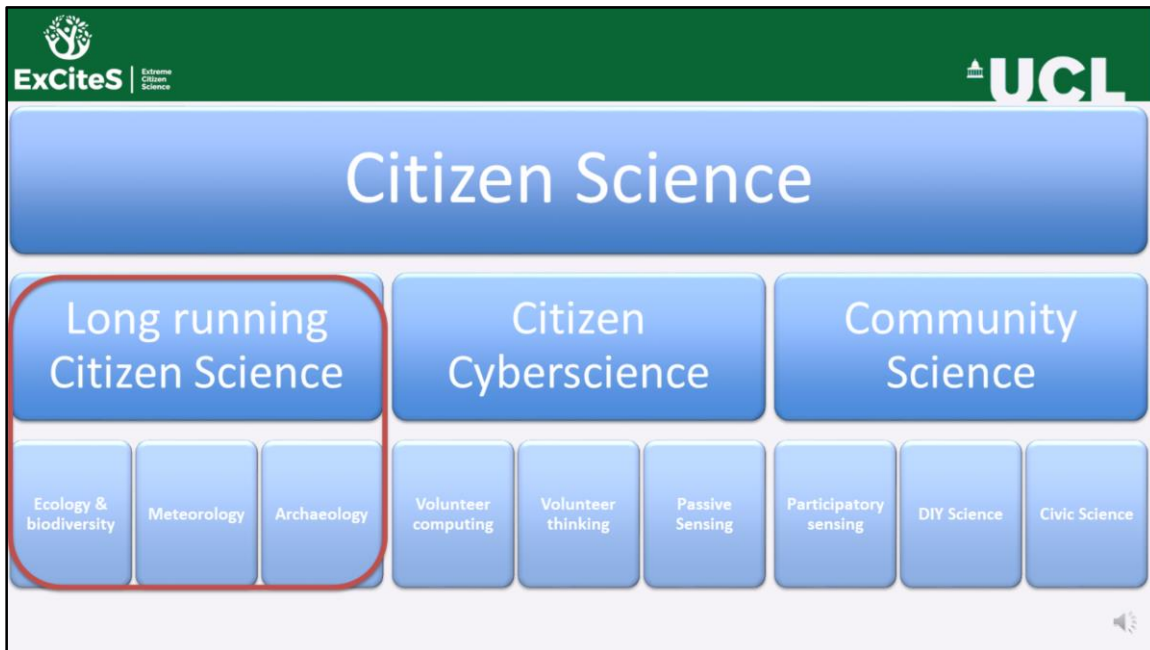


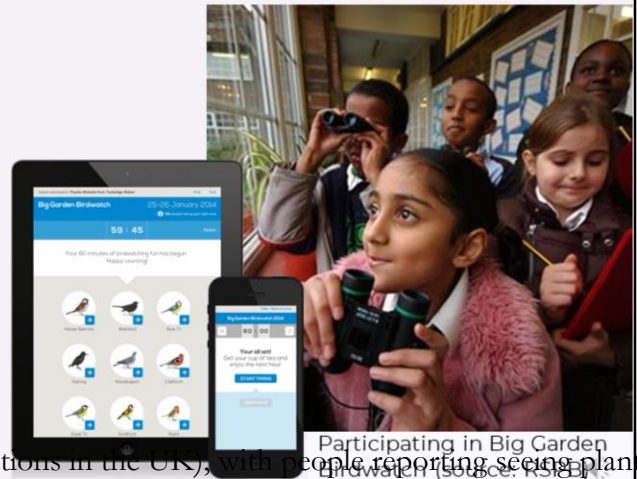
In the next few minutes, we will look at different types of citizen science projects so we see the wide range of activities that fall into the topic of citizen science. The overview will take us through different areas of science (domains), use of technology, and who is running the activity. You can find this overview in the additional reading for the class




Let's start by looking at some of the areas where citizen science continued to be part of the scientific activities of an area, but changed with technology and participation. Here are some examples from three of the areas where citizen science have been going on for a long time.


