Therefore, the amount of clean water used each year to flush toilets ranges from 3,000 gallons to 6,750 gallons per person.

As clean water is becoming increasingly scarce or bought up by corporations, it is becoming more important to conserve this precious and finite resource. Toilet conservation has traditionally been limited to reducing the amount of water used in each flush. Before the 1950's, toilets used upwards of 7 gallons for each flush, but that number has been reduced over time to the current standard of 1.6 gal/flush that was established in 1995. However, this does not change the fact that the water being used to flush the toilets is clean and pure. Water pre-use is an active way to conserve water. Currently, there are store bought models available that incorporate the sink into the top of the toilet tank, but they are more popular in Europe and Australia than in the US. We will seek to teach people how to modify their old toilets. This could feasibly be achieved in one way by retrofitting a toilet to produce a stream of clean water that can be used to wash one's hands. The water is used once before it drains into the toilet tank and bowl, where it will follow the flow of the regular flush. Water pre-use can conserve more water than water displacement alone. Present water pre-use technology can save up to 20% of the water that would otherwise be used in the bathroom. Water pre-use systems are cost efficient and available but are not widely used or accepted.

One issue with this practical technology is that Americans would be reluctant to embrace the idea of using water that is flowing to a toilet for washing their hands and brushing their teeth. Toilet water pre-use may be considered socially unacceptable, at first. It may be that as water becomes more

expensive and scarcity increases, that the social stigma will dissipate. As more of these systems are installed, people will begin to see that the toilet retro-fit design is cost effective. Also, the sink and the toilet can be engineered so that less space would be required for a functional bathroom. The aforementioned would require fewer materials for construction and in turn fewer resources consumed.

Our goals are to:

- conserve water that is clean and potable by eliminating the use of clean, potable water to flush toilets.
- break down social stigma around toilet water pre-use.
- build awareness of creative water conservation.
- make toilet modification replicable, accessible, and affordable to low income households.
- conserve water at CCAT.

To achieve our goals, our objectives are to:

- decrease water use in the CCAT bathroom when system is complete and functional.
- Encourage project replication
- Inform CCAT visitors of water conservation methods
- Strongly consider cost, skill level and simplicity when comparing project alternatives

Weighing alternatives:

Rainwater collection:

Pro: free water, non-chemically treated, best use of rainwater?

Con: infrastructure, skills, high cost, space, seasonal supply variability, large time investment for implementation

Bucket under sink:

Pro: proactive water conservation, easy enough for a monkey to do it, easy set up, allows for re-use of all water from sink, low cost, low time investment

Con: human error (overflow), social acceptance

System to connect sink to toilet:

Pro: doesn't allow for human error, low potential social stigma, flexible plumbing set up, relatively low cost,

Con: infrastructure, engineering requirements, does not eliminate all clean water use, relatively high time investment

Mellow yellow campaign:

Pro: water conservation, easy, no construction required, forces people to think about water conservation, zero cost, no time for physical implementation but long term campaign time investment

Con: does not achieve our goal, social acceptance

Flush with greywater:

Pro: eliminates clean water use

Con: cannot store it, replumbing is intensive, high cost, tools, engineering, high time investment

Wash n' Flush:

Pro: simple to use, small change in bathroom use more likely to be accepted, relatively low cost, easy enough for replicability, aesthetically pleasing, already accepted in other parts of the world, more

sanitary: auto start encourages hand washing, auto-shutoff eliminates touching faucet), novel idea, creative, potentially lead to less resources used for construction. Change the way bathrooms are designed and how space is used. (Conserves resources and space), CCAT installation will have much exposure, which increases probability of replication

Con: skill for construction, social acceptance, tools, hard to determine savings, relatively low time investment

Constraints:

- Time
- Social acceptance
- Access to tools
- Money
- Skills

Unintended Consequences:

- Our design splashes on the wall behind the toilet.
- Soap scum in toilet may attract soap-eating mold,
- water politics due to over-conservation in Humboldt County.
- Paradigm shift in how bathrooms are designed and used. (sink obsolescence?)
- Difficulty with ADA required toilet bar

Implementation Strategies:

Project implementation narrative:

We had the idea to use greywater or some other water source to flush the toilet, but didn't know how to go about it. After assessing the layout of the bathroom at CCAT, our preferred location for implementation, we found that some design possibilities were not feasible. We aimed to create a widely applicable design that could overcome several constraints: implementation time, social acceptance, access to tools, money, and necessary skills. We found helpful information on the internet site instructables that helped facilitate our design choice. After familiarizing ourselves with the inner workings of the toilet system, we scoured high and low for materials. We sourced metal parts for the basin and faucet from Arcata Scrap & Salvage. All other new materials were obtained at Hensel's Ace hardware. Through trials and tribulations, our design made several evolutions based on unforeseen problems that we had to overcome (namely, the ADA bar). After construction, we put together a flashy and informative sign to explain the function of the system and help people overcome their deep-seated fears of "toilet water." Following that, an appropedia page was constructed to achieve widespread dissemination of the design, thus meeting our project goals.

Timeline for Project Completion:

Brainstorm-----	(1/31-2/10)
Research Water Pre-use-----	(2/10-3/4)
Design-----	(2/10-2/12)
Final Design-----	(2/13)
Gather Materials-----	(2/13)
Construct & Testing-----	(2/14-3/13)
Documentation-----	(2/10-3/14)
Complete System-----	(3/14)
Sign Construction-----	(3/15-4/9)
Complete Sign-----	(4/10)
Design Appropedia web page-----	(3/21-4/20)
Contact C.C.A.T. Web Administrator--	(4/21)
Appropedia Page Posted on the web-	(4/22)

Monitoring and Evaluation Plan:

To achieve our goals, our objectives are to:

- Decrease water use in the CCAT bathroom when system is complete and functional.
- Encourage project replication
- Inform CCAT visitors of water conservation methods
- Make project accessible and affordable

Monitoring:

- Maintenance of overall system – provide enough information so CCAT Maintenance employees can ensure it is in working order. Information will be provided by interpretive sign, Appropedia page and Instructables how-to.
- Maintenance of sign – Digital version of sign will be stored in CCAT archives in case it needs to be reprinted in future years
- Maintenance of webpage – The online community is a permanent bank of information, which allows all versions of page to be stored, thereby preventing its accidental (or malicious) deletion.
- To ensure that the project information is disseminated, we will check the page hits on the Appropedia page and compare it to similar project demonstration pages.
- We will take a sample study before and after the 2008 Mayday & Compost Festival to see how much interest there is in our project and how likely visitors are to go to the appropedia page.

Evaluation:

The nature of CCAT appropriate tech projects is that experts or designers move away and systems often fall apart and are not up kept. This is an unintended consequence we discovered with no way to overcome. Providing information to future maintenance employees and co-directors is the best we can do.

As long as project stays working and remains implemented at CCAT, our objectives will be met. CCAT visitor feedback will help us gauge the efficacy of the system.

Time Sheet:

Every step of our project was collaboration. We used every class meeting that there was not a lecture to work on our project. Our meetings lasted the designated class length of 2 hours. We met 24 times for a total of 48 hours. Individually we made significant contributions that were imperative for the success of our project. Annie and Tim individually, on separate occasions, made a trip to Hensel's Ace Hardware to buy materials and tools. Annie had the expertise to design an appropedia web page to which Jeff and Tim contributed content. Jeff has the graphic design skills which he applied to the design of our interpretive sign to which Tim and Annie contributed content. Tim modified his home toilet to gain insight on the feasibility of project implementation. Jeff solely authored the article published in the CCAT A.T. Transfer newsletter.

Appendix A:

CCAT

Wash 'n' Flush
Interpretive Sign

Presenting...

Wash n' Flush!

