Global Urban Forest
Soil Health • Tree Health

The Revolution of Open Source Science – Part #1 – Urban Forest Citizen Science.

A three-part series introducing the biggest game changing delopment in the global Urban Forest industry

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The War on Science is an unprecedented term coined across the globe caused by recent international governments undermining, devaluing, and de-funding scientific institutions.

On World Earth Day 2017 hundreds of thousands of people in cities around the world showed their support through the March for Science. In arguably the largest scientific event in history, the March for Science indicates the poor state of affairs in which we find ourselves. This response of scientists is a direct response to recent attacks on scientific institutions namely climate and environmental science, destabilising the institutions that provide evidence-based decision-making to our elected officials is a dangerous slippery slope.

Devaluing science within modern civilisation is utterly incomprehensible especially when one looks at the historical role science has played in developing humanity, to understand its environment, health, security and is crucial in all we take for granted today. From procreation, the food we eat, our lifespan, and to how we communicate have all been shaped through wondrous leaps in scientific milestones.

We all depend on science and it is arguably the single most important component to humanity's future. Science is for all and it's time we take science back from those who stole it.

At this point in time at which we find ourselves, science may not just be at risk from the devaluing actions of a single government administration. The War on Science may have come from a compounding set of circumstances, over decades.

The 'ivory tower' level of the science community is determinedly focused on the commercialisation of innovative technology, understanding and development underpinned and financially driven by the corporate sector, taking the benefits of science from the grasp of much of humanity. This high-level, patent-locked scientific community has removed access, understanding and the benefit of scientific development and made it a user pays platform.

The reduction of curriculum-based science education at the early learning stage of schooling is possibly leading to a future generation of science-illiterate members of the international community.

The difficult task (to say the least) of scientific communication to the public, without dumbing the message down to a level where the impact is lost, can be attributed to the reduction of education standards. How many of us remember the basic principles delivered to us during school science classes? These core principles were taught because we all utilise science every day and understanding them is not just important to our day to day lives, but for when the day comes that a scientist needs to communicate a message we can understand. Science cannot be communicated in 140 characters or emoji list of pure nonsensical rubbish. A knowledge base in science is the single most important component of early school education because of science in general, impacting on our daily lives and throughout our lifespan.

The importance of science has been slowly diluted across multiple disciplines of study. Over the past decade, climate change deniers have submitted the view to global communities that the greatest challenge to humanity is still under debate. Undermining such important areas of study that inform governments when making critical evidence-based decisions on policy, is nothing but dangerous to the stability of modern humanity.

Currently, evidence-based decision making provided through scientific consensus is under threat. It is time for global citizens to voice their concerns and support the future of science and the development of forward-thinking young minds.

Historically science has been undertaken in isolation from the general public. This approach and attitude, that the engagement of the public is not a core requirement, may well be outdated. Citizen Science has proven to be an invaluable component of scientific research. The engagement of citizen science principles has enabled researchers to undertake study in areas that in the past would not have been possible.

For instance, museums around the world are engaging armies of citizens with an interest in science and a will to do something useful, to digitise hand-written records of observations and specimens.

Researchers, students and anyone who cares to look can see what was once only available by wading through dusty boxes in museum basements.

This drastically reduces the time taken in data collection. Technical advances in mapping allow analysis of these records in unprecedented complexity, giving access to valuable information to many audiences.

Citizen scientists typically need minimal training and usually do this at home, on their own computer and for free. Others are out in the field observing, reporting and mapping species, simplified by the use of mobile phone apps for identification and GPS for location.

The engagement of citizen scientists has reminded us that we can all contribute and develop a greater understanding of the unknown in the endeavor of making the world a better place.

Citizen Science enables large studies to be performed effectively especially with areas that cast a wide net of required data. The ability of Open Source platforms that enable people of all levels of society to contribute to larger data sets has proven to become an invaluable resource. Above image: Matthew Daniel and staff from the USDA, Prospect Park Alliance and NYC Parks Department discussing the current innovation of open source Citizen Science technologies at Prospect Park NYC - Oct 2016.

Give a man a fish and he will eat for a day. Teach a man to fish and he will eat for the rest of his life. Chinese proverb.

Maybe a terrible analogy, given the current state of global marine health but honestly the first to come to mind.

A more appropriate holistic example would be:

> *Give a human an apple and they will eat for a day. Teach a human to grow an apple tree, understand and improve soil health, protect and monitor the tree based on scientific principles, they and their future generations will eat forever.*

A little overdone but you understand where we are going with this.

Science is imperative to current and future generations. Reinvigorating scientific literacy is an investment in humanity and a blue-chip fund well worth investing.

A practical example:

Community revegetation work is almost always done by grassroots groups of interested and dedicated citizens who manage on shoestring budgets, unnoticed, rarely celebrated and often uncertain about the effectiveness of their efforts.

This too is changing. Tools are developing fast and coming online so that the value of the work of such groups can be measured with open source software.

The Friends of Westgate Park in Melbourne Australia is one such example. A well-organized community revegetation program that started work on this very neglected park almost 20 years ago. Lyn Allison, a committee member of the group is a local with a long history of environmental activism. Allison is well-connected, with serving a term on the Port Melbourne Council before it was abolished and 12 years in the Federal Senate with the Australian Democrats. Allison chaired the Senate Environment Committee and negotiated hundreds of amendments through the Senate to improve ground-breaking Federal environmental laws.