Biodiversity/Ecology

- Ecological observations of plants and animals (esp. birds), continue to be popular
- A review in 2012 identified 234 projects in the UK
- Big Garden Birdwatch – 1 hour, end of January, structured reporting, and over 500,000 participants



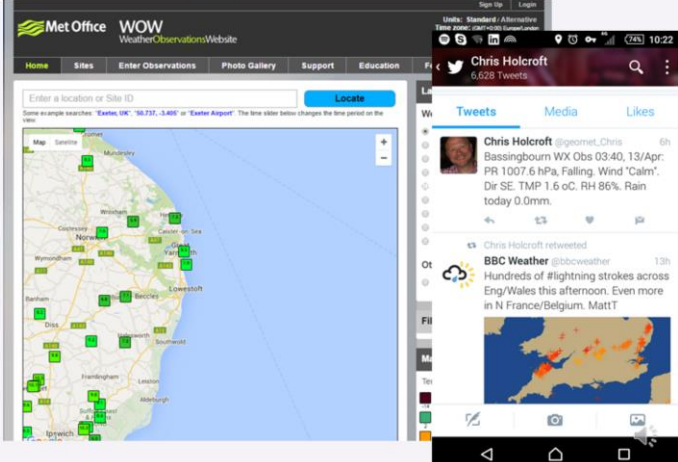
Ecological observations (also called biological observations in the UK), with people reporting seeing plants, fungi, and animals, is a very long running activity. There are many such projects – a review in 2012 identified over 230 projects in the UK. A good example for this is a Big Garden Birdwatch – a mass participation project run by the Royal Society for the Protection of Birds (RSPB) and engaging over half a million people to spend one hour, on a weekend, at the end of January, looking to the garden and reporting on the birds that they see. “A long-running citizen science project, the strengths of Big Garden Birdwatch are more obvious on engagement and communication aspects than they are on science. This activity involves an extremely large number of people, many of whom would not class themselves as birdwatchers but are encouraged to watch the familiar birds in their garden for an hour. This raises awareness and, through this engagement, allows the RSPB to build more support for conservation. The release of the results to the media provides the RSPB with its largest media story each year – thereby reaching more people.” (Dr Mark Eaton, RSPB)


