ASHDOWN HOUSE

3am

November 2011

The Official Newsletter of the Ashdown Community

Message from the Editor

Dear Ashdown,

It's hard to believe that Christmas is just around the corner !

Even with some turkey under our belt, we manage to keep busy with a multitude of interesting projects. In this issue we learn about Greenbean recycling, as well as another student (Lei Dai) 's research topic. And although most residents have been at Ashdown for a few months, we can still learn from a few tips (heat and AC controls), courtesy of Kristin O'Halloran at the front desk.

Best of luck with the end of the semester !

Sincerely,

Anne-RaphaelleAubry
Ashdown Newsletter Officer

In This Issue

Contact the Editor

Please direct any comments or queries about "3am" to Anne-Raphaelle ("Anne") at aubry@mit.edu

Resident Helpful Information – Kristin O'Halloran

The first in a series of helpful tips !

Heat Ventilation Air Conditioning Systems (HVAC)
Air Conditioning (AC)

The AC automatically works when the outside temperature reaches 70F/21.1C and maintains it for four consecutive hours. You can set your thermostat by ensuring the thermostat is set to "Auto" and then press the "Hand/Finger" button to reach your desired temperature. The heat will automatically work when the outside temperature reaches 65F/18.3C for four consecutive hours. If you are having problems with your heat,please review and select the appropriate action for your situation.

(A) If you do NOT have the flame displayed on your thermostat, please follow these steps:
1. Put on "ON" position.
2. Turn Heat to 40 degrees.
3. Wait approximately 10-15 minutes for the Snowflake symbol to switch to a Flame.
4. Once you have the Flame symbol, adjust heat to the desired temperature.
5. Switch to "AUTO" position.

(B) If you already have the flame symbol, please follow:
1. Press "Auto".
2. Adjust to desired temperature (will not go above 72-75 degrees F).
3. Press the "Hand/Finger" button.
4. Ensure the thermostat is set to "Auto". **See below

The Flame symbol should remain as long as you are continuing to heat the room.

*** If the action taken to adjust your AC/Heat does not produce the desired result, contact 617-253-4948 (3-FIXIT).*

Fire/Smoke Alarms
If the Smoke Alarm in your room sounds, DO NOT open the door to the main hallway. Open your windows as much as you can and air the room out that way. If you open the door to the hallway and there is enough smoke, it will cause the building-wide fire alarm to go off, warrant an evacuation of the building and call the Fire Department to Ashdown.

If you hear the Fire Alarm sounding, listen carefully to the voice commands of the system. You only have to evacuate your building if the command stipulates to do so. Know your building number!

Prediction of catastrophic shifts in ecosystemsusingearly warning signals

- Lei Dai

Lei Dai

The Earth's environment is experiencing significant challenges, mainly due to the impact of human actions. The loss of biodiversity, caused by both global climate change and local environmental degradation, is one of the most urgent environmental issues. The increasing rate of extinction of species, which has not been seen since the last global mass-extinction, could lead to irreversible changes to the ecosystems that humans rely on. Thus, to maintain a sustainable planet, it is crucial that we understand and manage the environment successfully.

One common phenomenon in ecology is that small changes in an environmental driver can lead to large responses in the ecosystem. Consider a species living in an environment that is slowly deteriorating due to habitat destruction, global climate change, etc. The population may have been in some stable state for decades, but it is nonetheless possible for the population to suddenly go extinct in a very short time period. The abrupt collapse of Saharan vegetation around 5000 years ago and the recent dramatic shift of Caribbean coral reefs into an algal encrusted state are two examples of such sudden large shifts in ecosystems. The underlying mechanism of such phenomena is that an ecosystem can have multiple stable states and can therefore respond to a change in conditions in a non-linear way. As environmental degradation slowly pushes the system towards the threshold, the resilience of the system, or its tolerance to fluctuations, is weakened. Thus a small perturbation could cause the ecosystem to jump to a state far away from the original state.