Problem:

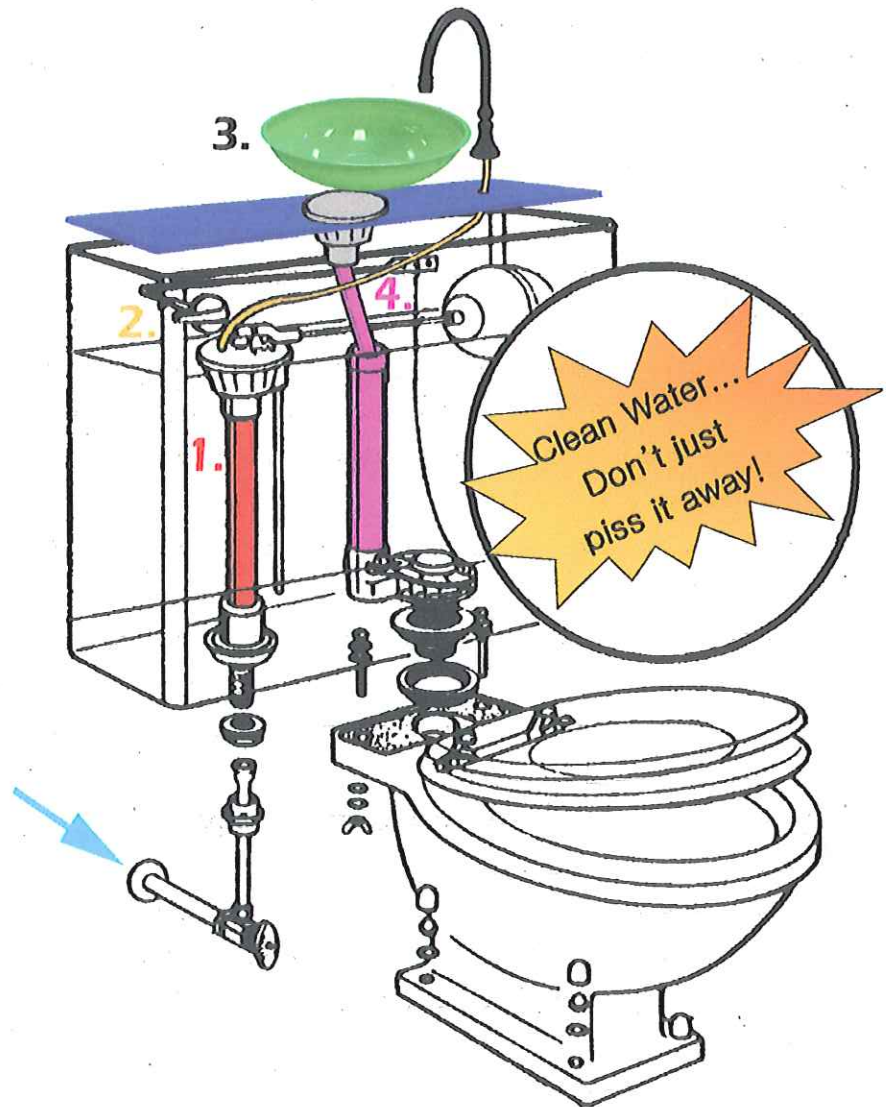
Clean, drinkable water is being used to flush human waste down toilets.

Solution!

Modify your toilet to flush with hand washing water.

What Happens when I flush?

1. **City water** flows into the **inlet tube**.
2. Water is diverted through **gold tube** and out faucet.
3. Wash your hands!
4. water drains from basin into **overflow pipe**, which refills toilet bowl.



Want to build one?

Visit www.appropedia.org/CCAT_Wash_n_Flush

An ENVS 410
Senior Project,
Spring 2008

Jeffrey Steuben
Annie Welbes
Tim Dower

Appendix B:

CCAT
Wash 'n' Flush
Appropedia Web Page

http://www.appropedia.org/CCAT_Wash_n_Flush

CCAT Wash n Flush

From Appropedia

Contents

- . 1 What Is It?
- . 2 Why Do It?
- . 3 Materials & Tools
 - . 3.1 Materials
 - . 3.2 Tools
- . 4 The Steps to Success!
- . 5 Unforeseen Issues
- . 6 Need Better Instructions?

What Is It?

The Wash n' Flush is a Humboldt State University environmental science 410 senior project implemented by Jeffrey Steuben, Annie Welbes and Tim Dower which is located in the downstairs bathroom at CCAT. This is a toilet modification that allows users to save water by utilizing the waste-water from handwashing to flush the toilet.



The CCAT Wash n' Flush

Why Do It?

The goals of our project were:

- . conserve drinkable water by eliminating the use of clean, potable water to flush toilets.
- . break down social stigma around toilet water pre-use.
- . build awareness of creative water conservation.
- . make toilet modification replicable, accessible, and affordable to low income households.
- . conserve water at CCAT.

We thought about the fact that clean, drinkable water is being used to flush human waste down the toilet. We consider this to be environmentally and socially irresponsible. Therefore, we took action.

Materials & Tools

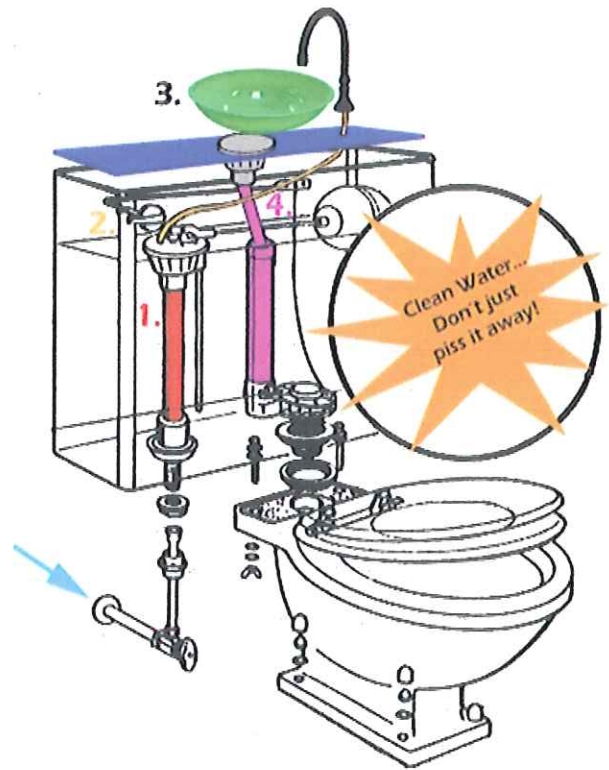
The following materials and tools were used for this specific project. If replicating, you may not need the same equipment or materials. Feel free to get creative!

Materials

- . 3/4 inch plywood lid
- . 3 feet quarter-inch vinyl tubing
- . 6 inches of three-quarter inch vinyl tubing
- . funnel
- . 2 feet of 1/2 inch copper pipe
- . Aluminum basin
- . 4 one-inch L brackets
- . Paint (blue)
- . Butcher paper

Tools

- . Jigsaw - for cutting lid
- . Power drill
 - . 3 inch hole saw
 - . 1/2 inch spade bit
 - . 3/16 molybdenum bit (for drilling aluminum)
- . Measuring tape
- . Hand crank flashlight



Paintstakingly photoshopped diagram of the Wash n' Flush

The Steps to Success!



Fig 1: We are tracing the outline of the tank and the location of the overflow pipe



Fig 2: This is the template we used to locate the overflow pipe, the faucet location, and where to place the brackets to secure the lid in place



Fig 3: Using the hole saw to make a channel for the funnel to sit flush with lid surface, and a hole for the funnel drain through



Fig 4: Wow, look at that fine hole!



Fig 5: These brackets, attached to the underside of the lid, sit inside of the tank, holding the lid in place.

Fig 6: Don't forget to seal the lid with some sweet and low VOC paint! yeah!

Fig 7: The basin was placed on the lid to locate where the drain would be located. We drew a circle on the bottom of the basin through the previously cut hole in the lid, then used the drill with a molybdenum bit to remove the portion of the basin that would be the drain.

Fig 8: Here's Tim bending the copper tube over his knee to create a faucet-like effect. This technique is not recommended, as the pipe may kink during the process. Instead, use a pipe bending spring to keep the pipe open and bent.



Fig 9: Hey, look at that bent pipe! Now slide it into the hole in the lid and secure it in place.

Fig 10: Attach the small vinyl tube to the water inflow tube, then feed it through the copper pipe. This is where the water will come out of your homemade faucet. Note the two 32 ounce bottles in the toilet tank to decrease the amount of water used to flush.

Fig 11: Here you can see the larger vinyl tube attached to the bottom of the funnel. It runs directly into the overflow tube in the toilet.

Fig 12: We added this Star Trek-like panel to guide the water that was splashing onto the wall, back into the basin. This addition may not be necessary depending on your particular basin and water pressure.

Unforeseen Issues

Since CCAT is a public facility, it is required to have a restroom that meets the standards of the Americans with Disabilities Act. As such, there is a bar on the wall behind the toilet. We had to work around this by using a shallow basin. This shallow basin, and the high velocity of water coming from the faucet created quite a bit of splashing. In an effort to mitigate this, we installed the Star Trek-like splash guard to redirect the splashed water into the basin. Even after installing this back splash, the problem of water splashing onto the toilet seat was not completely solved. If we had a toilet-bowl lid, this would be less of a problem.

The faucet creates a high-velocity flow of water. Because of this, handwashing style must be slightly altered to avoid splashing. Social acceptance of this system may be more difficult to achieve because it requires that people change their bathroom behavior.

- . Drilling through the half-inch of aluminum basin required the special molybdenum drill bit. A different basin might not require a special tool.
- . It was difficult to track the actual water savings without a water bill or some sort of water-use data logger. Our water savings might not be as great as we thought.
- . Seeing as this is a demonstration project at CCAT, the toilet is flushed unnecessarily by overzealous tour guides. Therefore, water is being used more at this toilet.