ExCiteS | Extreme
Citizen
Science

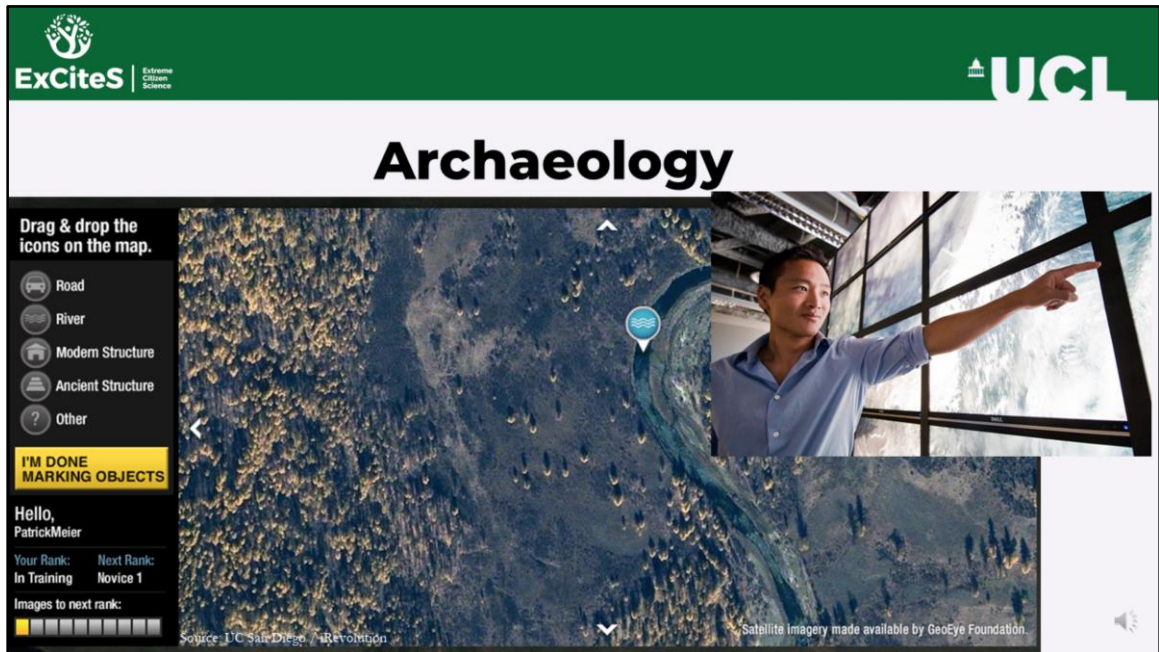


Meteorology

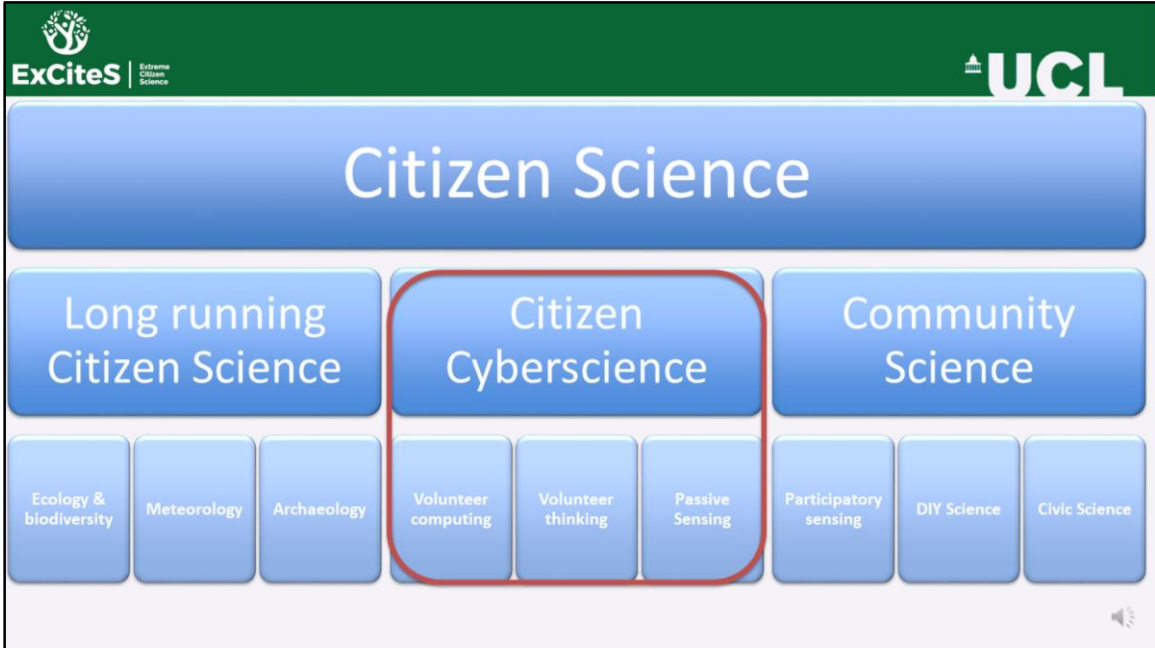
- Volunteers continued to contribute observations
- Met Office WOW approaching 1 billion observations per month
- Volunteers also use automatic weather stations



In the UK, we have long-running meteorological records for over 150 years. There is continuous participation of volunteers across the UK in weather observations, providing vital information. In its current incarnation, the Weather Observation Website – WOW is approaching a billion observations per month. Today, some volunteers link their automatic weather station to communication tools such as Twitter to share their observations – as you see in the report in one of my twitter links.



Volunteering in archaeology have a very long history – many people helped professional researchers during digs. In 2010, Albert Yu-Min Lin and colleagues devised a system based on high-resolution satellite imagery to engage over 10,000 volunteers in the task of assessing potential locations for the unknown burial site of Genghis Khan. The system asked volunteers to evaluate an area visually and mark locations that they considered as potentially interesting. The ability to engage a huge number of volunteers enabled the examination of a very large area (6000 sq km), yielding 55 candidate sites for further archaeological studies on the ground. The application that was developed for this task eventually evolved into the Tomnod system, now used by Digital Globe for humanitarian and other crowdsourcing efforts.




The next group of projects that we will look at are part of Citizen Cyberscience - a term that Francois Gray coined in 2009, defining citizen cyberscience as an activity that completely relies on the use of the internet and computing devices. Citizen cyberscience could not take place without the internet and therefore it is new.


