

Exploring Experimentation in an Innovative Citizen Science Project

Ria Follett, Vladimir Strezov
Macquarie University NSW Australia
ria@ourresearch.net

Citizen Scientists More than science assistants?

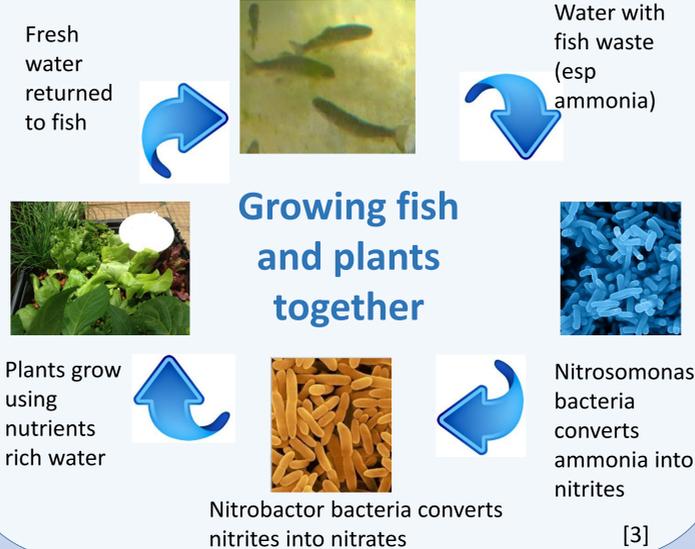
Most Citizen Science Projects rely on citizens to

- Collect data to be used by scientists or
- Analyse large datasets provided by scientists

In these cases citizens act as science assistants [1].

Studies originating and run predominately by citizens tend to be focused on action rather than contributing to scientific literature [2].

Aquaponics



Commitment and Motivation

What motives the citizens to be prepared to contribute long term to valuable research?

It was found that the participant's experience in running aquaponics was a key factor. Experienced contributors were

- More than twice **more** likely to contribute to the survey
- More than five times **less** likely to contribute more than 2 entries to the diary
- **Less** likely to raise research questions (all research questions were raised by novices)
- **Less** likely to contribute to finding answers (all research was done by novices)

Those who had most to benefit from learning were the most motivated [4].

Research Questions

Can citizen scientists be "real scientists"?

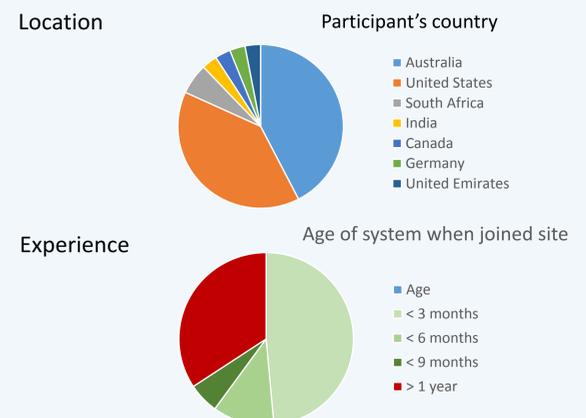
By observing the actions of citizens in a science project where they are involved in all steps, do citizens conduct "real science" ?

What is a suitable area for this research where citizens

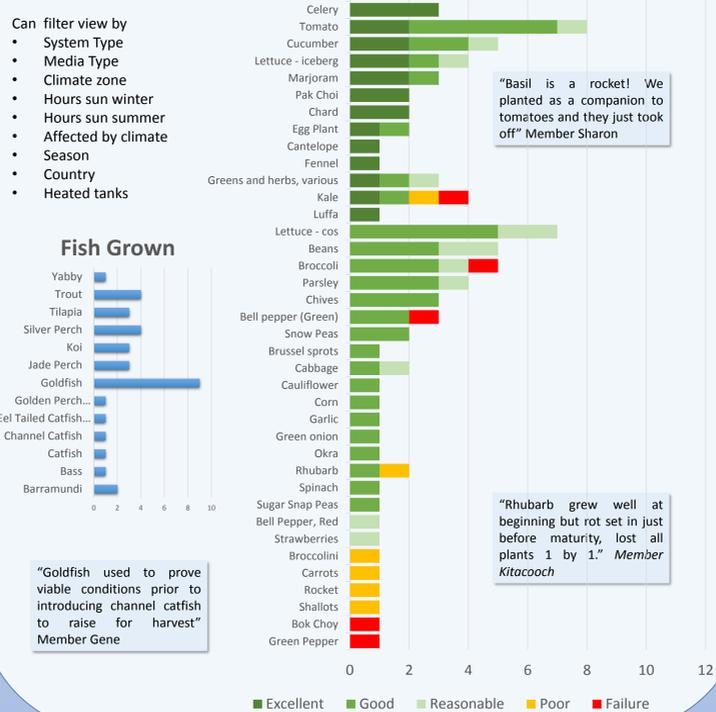
- are already involved
- like to experiment
- can collect structured data
- raise questions (hypothesis) that can be answered by the collected data

Home based aquaponics satisfies this.