Need Better Instructions?

Yes, you do. Find an awesome step-by-step process to create this system at [http://www.instructables.com/id/Hack-a-Toilet-for-free-water./](http://www.instructables.com/id/Hack-a-Toilet-for-free-water/)



This is a project from Humboldt State University's Campus Center for Appropriate Technology. Please see other CCAT projects here on Appropedia or check out the CCAT homepage (<http://www.humboldt.edu/~ccat>).



Retrieved from "http://www.appropedia.org/CCAT_Wash_n_Flush"

Categories: CCAT | Sanitation | Water conservation



- . This page was last modified 00:49, 30 April 2008 by Lonny Grafman. Based on work by Annie Welbes and various and Anonymous user(s) of Appropedia.
- . Content is available under GNU FDL.

Appendix C:

CCAT

A.T. Transfer Spring 2008, p.8,

Fix your flusher- a DIY

By: Jeffrey Steuben,

CCAT Co-Director

A.T. TRANSFER

CAMPUS CENTER FOR APPROPRIATE TECHNOLOGY

Since 1978



*30 years
and still growing...*

Spring 2008



Back row (L-R): Dani Ladimir, Paul Huttenhower, Jeff Steuben, Lauren Parish, Matt Peters, Tommy Viducitch, Jasper Peach;
Middle row: Nathan Chase, Annie Hehner, Erin Ryon, Matt Schiff, Sara Dykman, Jocelyn Orr, Jess Huyghebaert; **Front:** Rose Dana. *Photo by Maiyan Linane*

First word

BY JASPER PEACH
 PROJECT MANGER

I'm listening to Led Zeppelin's *When the Levee Breaks*, blasting toward Eugene at 65 mph for another weekend race, when the full picture hits me. Hearing the first lyrics, "If it keeps on raining then the levee is going to break," I can only think about problems like global warming, fossil fuel woes, global hunger and war building up behind this constructed blockade that's shivering and nearly ready to burst. Sometimes we get caught up in a lifestyle that may not be the most socially responsible; my running addiction means I drive or fly with the team to get to where we need to go. Our one nod to living appropriately is that we always carpool to races. I know. That's it. It's not big enough or sustainable enough to get the attention of the likes of Woody Allen or Al Gore, but it's reality.

Now, before you feel the urge to stone me for treading heavily on the Earth, and before you go on to read about progress at CCAT and new co-directors, hear what I've got to say. Thinking back to my first experience with CCAT, I was a bright-eyed freshman right out of high school with the urge to make biodiesel and save the world. Somehow I convinced Krystal, Eddie, and Kendra to hire me on as a biodiesel technician. My idealism, my vision and my dedication to one small part of the fight to keep the levee from breaking got me involved with CCAT. That involvement has lasted my entire career here at Humboldt, and has given me the opportunity to see that we can't

stop the rain from coming down and filling up the reservoir behind the levee. We can't be the planning committee that came before us and made the levee shoddy in the first place. We can be the concerned, committed citizen, though, balancing our need to make a life in the modern world with our duty to walk along the levee, patching up what we can while getting those with more resources and power than ourselves to recognize the problems and do something about them.

On the cusp of graduation, I feel I have acquired many skills that will help me outside Humboldt County. Countless hours spent trying different cement to clay ratios with Jeff or learning how to build living roofs with Engineering 305 students all demonstrate why CCAT is so great and exciting. It is a place to learn and grow and discover new solutions or revitalize past practices. It is the hub to a bike wheel and it is only strong with people creating new spokes.

So, if you wonder how to get away from an unsustainable lifestyle or if you've already started and you want to do more, come to CCAT. Make that pilgrimage again if you haven't in a while. Rekindle that flame, because right now there is a whole slough of projects that are in motion or need that extra push. Thinking back to the levee, I know we can't dwell on the things that got us into our present situation other than to recognize what they were. We must make a pact with ourselves that we will not be that shameful past to future generations, and enter every day like my bright-eyed freshman self; ready to work for the present and the future.

table of contents

first word	2
retreat weekend	3
fruit that flourishes	4
from coast to coast	5
shift change	6
CCAT library	7
fix your flusher	8
the next 30 years	9

AS
 Associated Students
 "The A.T. Transfer is the official newsletter of the Campus Center for Appropriate Technology, which is funded by the Associated Students of Humboldt State University. The views and content of the A.T. Transfer are not censored or reviewed by the Associated Students."

staff

Editors

Rose E. Dana (design),
 Elizabeth Hilbig (content, photos)

Layout

Rose E. Dana, A. Dominic Efferson,
 Elizabeth Hilbig

Thanks to our *local* printer,

Bug Press

Reach them at 707.822.2001



Aydee Virgen poses with the cat potholder during a vegan enchillada workshop led by Argelia Munoz. Elizabeth Hilbig

Retreat weekend at CCAT

By ANDREA LANCTOT AND JOCELYN ORR
INCOMING AND OUTGOING CO-DIRECTORS

Green Campus and the Campus Center for Appropriate Technology (CCAT) hosted the First Annual Sustainability Retreat Weekend during March 28 – 30. The retreat was a small event planned to showcase student-initiated sustainability projects and campaigns on Humboldt State's campus. The event focused on campus energy use in relation to energy efficiency, transportation, waste, and food. Jocelyn Orr, CCAT Co-Director, and Andrea Lanctot, future CCAT Co-Director and current Green Campus program coordinator, organized the event. The mission of the retreat was to unite neighboring campuses, their students and stakeholders in an information exchange.

Twenty-five people participated in the event and with the help and assistance of numerous students and faculty. Students from Chico State, University of Oregon, and Humboldt State spent three days touring, discussing, and presenting on sustainable initiatives. Chico State University's sustainability coordinator Jillian Buckholz got to speak with TallChief Comet, Humboldt State's sustainability coordinator. Other special guests included Renee Lafrenz and Jennifer Alvarez from the nonprofit Alliance to Save Energy (the Green Campus Program's parent organization), Andy Coghlan, sustainability specialist for the University of California Office of the President. Jocelyn's visiting family also attended the event.

The weekend was put together by the collaborative efforts of the Green Campus

Program, The Campus Center for Appropriate Technology (CCAT), The Bicycle Learning Center (BLC), Green Wheels, The Arcata Educational Farm, Students for Community Food, The Food Collective, The Campus Recycling Program (CRP), The Humboldt Energy Independence Fund (HEIF), Schatz Energy Research Center (SERC), TallChief Comet, and members of the Social and Environmental Responsibility Clubs Coalition.

The two-day event began on Saturday, March 29. The morning kicked off with a two-hour sustainability tour of Humboldt State followed by a Green Wheels and BLC presentation on alternative transportation. Visiting students shared their alternative transportation plans and brainstormed on new ideas. The afternoon session was a two-hour energy session by Green Campus, HEIF, and Richard Engel of SERC. Humboldt State's Green Campus and Chico State's Green Campus were able to share energy efficiency projects and exchange project suggestions. After a day of networking, attendees took an interpretive walk of the Arcata Community Forest. Attendees ate a local organic meal, cooked by students. Humboldt Circus provided the after-dinner entertainment. The interactive performance had attendees rapping about "Earth, baby," and involved in acrobatic feats. Attendees were moved both by the circus's hilarious performances and their insightful reading from Joanna Macy's *Coming Back to Life: Practices to Reconnect Our Lives, Our World* (a copy can be found in CCAT's library).

Students cooked a large breakfast of local ingredients Sunday morning before heading off

to the Arcata Educational Farm. Student farm managers and Paul Huttenhower of the Food Collective discussed farm-to-schools programs and student food campaigns. Retreat participants toured the farm and then helped with weeding the strawberry patches. Humboldt State's Dining Services graciously donated a delicious lunch that was served at the Arcata Marsh before participants received an interpretive tour of our unique wastewater treatment plant and wildlife sanctuary. After the marsh, CRP hosted a discussion on campus waste issues and running zero-waste events.

Wrap-up of the retreat began with a special guest speaker from the Center of Excellence in Climate Change Communication Research, based out of George Mason University. Connie Roser-Renouf gave an insightful talk on communication challenges, environmental psychology, and what spurs people to action.

Overall, participants hoped that the event would be continued and that the small intimate group would be maintained. Participants encouraged the organizers to manage the time better, include more campuses, and give more time for other campuses to present their successes.

The retreat weekend provided an opportunity for Humboldt State students to learn about our own campus and how to run a conference. The experience united student groups and strengthened some bonds while fostering new ones. It provided our neighboring campuses and ourselves an opportunity to share ideas, resources, and to enjoy Humboldt!