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Volunteer computing


climateprediction.net
 the world's largest climate modelling experiment for the 21st century



This globe shows your climate model running
Model date and time: 19/10/1952 00:30



.tmos Model Time - 00:30
 .tmos Model Date - 19/10/1952
 .tmos Elapsed - 0685:15:50 (2.99 s/TS)
 .tmos Progress - 826417 of 4147560
 .tmos Progress - 19.93 %

2015 December Extreme weather in the UK

Applying three independent methodologies of extreme event attribution, we show that temperatures and precipitation in the UK in December 2015 were extremely unlikely even in a warming world with observed SST patterns, including El Niño, as an additional driver. This indicates that random weather noise played a very large role in December's weather. At the same time, the event was much less likely in the representations of a climate without human influence, showing that climate change greatly affected the odds of such a month occurring.

The observed temperature anomaly is so far outside the expected distribution that the odds are difficult to determine. We find that anthropogenic climate change approximately doubled the occurrence probability of the event for lower return times. Analysis of the historical link between the observed CET dataset and El Niño shows no discernible influence on the CET in winter. This is confirmed by a coupled model analysis that only shows a weak connection. The weather@home simulations including all ocean temperatures are warmer than the Climatology ensemble. This includes El Niño, but also the warm subtropical Atlantic Ocean, which was the source region of the mild air flowing to Britain in December 2015.

Similarly all three methods show an increase in the likelihood of high precipitation in Northern English winters due to human-induced climate change. The connection with the El Niño signal is weak in December, but the weather@home simulations


Tasks

FightAIDS@Home - Vina

World Community Grid
ready 75.0%

Elapsed time: 04:03:30
Task Name: FAHV_x3NF6_BJN_FBPb_rig_0205859_0382_8
Deadline: Sat 29 Mar 2014 07:10:29 pm

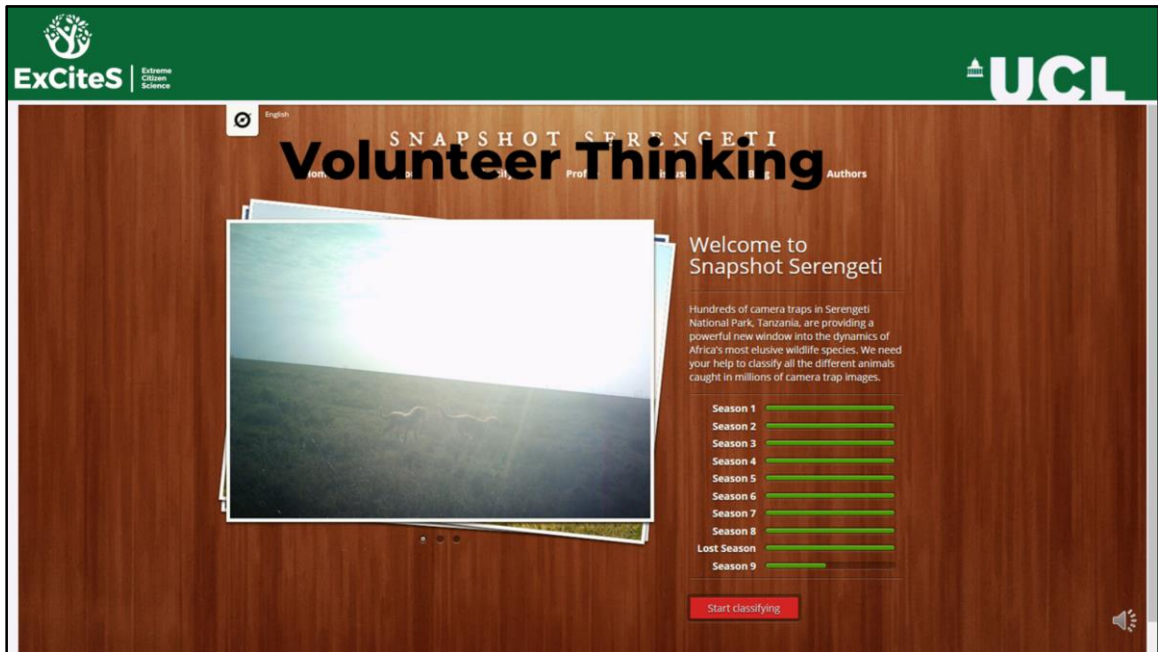
FightAIDS@Home - Vina

World Community Grid
ready 20.0%


Elapsed time: 02:07:44
Task Name: FAHV_x3NF6_AJN_Y3a_rig_0205304_2274_4
Deadline: Sat 29 Mar 2014 09:40:34 pm


Computing will resume when battery charge reaches 90% (currently 73%)

Volunteer computing is a project by downloading software to your computer or smartphone, which allows it to use the device processing capacity when you are not using it (which is most of the time) and put it into good use. An example from earth sciences is the climate prediction project (weather@home), where people let scientists at Oxford University run climate models on their computers. There are also many health-related projects in this area.