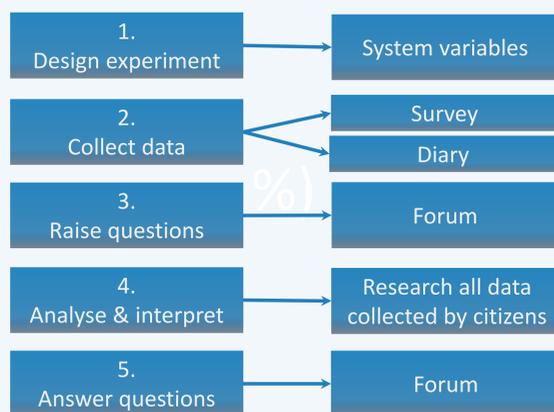
Who took Part



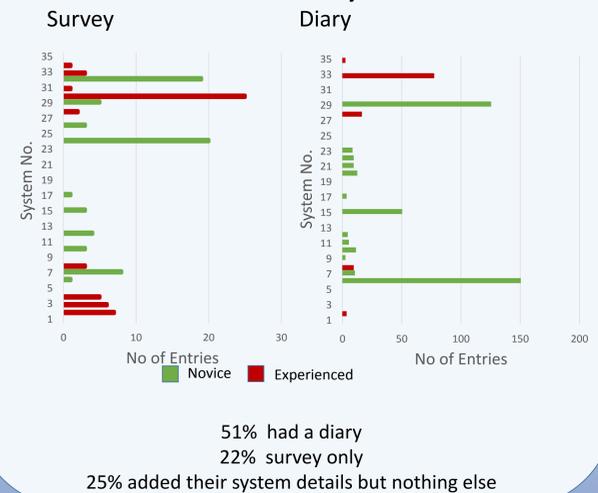
The Survey



Role of Citizens



What data did they collect?



Role of Professionals

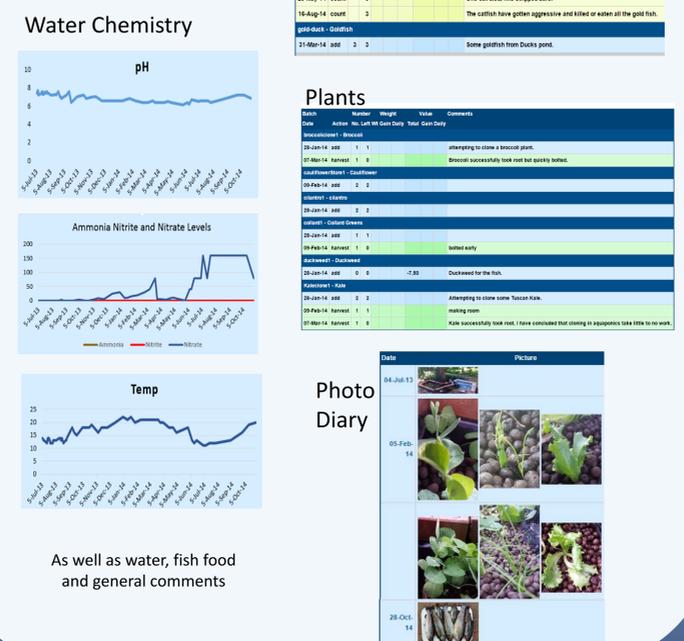
- Provide the website
- Advertise opportunity via forum
- Observe how citizens conduct research
- Disseminate results to
 - interested citizens
 - science community

Measuring Motivation

Two areas - varying commitment and research value

- The effort required for the survey is minimal although it provides valuable data
 - The effort required for the diary is significant, but provides valuable data for detailed analysis.
- Citizens can contribute to either or both.

The Diary



Did citizens do real science?

The Scientific Method is defined as systematic observation, measurement and experimentation, the formulation, testing and modification of hypotheses. (Oxford Dictionary).

Participants in the project partially fulfilled all these steps.

But - the way they attempt answer their research question was practical rather scientific

"It works for me so it must be right"

There was little evidence of detailed analysis and comparison of available data, although there is evidence that they did access data in other diaries. For example one of the systems with high pH added iron supplements which would affect the results, but this was not raised by any of the participants.

Further research could inform the type and level of guidance or training required to enhance the ability for participants to analyse the resulting data.

One of their research questions

Question : Did high pH levels affect plant growth?

Looked for existing sources of knowledge: eg popular aquaponic sites recommend pH of 6.5 to 7 allow update of nutrients (eg iron) by plants.

Collected data: 4 participants have pH >8, all other participants had lower pH levels.

Looked to their own experience:

- "Most of my Kale is fine but some have yellowing leaves"
- "my plants look health and my fish are thriving so no problem"

Experimented with different pH level and found it made no difference to their plants.

Concluded high pH is not a big problem

References

1. Lakshminarayanan, S. (2007). Using citizens to do science versus citizens as scientists. *Ecology and Society*, 12(2).
2. Wiggins, A., & Crowston, K. (2011). From Conservation to Crowdsourcing: a Typology of Citizen Science. *Proceedings of the 44th Hawaii International Conference on System Sciences (HICSS 2011)*, 10 pp.-10 pp. doi: 10.1109/hicss.2011.207
3. Bernstein, S. (2011). *Aquaponic Gardening: A Step-By-Step Guide to Raising Vegetables and Fish*: New Society Publishers.
4. Rotman, D., Hammock, J., Preece, J., Hansen, D., Boston, C., Bowser, A., & He, Y. (2014). Motivations Affecting Initial and Long-Term Participation in Citizen Science Projects in Three Countries.