Fruit that flourishes on the forest floor

BY PAUL HUTTENHOWER
PERMACULTURE ADVISOR

A big part of this semester at CCAT has been a magical journey into the realm of the fungus among us. Fungi are an incredible group of organisms that do so much for us. First of all, we would probably all be up to our eyeballs in organic matter if it weren't for the huge role that fungi play in decomposition. Also, fungi help improve the resilience of our local flora through their mycorrhizal relationships with plant roots, making it easier for the plant to uptake nutrients. Without fungi in the soil, it degrades and artificial inputs of fertilizers become needed.

On top of these tremendous services that fungi provide to our ecosystems is perhaps my favorite of their characteristics, their edibility. Fungi are an amazing source of both food and medicine, and on the rainy coast of Northern California they provide an incredible off-season harvest. When the rain sets in and the fields are looking bleak, the beautiful bloom of the fungi makes for a bountiful harvest.

Here at CCAT we have prepared ourselves to partake in the in the mushroom harvest without leaving the familiarity of our backyard. To do this we have made two large mushroom beds that should provide us with a continual fall and winter harvest. The species we chose are nemekeo, the traditional miso soup mushroom, and blewitts, considered a delicacy by most fungi fans. Both of these species should begin fruiting after the weather gets cold and rainy in the fall and provide a substantial harvest through the winter months.

When selecting the species for your bed, match

appropriately based on your habitat. And since wet weather cycles trigger the fruiting, consider the rainy season as well as your schedule in order to plan inoculation times. You don't want to miss the fruiting phase, and it can both start and end within one week if conditions are right. Check on your bed often once you expect mushrooms.

So, the question becomes how to go about making this a reality. Well, in order to cultivate mushrooms there are really only two essentials: a substrate for the

fungus to feed and grow on, and inoculants of the fungus itself. The substrate that you use is highly dependant upon the species of mushroom you are attempting to cultivate. However, most of the more popular edible mushrooms do quite well on a hard wood. The most popular wood to use is alder, and the most accessible form for fungi to feed on is in small pieces; chips or saw dust. It is important to keep in mind that the fresher the wood is, the less competitors there will be for your fungus. That means fresher wood allows it to colonize the wood more quickly and establish itself.

To make a bed, remove any loose debris and build up the substrate in the cleared plot. The method that we used in our beds was a combination of alder chips and logs. Although chips are a more accessible food for the fungus they are also able to be consumed very quickly, whereas a log is not quite as accessible but can provide a more long-term food source. So, by combining the two forms of substrate it is possible to set your fungus up for quick colonization and longevity.

Ideally, you can site the bed in an area of low ground coverage and dappled sunlight. The bed is dug into the ground. The logs go in on the bottom since they are the long term storage, while the chips get mixed with the inoculants and are layered on top of the logs to create the surface of the bed. Once the bed is built you want to make sure it stays moist for an extended period of time so the fungus can establish itself. Then it's just a waiting game (often a six-month wait), and eventually an eating game!

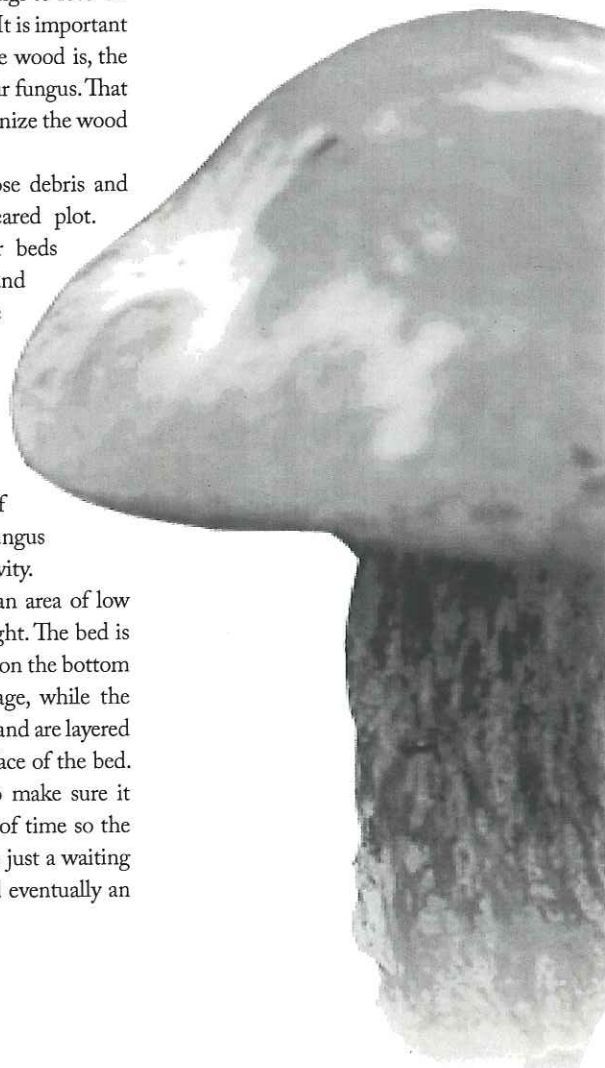
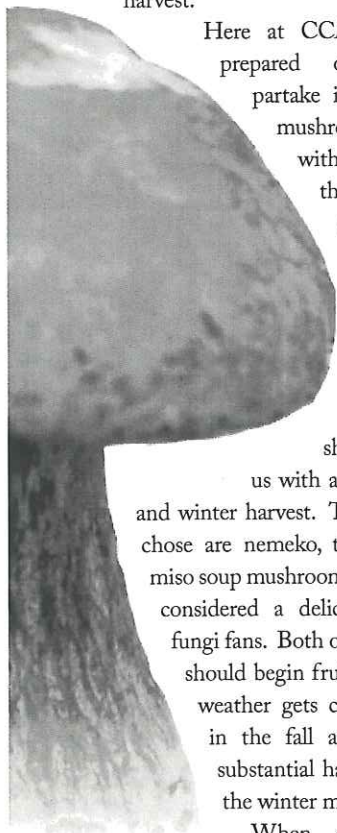
mushroom quick tips

You can direct mycelium through a yard by including a favored substrate debris in the landscaping.

The research of Paul Stamets and other modern fungi experts reports on the, "...critical pragmatic solutions showing us how to work with nature in order to heal nature."

Beware! Native and sometimes poisonous mushrooms may show up in the bed. Read about identifying your edible species before harvest.

*Sources: Kenny Ausubel, founder and co-executive director of Bioneers.
Paul Stamets, author of Mycelium Running.*



From coast to coast

spreading CCAT's know-how across the nation

By ELIZABETH HILBIG
AT TRANSFER EDITOR

Richard Olson, director of Sustainable and Environmental Studies (SENS) at Berea College in Kentucky, said he and his students are completing an exhibition house to spread the word about a sustainable lifestyle. What spurred them to action? A visit to CCAT.

"We were inspired by the passion and zeal of the 2001 directors who worked their butts off and took seriously the desire to make a difference," Olson said.

Students from Berea College came across the country with Olson to visit CCAT back in 2001. Olson and students slept on the floor at CCAT, and had their first taste of a sustainability demonstration house.

Living among and using sustainable technologies while teaching others about them may not seem like a novel idea for some, but many visitors still come to CCAT to find out how its done.

Olson said they learned from CCAT the value of a broad range of activities to attract the most people. "If we don't get a lot more people dealing with this [environmental crisis], we're dead," Olson said.

Berea student Megan Naseman later came to Humboldt State on exchange for a semester and interned with CCAT. She gained hands-on training and first-hand experience in the different ways CCAT connects to community, from events to activities with local children.

And at University of Oregon, the Center for the Advancement of Sustainable Living (CASL) began with University of Oregon student Joanna Rogers in 2002. Rogers never forgot the unique program she found as a visitor to CCAT, one she relied on "to create a viable alternative to the presently unsustainable status quo." Rogers worked along with Gary Houser, a former Arcater and CCATer, to gain admistrtrive support and establish CASL.

Garrett McSorley, a 2004 CCAT co-director, is a graduate student at University of Oregon. McSorley is an advisor to CASL and works with current CASL directors and volunteers to advance the final stages

of construction at the demonstration house. McSorley said completing the slew of projects, like adding rainwater catchment and a dual flush toilet, will allow CASL to house resident directors.

Since the visits to CCAT, Berea College started construction of the Sustainable and Environmental Studies (SENS) House. Guided by CCAT's framework, the House will be home to four student directors with its completion later this year. But all around the SENS House grounds, endeavors in the spirit of CCAT are underway. Some more involved projects include the design and maintenance of an ecological machine that devours eco-village sewage, and the transition

of lawns into edible landscapes. To maximize the demonstration of a natural building on-site, the structure's six walls are made out of different

materials from cobb to cordwood. The SENS house staff is improving a living roof and had radiant floor heating installed, much like CCAT.

"We need to be teaching people practical skills for communities; that's in terms of energy, food, transportation," Olson said. He calls this 're-skilling.'