The growing interest in studying catastrophic shifts opens up an interdisciplinary research area between physics and ecology. In physics, when systems approach a phase transition (a similar phenomenon to the catastrophic shifts), the time for the system to recover from a perturbation increases to infinity. This behavior, which is a general property of such phenomena, is called critical slowing down. The theory of critical slowing down provides powerful tools to predict the possibility of a catastrophic shift with time-series data. Suppose we have a series of observation of the ecosystem at different time points. Based on these data we can calculate statistical indicators such as variance to describe how large the fluctuations are, or autocorrelation time to quantify the extent to which a system state is related to its previous states. Theory suggests that these statistical indicators can be used as early warning signals of catastrophic shifts, because they will increase as the system is getting closer to the threshold.

Important concerns arise as people attempt to evaluate the early warning signals proposed by theory. Can we actually observe the warning signals in a real living system? What are their implications for environmental management? One of the outstanding challenges is to test the warning signals directly by experiments. A recent study in a zooplankton population demonstrates that the extinction of a population in a deteriorating environment is preceded by warning signals. Although these results are encouraging, the zooplankton population in this experiment do not represent the typical population dynamics in nature. In particular, this population size smoothly fell to zero as the environmental quality was degraded, meaning that in this system the population size being small is perhaps the best "early warning indicator" of impending extinction. In contrast, many plant and animal populations collapse below some critical size because of the need to find mates, group hunting behaviors, or other cooperative effects. This scenario, named the Allee effect, is observed across many species and significantly impacts the viability of populations.

Prediction of catastrophic shifts in ecosystemusingearly warning signals

- Lei Dai

My research aims to evaluate early warning signals before population extinction in a laboratory population that displays the Allee effect, and to investigate their potentials for application in the management of ecosystems.

My experimental system is a population of cooperatively growing yeast that goes through a death-birth process every day. The death is introduced by a daily dilution procedure through which only a fraction of the population is chosen to survive for the next day. The growth is set up in a well-mixed rich liquid media with sucrose. Because of the cooperative sucrose metabolism of yeast, the population can be manipulated to show the desired Allee effect. The environment can be easily tuned by changing death rates and nutrient levels. Every 24 hours, the cell density is monitored to test the population viability and generate time-series data for statistical analysis. On the theoretical side, I model the growth of yeast population with ordinary differential equations and evaluate the statistical indicators by stochastic simulations. The comparison between the theoretical results and the noisy experimental data offers insights to the limitation of applying the early warning signals in a real living system. Preliminary results from the experiments have identified a clear increase in the magnitude and correlation of fluctuations near the system threshold, in accordance with the prediction from theory and simulations.

Given that early warning signals can be observed in ecosystems, another practical issue is how they should be used to assess the extinction risk and adjust environmental management. In many ecosystem management strategies, the focus is on the prevention of perturbations such as droughts and disease outbreaks. These strategies are expensive and often unsuccessful, as disturbances are a natural component of the ecosystem. The new insight from research on ecological thresholds is that our efforts to reduce the risk of unwanted ecosystem shifts should instead focus on gradual changes that may reduce the resilience of the ecosystem. For example, instead of devoting a lot of resources to minimizing the devastating effects of an oil spill, it may be more effective to monitor the ecosystem's change in resilience over time and make sure that it is stable against possible influences caused by stochastic events like an oil spill.

The assessment of ecosystem resilience can be achieved by the same statistical methods, although we still know little about how the increase of warning signals reflects the degree of resilience loss. My experiment in a controlled microbial system could quantitatively map this relationship and give suggestions regarding whether it is possible to use these warning signals to evaluate the resilience of a system.

The ongoing research of catastrophic shifts in ecosystems has profound consequences for the environment and sustainability. I expect that the experimental demonstration of early warning signals before sudden population extinction will shed light on the prediction of catastrophic shifts in various ecosystems ranging from lakes, forests to marine systems. Furthermore, I hope that my work will aid in the eventual application of early warning signals to ecosystem management and environmental preservation.