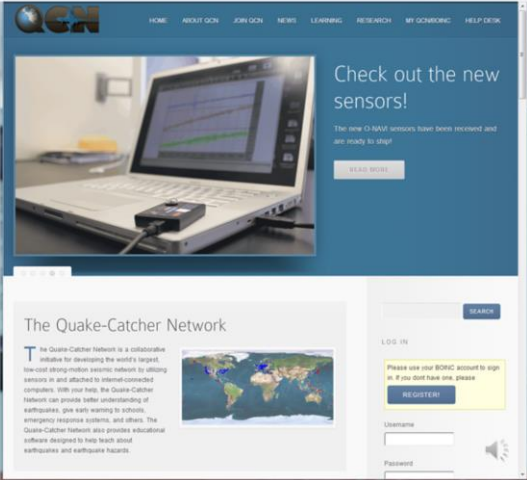
Volunteer thinking is when people participate in a project that sends them information over the internet and asks them to classify or annotate it. Here is an example from Zooniverse, the largest collection of such projects which started with Galaxy Zoo (a project in astronomy) and continue to project like this one, Snapshot Serengeti, in which scientists are sharing images from movement sensitive camera (known as Camera trap) and then ask volunteers to classify which animal was seen in the image, or any other interesting detail.


ExCiteS | Extreme Citizen Science

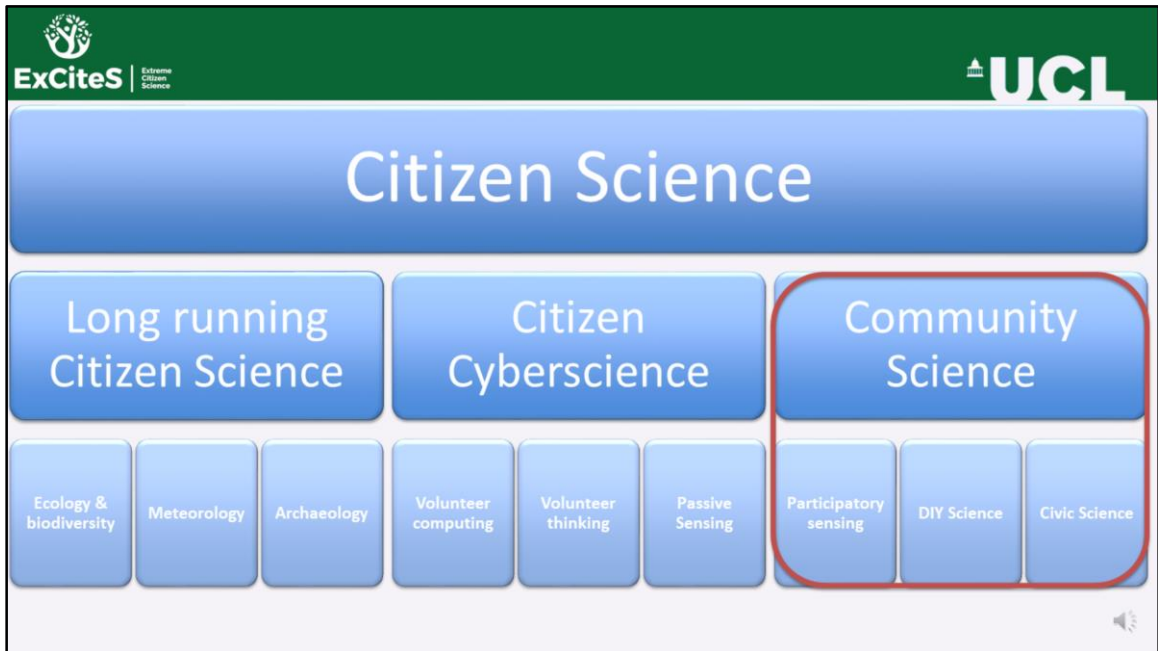


passive Sensing

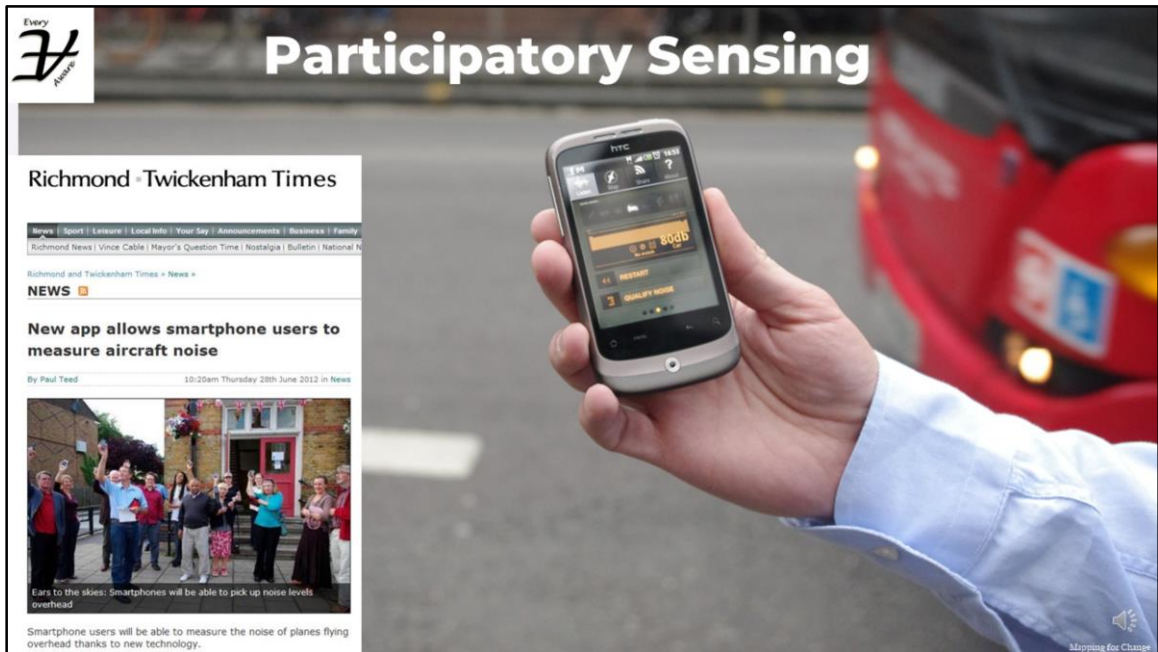
- In passive sensing, participants download a software, and sometimes connect a sensor, to allow for a wide network of observation.
- Quake-Catcher provide detailed seismographic observations



Finally, passive sensing. Participants either connect sensors to their computers or smartphones or use the built-in sensors that are available in devices. Passive sensing is mostly based on automatic data capture and sharing, without the conscious intervention of the volunteer. The Quake-Catcher Network (QCN) is utilising the movement sensors that are integrated into some laptop computers, to enhance observations from existing seismic observation stations. QCN is improving the quality of seismic information that is emerging from events. Interestingly, QCN is utilising the BOINC framework which is widely used in volunteer computing but extends it by linking to sensors