The SENS House staff saw that concrete examples provided by a demonstration house offer a personal understanding of the technology. "It gives credibility and shows what the sustainable life is like day-to-day," Olson said, "so that people who visit might say, 'It could look like this - and it's actually o.k.'"

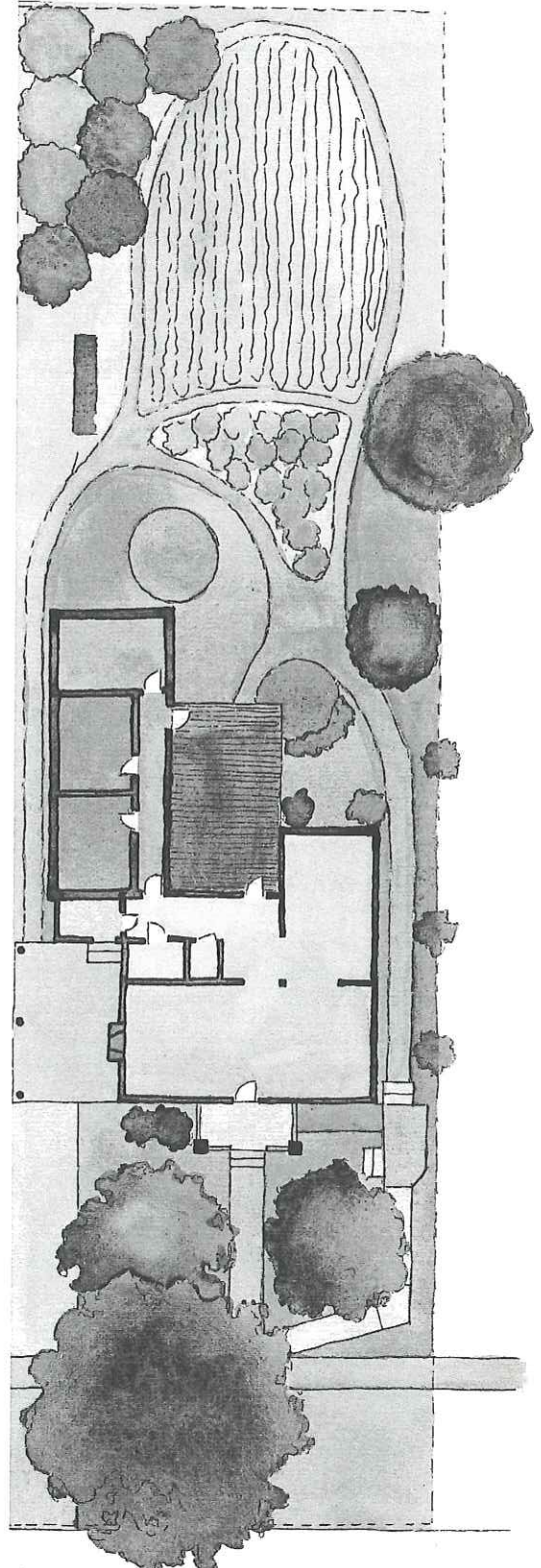
Olson said the importance of such centers for sustainable living only grows with time. "We need to see radical changes, an 80 percent reduction in material use," he said.

The SENS House balances this weighty assessment by stressing that small-scale, daily lifestyle changes are key to a better tomorrow.

Meanwhile, the inspiration keeps spreading. CSU Chico and Dartmouth students are a few examples of other groups that took concepts of sustainability and hands-on demonstration from CCAT and are modeling their own programs and centers after Humboldt State's.

"It gives credibility and shows what the sustainable life is like day-to-day..."

Richard Olson, SENS director



A watercolor illustration of the design for the green remodeling and expansion to the CASL house, University of Oregon.

Illustration by Samantha Rusek, CASL Design Team

Shift Change

Jamie Russel

Incoming CCAT faculty advisor, applied tech professor

John Meyer

Outgoing CCAT faculty advisor, government professor

CCAT: When did you come to HSU?

Jamie Russel: I came in August of 2006.

CCAT: And when did you first get involved with CCAT?

JR: Oh, gracious. I knew about your organization before I came.

CCAT: Is that why you came?

JR: It was one of the reasons, actually. Before my interviews, I was browsing the Webpage and I saw CCAT. And took some looks at the pages there, so I knew about CCAT before I came on campus. I was here in the fall semester, but it wasn't until the spring semester I started attending the steering committee meetings. The first year is kind of a blur.

CCAT: So someone invited you to be on the steering committee?

JR: Yeah, I think Mark [Doggett] had been serving on the steering committee and he and I talked when I came. He suggested that since I had more of a sustainable design/green background, I should jump on.

CCAT: What was it that attracted you to CCAT? Why did CCAT interest you when you were looking at coming up to HSU?

JR: I think anytime you see strong commitment from students to something like appropriate technology or sustainable design or whatever, whatever concept or moniker you want to put on it, when you see that maintained over time, that's really impressive, that means there's a strong core, and a movement there. I think it's a good indication.

CCAT: I agree, it's easy to start a movement and have it die out in three years when you graduate.

CCAT: What do you hope to see come out of your time as faculty advisor? Any plans on how long?

JR: I haven't thought about the actual duration. We could play that by ear. It's important to have the institutional knowledge be transferred, and the half life of co-directors is just a semester... But you have the whole steering committee as well, I don't know how critical it is. Maybe that's a discussion the steering committee should have, Do we want to get formal and set some kind of a term limit?

CCAT: John [Meyer] had talked about some kind of term limit so it's not awkward when you're like, "I want to step down"... But regardless of that, you are joining this organization that's been around 30 years, what are you really excited about?

JR: I'm excited about the built environment and buildings. And what can be done to lessen the impact; it'd be great to have zero-impact buildings but that's a ways way off. I see CCAT, with the house there, as a great place to explore that. I know there's been a push in the past, or more recently, for more data monitoring and things along that line. I think actually installing things, installing equipment, and some things that are a little bit experimental, like experimental solar thermal stuff that people could potentially make on their own... testing those out would be really fun and exciting. But I don't want my personal joys and inspirations to take over the organization, because there are a lot of other things that CCAT does, with outreach, for transportation, for self-sustaining growing your own food... there are LOTS of other things that aren't necessarily in my expertise area, I don't want what I really get excited about to overshadow those things. I think it's probably important that I get better acquainted with the all the heavy interest areas that CCAT focuses on right now, so I can help those. Where I can, where appropriate, I would like to focus on the built environment and the house.

CCAT: I think this is an appropriate time for you to step in then, because this is when we're like, "All right, we've got the house ready, now we want to build a workshop and greenhouse." Those structures are going to take some serious consideration.

JR: I think that's a good interface for another synergy where we talked about with the class. [referring to product prototyping class]

So, I think being able to integrate those classes, and some of our students. I think traditionally a portion of our students involved in CCAT, but I don't know how big it's been in the past. My impression is that it hasn't been that big. There's always a much more dedicated group of people, and then a lot of people who have no idea.

INTERVIEWS BY: JEFFREY STEUBEN

CO-DIRECTOR

CCAT: You've been the faculty advisor since 2000. Over that time, what do you think has been the most significant thing that's happened as a result of your relationship with CCAT?

John Meyer: I don't think there's anything I can point to that was directly a result of my relationship with CCAT. Almost everything good that CCAT does is a collective project. Certainly, the most significant thing that's changed over the last seven years has been the move. Almost literally the moment I became faculty advisor, the question of what space CCAT was going to occupy, and what its relationship to the University's Master Plan, and what kind of facility it was going to be given with all the other things the University was doing has been the biggest question.

Literally within a week of when I signed on as faculty advisor we had meetings with the all the University administration to decide whether or not they were going to put a parking lot where there used to be a strawbale shed... It's been an ongoing question that I think is largely resolved now, which is why I feel like it's a good time to hand it [the role as advisor] off to somebody else. I think that Jamie's got a lot of skills that will be really valuable for CCAT moving forward with its projects and designs.

CCAT: The political side of things is a little less crucial now?

JM: I think it is. I guess the other thing I would say though is my attraction to CCAT has never been so much about politics in that sense. My field of study is political theory. What political theory is more than anything else, in the biggest picture sense, is asking questions about what kind of society people want to live in. What really attracted me to the organization, and continues to keep me involved, is that in some sense, CCAT is one big experiment in trying to think about and talk about and discuss how to live. And how society can live. And in that sense, it's absolutely a great program and a great opportunity for students to gain that experience.

CCAT: How do you think you have grown out of this relationship?

JM: I've learned a lot about the technical systems... I'm still no expert, but I certainly have a much better appreciation for things like the greywater system, and the solar systems, and the other things in the house that were never really my background. In particular, some of the alternative building materials that I've learned about through CCAT. Building out of cobb, building out of straw bale.

CCAT: Didn't you recently remodel your house too?