"The Friends of West Gate Park is a remarkable group that has quite simply transformed this 40-hectare park into a bushland gem of immense importance to biodiversity in inner Melbourne"
Lyn Allison.

They have propagated and planted hundreds of thousands of locally indigenous species in 9 distinct plant communities, based on the highly varied soil trucked in 30 years ago from building sites around Melbourne.

Member volunteers, corporate staff teams, service organisations, and workers from government departments, Work for the Dole and Green Army programs have been recruited to mulch, weed, and plant solidly for 2-3 days each week.

"*It's notionally managed by Parks Victoria but they have no budget for revegetation on any scale let alone what has been achieved"*, says Allison.

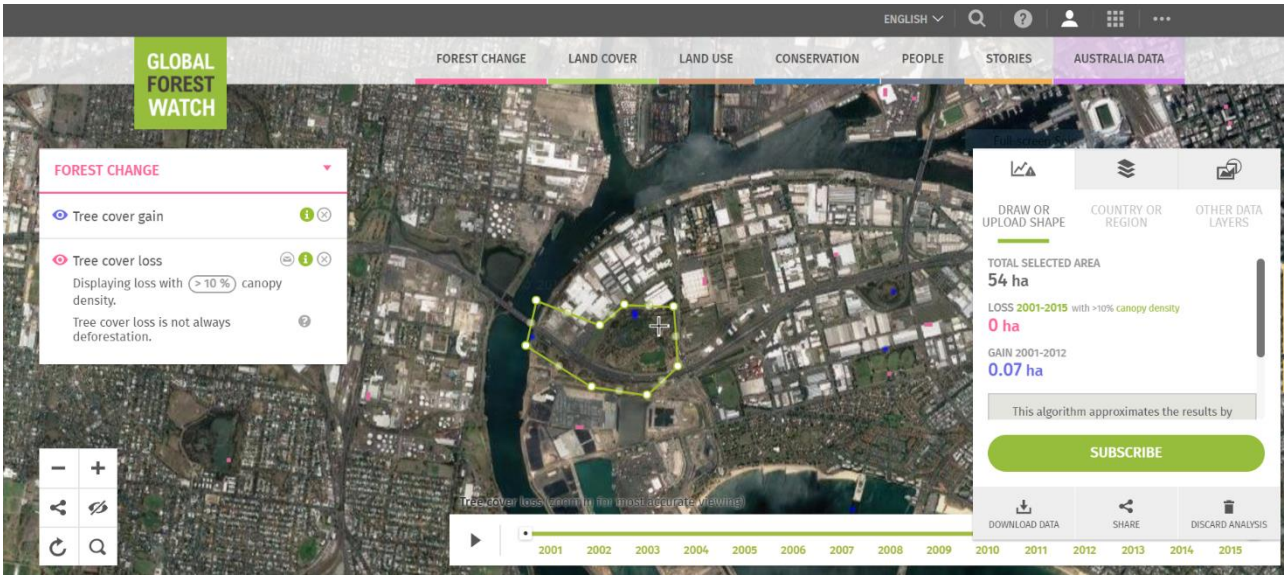
There is no doubt that the revegetation has improved biodiversity. The park is now habitat for more than 150 bird species since counting began 15 or so years ago. The fruiting bodies (the mushrooms) of at least 60 species of fungi appear in a good, wet winter and identifying more and more spiders, bees, dragonflies, butterflies and moths and they are clearly part of a developing ecosystem for birds, snakes, lizards, turtles and sadly foxes.

The city skyline is disappearing behind the treetops. Participants, marvel at endangered species like the Woolly Waterlily regenerating across the

lagoon, the delicate show of Tufted Bluebells in the Redgum Woodlands and the red, yellow and purple salt marsh around the lake edge. With roughly 70% of the park now revegetated using the science of horticulture, the group wants to be able to answer other bigger questions about the health of plants, whether the soil has all the necessary bacteria, fungi, nematodes, earthworms and insects to support them? Are they in ecological balance? Will the park ever function as a truly natural environment that has evolved largely undisturbed over millennia?

Open source platforms can enable community groups to effectively determine the revegetation efficacy through advanced satellite imagery and additional open source platform analysis.

A quick look at Global Forest Watch (GFW) shows that the park has substantially increased the tree canopy cover.



GFW – Analysis of Westgate park revegetation works over time.

Where to Next?

Community Engagement is a consistent and ongoing requirement for successful Urban Forest development now and into the future. This is recognised throughout the globe, although what works in one particular region may not work in others.

Engaging the public in projects that provide value to the community as a whole and stimulate enthusiasm and dedication to individuals in current times, is difficult. Engaging communities in projects that are based on robust science and advanced understanding of environmental factors, that develop a life of their own through collaboration and interconnection, linking to future generations of participants, may seem straight out of science fiction.

The current level of technology is unveiling an exciting new world of rapid advancement in environmental sciences in which all humanity can contribute. Citizen Science **will** change how science is conducted in the future.

Friends of Westgate Park and another great project Friends of Caulfield Park, look forward to upcoming workshops with Matthew Daniel of Global Urban Forest which will demonstrate the exciting and revolutionary new open source platform that will be introduced in the following instalment of this three-part series.

These local Melbourne community groups will learn how to measure the gains that have been observed and demonstrate that it is possible to make an inner urban bushland sustainable and measure the outcome and benefits with open source Citizen Science.

The Next instalment:

The Revolution of Open Source Science – Part #2 – Calculating Tree Health