The final part of the tour will look at projects where participants have a wider role in shaping the project. The projects that we looked at so far are led by scientists who are setting the details of the project and then ask people to join in. The set of projects that fall under community science have an increasing role for the participants.



In participatory sensing, the participants in the project have a role to play in deciding the sensing is taken place. It is an activity in which a group of participants contribute together to a body of information. Importantly, while the term is now used liberally to describe a wide range of crowdsourced sensing activities with varying levels of active engagement with the citizen scientists who will carry out the sensing, in the original definition (Burke et al. 2006; Goldman et al. 2009), *“Participatory Sensing emphasizes the involvement of citizens and community groups in the process of sensing and documenting where they live, work, and play...”*. In the everyaware project, the WideNoise app was used with people who live near Heathrow airport, in which they have used the data collection process to demonstrate where they experience airplanes noise.

DIY Science



Join the Flood Network Community



BECOME A FLOODWATCHER - KEEP AN EYE ON THE MAP

You don't need any fancy technology to become a Floodwatcher. You can take readings from gaugeboards or take photos and we can include them in our data. We're building a network of people and sensors around the country to monitor flooding at a local level.

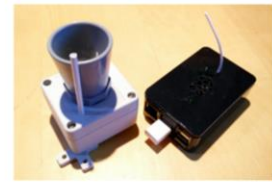
The information helps people to make better decisions during floods and quickly shares knowledge of a changing situation. We combine Environment Agency data with crowdsourced sensors in ditches, streams, drains and even under floorboards to give a near real time picture of levels.