JM: We did, we recently remodeled our house and much of that was inspired by work at CCAT and the contractor we worked with is Paul Bias, who's the same guy who's done all of CCAT's work.

Liberate your passion

with literature at the CCAT library

By ROSIE RECORDS
LIBRARIAN

The CCAT library started as a small book collection in the living room of the early Buck House. In the library's new downstairs location, it now has room to grow. Today the library has over 1,000 books, DVDs, videos, and magazines in circulation and reference. The CCAT library collection can now be easily searched online. You can find a link on CCAT's homepage or google 'CCAT library.'

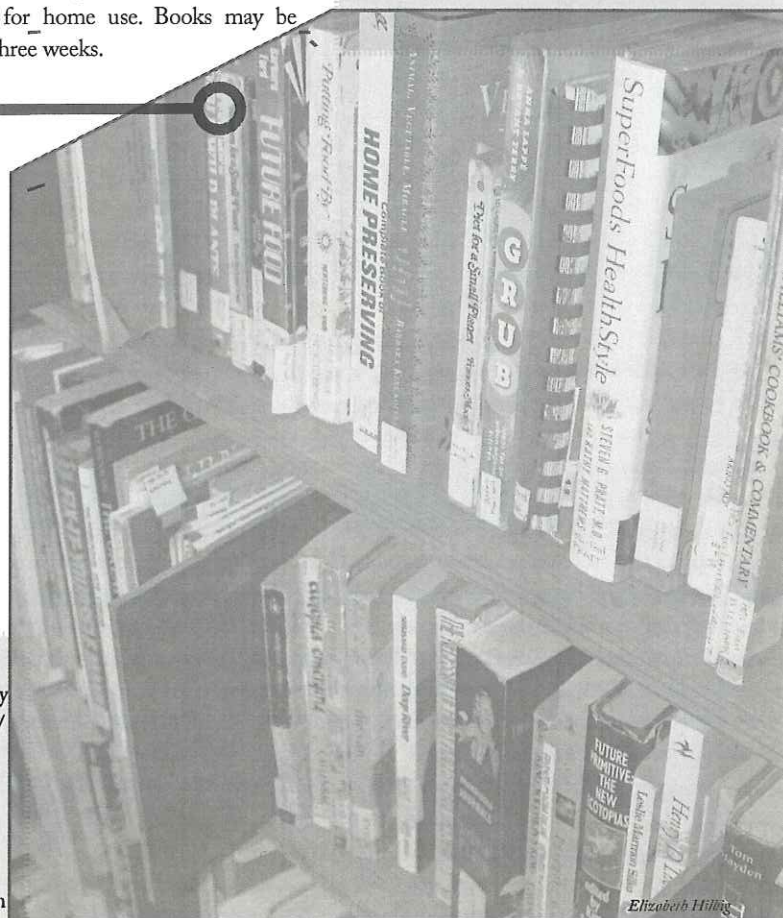
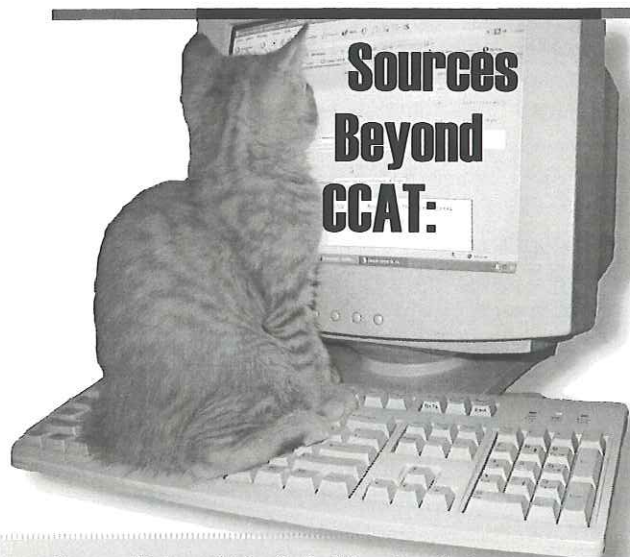
The library encompasses a spectrum of subjects, as varied as the visitors to the collection. Our visitors are students, faculty, community members, and travelers from all corners of the world. Many are looking for resources to help them live in a more sustainable way, whether it be books on greywater marsh construction, insulating and weatherproofing their homes, straw bale and cob construction, pedal power technology, home canning, vegan and raw cuisine, or organic gardening. As librarian, my goal is that the CCAT library continues expanding our collection with books that will be of hands-on, practical use for this CCAT community.

We are working with CCAT employees and with the teachers and students of CCAT classes to purchase books that will be of the greatest use to CCAT library patrons. A few titles requested by students and faculty that are now enriching our shelves are *Permaculture in a Nutshell*, *Rainwater Collection for the Mechanically Challenged*, and *The New Create an Oasis with Greywater*. You can help us improve our collection by offering recommendations of titles for purchases, or by giving a donation of books or funds for book purchases. A recent donation of books last year more than doubled our collection of urban design books, including *Green Urbanism: Learning from European Cities*, *At Road's End: Transportation And Land Use Choices For Communities*, and *Carfree Cities*.

The library is open to the public during regular CCAT business hours, Monday through Friday 9 a.m.-5 p.m. All are welcome to stay and read in our downstairs reading area, or to check out books or media for home use. Books may be checked out for three weeks.

how to help:

- 1) Request books. I always welcome requests for new titles for the CCAT library. We prefer guides to hands-on projects or design—things that are harder to find elsewhere. To request a title, e-mail Rosie Records, CCAT librarian, at CCAT@humboldt.edu
- 2) Donate books. Kind book donations last year more than doubled our planning and development section with books on sustainable urban development, health and community design, and carfree cities. We welcome donations of good-condition books that are related to CCAT's mission.
- 3) Donate money. Every year we must pass up some excellent books because they are out of budget. Donations to CCAT are tax-deductible and can be marked for the CCAT library.



• **Appropedia** is a wiki site for "collaborative solutions in sustainability, poverty reduction and international development," started by Humboldt State professor Lonny Grafman: <http://www.appropedia.org/>

• Humboldt State University's **library appropriate tech. collection**:
<http://library.humboldt.edu/ATL/>

• The Humboldt State **Environmental Resources Engineering program resource list**:
<http://library.humboldt.edu/%7Echadwick/ereweb.htm>

Fix your flusher- a DIY

By JEFFREY STEUBEN
Co-DIRECTOR

When searching for a topic to focus my senior project around, I was confronted with a puzzling question: Why do we use drinkable water to flush our toilets? And more importantly, 'Can I do anything about it?' To answer this question, myself along with my group partners Annie Welbes and Tim Dower constructed what we coined the "Wash n' Flush." By modifying only a few toilet tubing parts and installing some hardware, we were able to turn the back of the toilet into a sink for washing hands.

We had three goals in mind when we designed our system -

- ◆ Eliminate the use of clean water to flush toilets
- ◆ Encourage replication
- ◆ Conserve water

The first goal signifies the most important change with the installation of the Wash n' Flush. Rather than use clean water, even if very small amounts, the toilet can now use a waste water to accomplish its function. Until

now, toilet water conservation has been manifested only as reducing the amount of water used to flush.

Our design was chosen because it required very little money, skills or expensive tools, and therefore could be replicated by almost anyone. CCAT was also the natural location to implement a project such as this. Our project would be exposed to a large number of visitors, which would in turn increase the likelihood that people would replicate it.

Water conservation was not our largest consideration, but rather a pleasant consequence.

And beyond saving water, the system saves energy wasted when clean, treated water is used to flush. We expect some savings, since people no longer use the fresh sink water to wash their hands after going to the bathroom, but it would be difficult to track an accurate amount.

Problem:

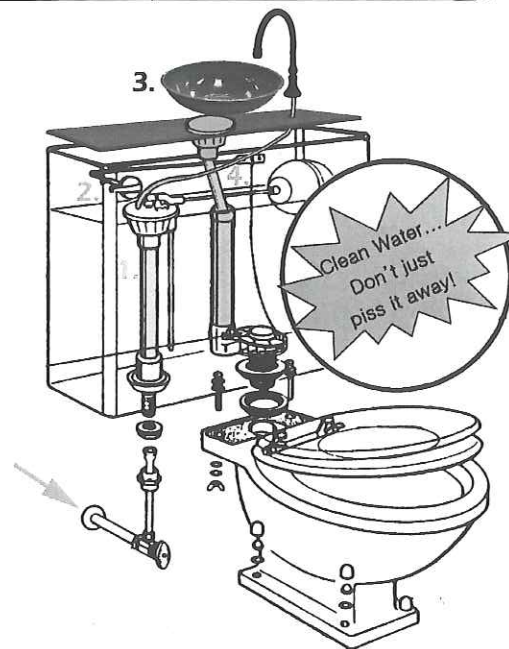
Clean, drinkable water is being used to flush human waste down toilets.