Greenbean Recycling: Gaming through Greening
ZahraaSaiyed - Kristina Momchilova

Residents of Ashdown, Sidney-Pacific, and Edgerton gathered in the Hulsizer room to participate in the first Eco-Fact dinner at Ashdown House last month. Eco-Fact dinners are a collaborative effort by the NorthWest dorms to keep an active dialogue about current environmental and energy issues at and beyond MIT. The Eco-Fact dinners are a way for students to engage in discussions relating to a specific topic, led by professors and/or professionals in the field, over a complimentary meal. For the first event, we had the pleasure of hosting Greenbean Recycling.

Greenbean recycling attempts to expedite recycling and make receiving cash value for recycled products much more dynamic. Recycling bottles and cans has been restricted to two forms at MIT; using the blue bin where you cannot get your 5 cent deposit back, or taking bottles back to a grocery store where a reverse vending machine spits out a receipt, requiring you to wait in line to be able to get your nickel. Typically, these machines will not accept what is not sold in the store, nor will it take anything that is not part of the bottle bill here in Massachusetts. The bottle bill gives 5 cents for carbonated drinks only, so no water bottles, iced tea drinks or sport drinks also known as non-deposit items can be deposited.

Greenbean Recycle responds to these issues and also does more; it highlights your impact in real time, showing what you have removed from the landfill and your energy savings for each material you recycled. It also puts your 5 cent deposit into your PayPal account, TechCash account or you can donate the amount to a charity. Greenbean takes all bottles and cans, so you can recycle your water bottles, sport drinks and iced tea drinks.

Students listening to a Greenbean presentation
Image courtesy Z. Saiyed

Greenbean Recycling: Gaming through Greening
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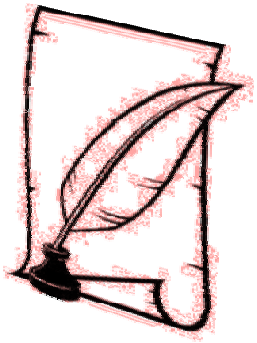
Greenbean will soon offer an option to compete on recycling with other groups and schools: "Greenbean Recycle took their own spin on reverse vending machines by allowing members to sign into their account to earn points and track their progress. Users first register through the site by creating a profile and choosing a team. As of now, the machines are only located in [one] place: MIT. This means the service and teams are exclusive to MIT, [but will soon expand to] Tufts. Once registered, they're given the option to choose a fraternity or sorority as a sub team. The next step asks users to decide if they prefer to earn money, receive tech cash (i.e. funds added to their university cash card), or make a donation." (Libby D, Technocrati.com)

The container count can bring users extra rewards if one chooses to participate in one of Greenbean's many challenges for the chance to win various gift cards for iTunes and Best Buy as well.

The Environmental Officers of the aforementioned dorms are interested in hearing from you about topics for future Eco-Fact dinners. If you would like to attend such discussions, or have an eco-friendly focus in mind, please contact ashdown-environmental@mit.edu. NW Eco-Fact dinners will rotate between the dorms, and the respective officers will inform accordingly.

Citizen's Corner: Submission Guidelines

NEW: AMC Ticket or 10$ Amazon Gift Certificate for unsolicited submissions !



Do you have a flair for writing?

Do you have an experience you would love to share? A cause you want to speak out for? An event you would like publicized and reported?

The ears of Ashdown are thirsting to hear your story!

The "Citizen's Corner" is a section of "3am" aimed at reflecting the lives and perspectives of Ashdown residents. All Ashdown residents are invited to contribute, and all kinds of material are welcome. In the past, we have received everything from overseas exchange program stories to essays about environmentalism. We are especially keen on the views of international students comparing the way of life (in terms of culture, atmosphere, education system etc.) here to the ones they were used to.

Guidelines in a nutshell:

- Submissions should be between 100 and 1500 words.
- No politically sensitive, religiously sensitive or pornographic material.
- Pictures to accompany text are welcome.
- Email title: "3AM SUB: <title of submission>".
- Email Anne-RaphaelleAubry ("Anne") at aubry@mit.edu.