INSTALL A FLOOD MONITOR

Do you live within 40m of a river or stream and have broadband? Would you like to know water levels when you're not home? Flood Monitor contributes to the resilience of your community by sharing this information.

You can install a Flood Monitor and see your readings live on the map every 15 minutes. Flood Monitors (£250) are available to groups or individuals who'd like an unobtrusive, low-cost way of monitoring water levels and contributing this to a bigger community.

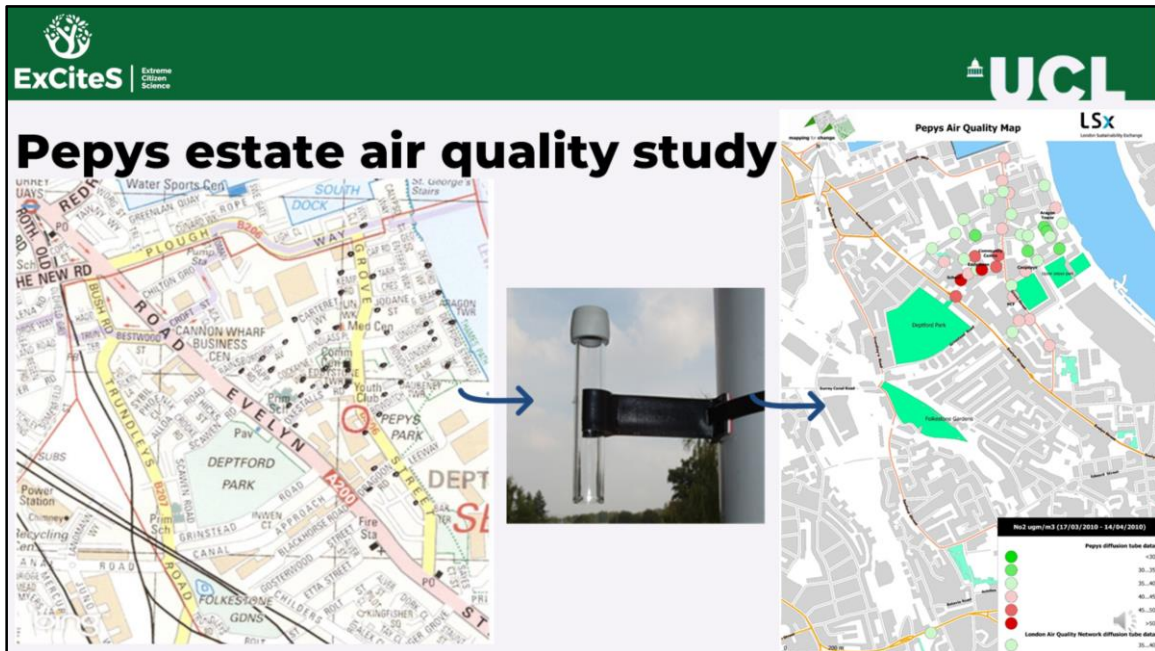
If you'd like a sensor then email us and we'll get in touch. We have a small supply of sensors to donate to community groups and individuals can buy one for £250.



DIY science is happening when people are using Do It Yourself techniques and approaches to address issues that concern them, either in their environment or in a laboratory. At one end of the spectrum, there are projects of developing flood monitoring and other ways of monitoring the environment, while at the other hand, there are DIY Biology (DIY Bio) where people are exploring aspects of modern biology through exploration of what they can do with DNA analysis – this is called Biohacking.



Another version of DIY science is called civic science – it is when the activities are explicitly linked to community goals and questions the state of things. While some DIY science is done from such a perspective, civic science can also include work with indigenous communities in the use of smartphones to record community resources and other local features, even when the participants are non-literate. The Public Lab of Open Technology and Science is an organisation that develops DIY tools that can aim to assist communities in issues of environmental justice, when a specific community is experiencing more environmental pollution than other places.



Another example is a study that UCL was involved in 2010, in which after a study of noise at the Pepys Estate in Deptford, south London, we carried out a study of air quality in the area, using a simple device – a diffusion tube, which allows measurement of NO₂ level – a pollutant from traffic. IT was possible to show that the area near a local scrapyard is especially polluted.