Solution!

Modify your toilet to flush with hand washing water.

What Happens when I flush?

1. City water flows into the inlet tube.
2. Water is diverted through gold tube and out faucet.
3. Wash your hands!
4. water drains from basin into overflow pipe, which refills toilet bowl.



Want to build one?

Visit www.appropedia.org/CCAT_Wash_n_Flush

An ENVS 410
Senior Project,
Spring 2006

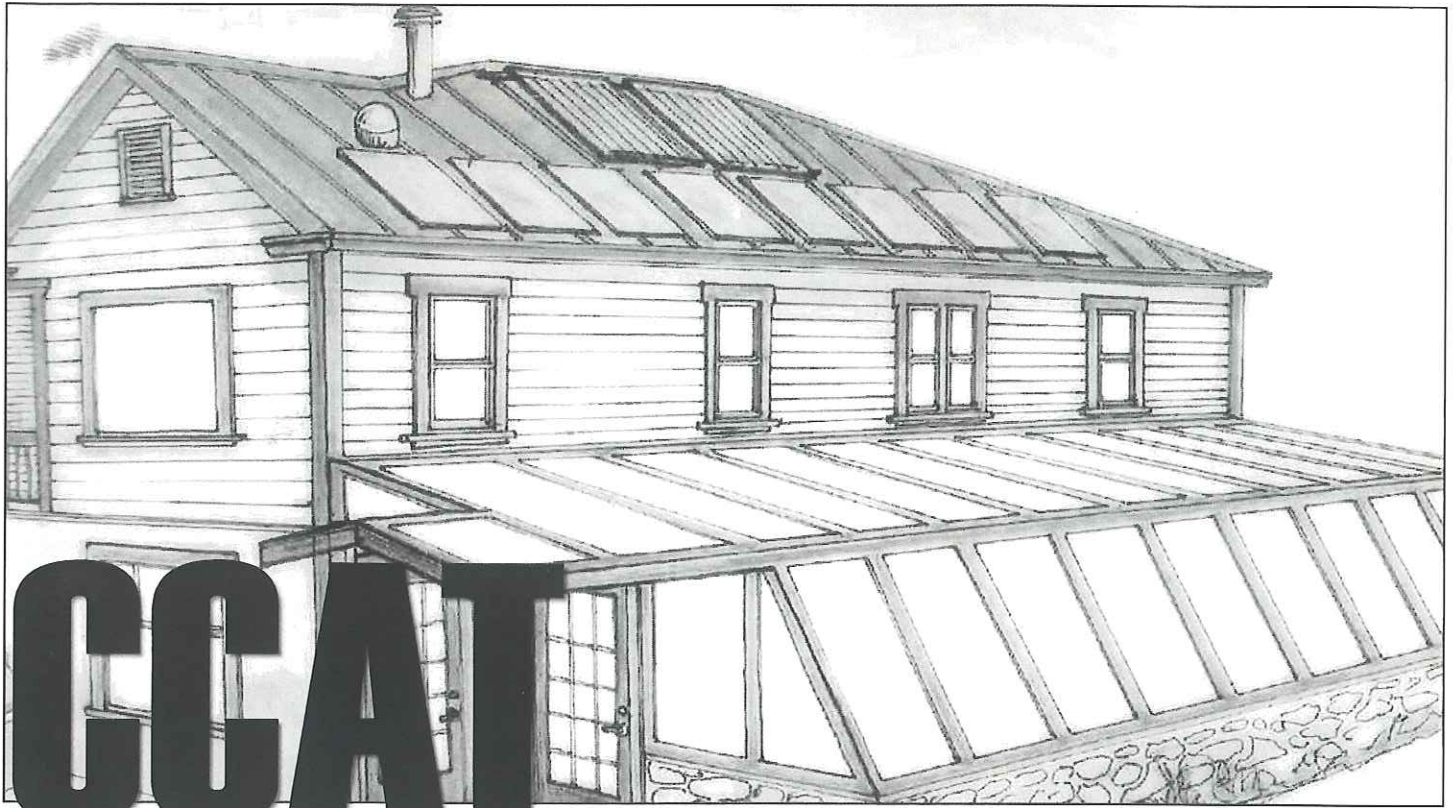
Jeffrey Stauben
Annie Welbes
Tim Dower

◆ **Did you know...** According to the California Department of Water Resources, the average person flushes a toilet about 7-9 times per day, and larger capacity toilets consume up to 6 gallons per flush. Ultra low-flow toilets use a fifth the water, and the Wash n'Flush will save you even more.

Flashback to the Winter of 1990:

An article in the *A.T. Transfer*, 'Mothership No More: Electrical Self-Reliance at CCAT,' by Jack West, celebrates a big step in CCAT history.

Well the time has come for CCAT to cut the cord from the mothership. That's right folks, CAT is ready to say good night to the fossil-burning, atom-splitting industry of centralized power. Over the past decade the Buck House, CCAT's home, has been slowly moving in the direction of energy self-reliance, and now it is time to take the last few steps by setting up an independent, on-site power production system. We feel that as the world prepares to fight for the few last drops of oil, it is becoming increasingly important to demonstrate that the technology exists right now to end our energy dependence on dead fossils primarily buried beneath the deserts of distant land. All of the energy the this world needs, and much more, is found in the most obvious of spots: the center of our solar system....Right now at CCAT there are 10 photovoltaic panels and a wind generator which convert free sunshine and wind into electricity.



CCAT the next 30 years

This illustration depicts the vision for the new CCAT House of the future.

Garrett McSorley, former CCAT co-director

JESS HUYGHEBAERT
Co-DIRECTOR

CCAT has come a mighty long way since it's beginning. Back in 1978, who knew how we would grow and acquire a house, becoming an internationally recognized demonstration house. We field phone calls from all over the United States and the world, sharing sustainability with the thousands of people who pass through our home every year. It's incredible the changes and challenges CCAT has gone through, and it's amazing to say this is our 30th anniversary! While we're celebrating and looking back at all the accomplishments we have made, we've also begun looking forward. Where will CCAT be in another 30 years? There's a lot of changes predicted for our future, and a lot of uncertainties. We have many hopes and aspirations. Here's our vision of where CCAT might be in another 30 years.

We'll have a well-established greenhouse that is central to our subsistence diet, with a huge variety of food growing in it year-round. The co-directors who live here will be able to feed themselves, and provide food for employee meals, meetings and festivals from our gardens and the greenhouse. All of our seeds will be saved, and we will have started a seed bank and seedling distribution within the community

every spring time. Our fruit trees on the north side of our land will be near maturity, and canning and preserving workshops will be held every fall to demonstrate how to preserve the fruit we harvest. Cider will be a mainstay of CCAT Week in the fall. Our lemon tree will provide sweet sourness for lemonade, and peach pie will be sold in the mornings. The co-directors will have detailed guidelines to follow, with plenty of room for innovation. Our projects from the last 60 years will be meticulously documented. Filing cabinets and online records well-organized, will provide an accessible resource to our employees, our local area and the wider community.

Perhaps our reach won't be so extensive anymore though. The world around us may have shrunk due to the peak of fossil fuels, and a global economy could be a thing of the past. On the other hand...it may not be. Either way, CCAT will have developed an extensive network within Arcata. We will be a hub for education, having extended our unique pedagogy into further hands-on experiences. Regular classes and workshops will operate out of the downstairs portion of CCAT. The nature of these workshops will have evolved from the basic, useful life skills we teach now, to more elaborate, invested workshops that explore social, historical, philosophical aspects of technology.

Life at CCAT will be more healthy in a sustainable style. Though we preach appropriate and healthy living, often life is very hectic at CCAT for those who live and work here. We envision slower living in the future here, with more networks within the local community and with students. With sixty years of work and experience behind us, projects will have slowed. We'll be learning from our mistakes and perfecting our technologies. Life will slow, and we'll have more time to focus on disseminating technologies and sharing with the community. We'll have time to develop community and be able to maintain our grounds, instead of constantly working at new developments.

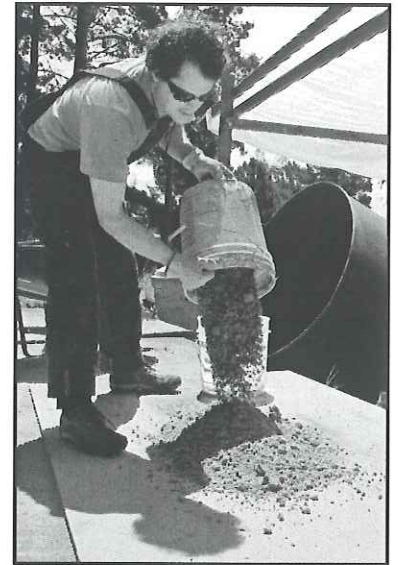
It all sounds beautiful, doesn't it? And I'm confident that this sort of vision has been held by past CCATers and visitors. An important question to ask is, 'how are we going to make this truly happen?' How are we going to ensure that our dreams are passed on, and how are we going to implement behaviors that we want to be continue? We're working now to streamline and organize all of our information and knowledge. We're building databases, trying to file our common knowledge so that CCATers in the future can know how it's been done and improve upon it, instead of starting from the ground up. Following such a strong past, we are sure to have a bright future.



Elizabeth Hilbig



Rose Dana

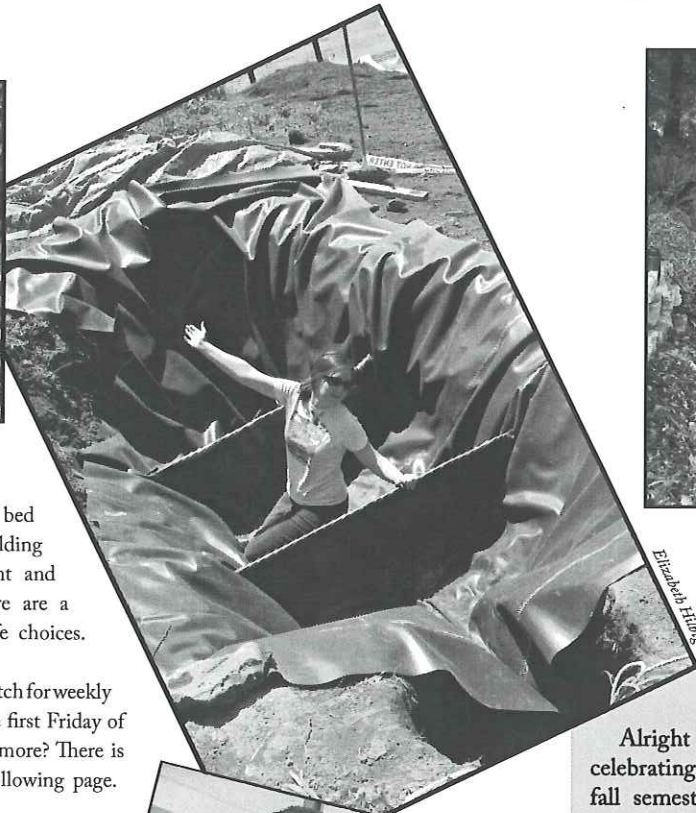


Elizabeth Hilbig

Curious about the buzz of activity at CCAT? Come on by and get involved!



Elizabeth Hilbig



Elizabeth Hilbig

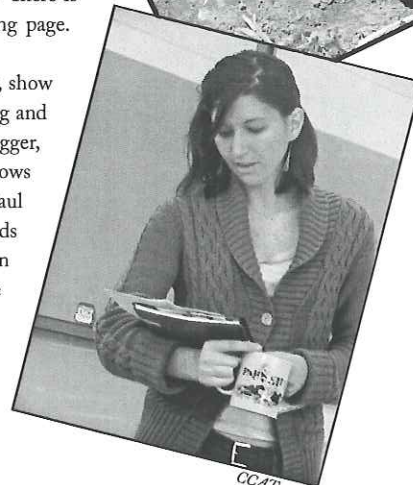


CCAT

From reusing cardboard for garden bed preparation to making vegan donuts or building rammed earth blocks by mixing soil, cement and clay like Eghan Thompson (top right), there are a variety of ways to learn about sustainable life choices.

Volunteer from 10 a.m. - 5 p.m. on Fridays, watch for weekly workshops, or come with a hungry belly on the first Friday of the month for CCAT potlucks. Interested in more? There is a course schedule for next semester on the following page.

The pictures on the second row, left and center, show off the efforts of Engineering 305 students in digging and installing CCAT's new greywater marsh. Corinne Cogger, who designed the system along with Niki Beckman, shows off the lined and baffled marsh pit. At far right, Paul Huttenhower and Erin Ryon prepare mushroom beds with a volunteer's help. And below, co-director Jocelyn Orr discusses lecture material with participants in the sustainability retreat.



CCAT

PARTY, PARTY

Alright party people, CCAT is celebrating its 30th Anniversary during fall semester this year, at the end of CCAT week. Stay tuned for information on this super celebration. Everyone is welcome. We hope to see you there!



Elizabeth Hilbig

A new crop of co-directors at CCAT: Azad and Andrea take over next fall

Azad Zandi's outlook

As an interdisciplinary studies major, Azad is combining the forces of appropriate technology, social science, and spatial analysis to save the world...some way or another. It's a lovely job, and he says somebody's got to do it!

"To express in words my unspeakably potent delight toward becoming co-director at CCAT would belittle the gargantuan grandeur of awesomeness it truly encompasses," he said.



Azad and Andrea sport some gear from the yurt and get ready for next semester. *Elizabeth Hilbig*

Andrea Lanctot's outlook

When I walked into CCAT two years ago, I found a group of hard-working, dedicated students who inspired me and taught me that anything was possible. I started taking CCAT classes and was able to work on projects at CCAT through my environmental science-appropriate technology major. I believe you learn best by doing, and my connection to CCAT grew deeper when I took on the natural paint project for the interior of the Buck House. Through the natural paint project I learned more about indoor air quality and the thousands of chemicals in our cleaners, furnishings, and building materials. Since the project, I have become dedicated to investigating what is in the products we use everyday.

I have always loved working with my hands and the earth through gardening, sculpture, ceramics, and art. Appropriate technology allows me to make natural, functioning art through natural building and painting, permaculture, and ecological design. I hope to share the beauty of CCAT with more students, build a new greenhouse, and expand our medicinal gardens. The amazing thing about CCAT is that the incredible things being done here are able to empower people to take action in their own homes and lives. I know this next year I will learn more than I can imagine, and I can't wait to share it with the world!

CCAT's Fall 2008 courses:

ENGR280: Sustainable Technology Seminar (1)

CRN: 43344 Tuesdays 2-5

This seminar series will feature tours of a range of technologies and their applications in the community. Potential topics include green building, community agriculture, graywater systems, alternative energy, biodiesel as a fuel, and more.

ENGR280: Lost Arts of Living (1)

CRN: 43346 Wednesdays 11-1

A series of experiential and exploratory workshops covering skills, crafts, and natural patterns that are no longer commonly practiced. Potential topics: shelter & fire building, natural paints, canning, and more.

ENGR280: Permaculture Lecture Series (1)

CRN: 44228 Time TBD

This course will cover the fundamentals of permaculture: sustainable systems design through reading and discussion of literature, focus projects, and surveys or technologies and permaculture systems.

Note: All courses are eight weeks long. Register through H.S.U.

ENGR280: CCAT Green Construction (1)

CRN: 44227 Thursdays 12-2

This course will provide students with hands-on experience, exploring the design and construction possibilities for the new CCAT facility and grounds. Students will learn about green & alternative building materials.

ENVS480: Organic Gardening (1)

CRN: 43743 Time TBD

This course teaches small-scale food production, without the use of chemicals. Gain hands-on experience in soil preparation, plant propagation, garden planning, greenhouse management, and more.

ENVS480: Herbalism (1)

CRN: 43744 Thursdays 2-4

Learn the use of herbs as medicine, and how they can be used to maintain better health in this eight-week course. Learn herb cultivation and propagation, herbal remedy creation, and alternative healing methods.

ENVS480: Trash to Treasure (1)

CRN: 44996 Mondays 12-2

This course will focus on finding waste materials and turning them into something usable. Some sample projects include making beads out of flower petals, basket weaving, crocheting with plastic bags, using chip bags to create reusable shopping bags, and altering clothing.

Thank you so much for supporting CCAT. If you'd like to support us further with donation, here's your chance! We're raising funds to build a beautiful greenhouse at the new CCAT site. To help, please include this slip with your donation of:

- \$10
— \$20
— \$50
— \$100
— Other

Please send your donation to:

Campus Center for Appropriate Technology
1 Harpst Street
Arcata, CA 95521

CCAT thanks you!

CCAT celebrates 30 years of living lightly on the Earth



< Paul Huttenhower divides vegetable starts for a young girl who came to CCAT in March with her classmates to take part in spring planting.
Erin Ryan



(above, L-R) Nathan Chase, Sara Dykman, Tommy Viducitch, and Matt Schiffenjoya CCAT staff dinner in the living room. *Elizabeth Hilbig*



The old CCAT site and greenhouse from about six years ago (above), and the new site (below) with the first signs of green growth on the ground and a small living roof. *CCAT*



Campus Center for Appropriate Technology
Humboldt State University
Arcata, CA 95521
ccat@humboldt.edu
(707) 826-3551

Nonprofit Org.
US Postage Paid
Permit No. 78
Arcata, Ca 95521

