# Citizen Science

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A joint initiative by

Universität Zürich UZH | ETH zürich

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# Global wildlife observation network iNaturalist surpasses 25 million observations of wild plants and animals

A growing community of iNaturalist users—and the artificial intelligence they help power—help observe and monitor more than 229,000 species around the world.

© 2018 iNaturalist user rappman; a "painted snail" from Cuba

**Press Contacts**

If you are a journalist and would like to receive Academy press releases please contact press@calacademy.org.

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**Digital Assets**

Hi-res and low-res image downloads are available for editorial use. Contact us at

# Take the Great Pollinator Habitat Challenge

# Seeds for Needs

*Farmers scoring wheat varieties in a field trial in the Tigray Region, Ethiopia. Credit: Bioversity International/J.V.Gevel*

## Seeds for Needs: Using crop diversity to adapt to climate change

### Challenge

With climatic uncertainty projected to increase in the future, agriculture and food security are more vulnerable than ever. Poor smallholder farming communities in the developing world will be hardest hit. These farmers need quick

# CITIZEN SCIENCE

Scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions.

(Oxford English Dictionary)

A broad range of activities where people produce scientific knowledge outside of traditional scientific institutions.

(Strasser and Haklay 2018)

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citizen science

participatory action research

community based research

science 2.0

open science

responsible research and innovation

amateur science

citizen cyberscience

crowdsourcing

do-it-yourself (DIY) science

# Types of CS Projects

"DEGREE OF PARTICIPATION"

level of collaboration with scientists
*(contributory, collaborative, co-creation)*

KIND OF CONTRIBUTION

Tasks for participants
*(sensing, computing, analyzing, self-reporting, making)*

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**CONTRIBUTORY**

Designed by scientists and for which citizens primarily contribute data.

**COLLABORATIVE**

Designed by scientists and for which citizens help project design, contribute and analyze data, disseminate findings

**CO-CREATED**

Designed by scientists and citizens and for which citizens are actively involved in most/all aspects of the research process
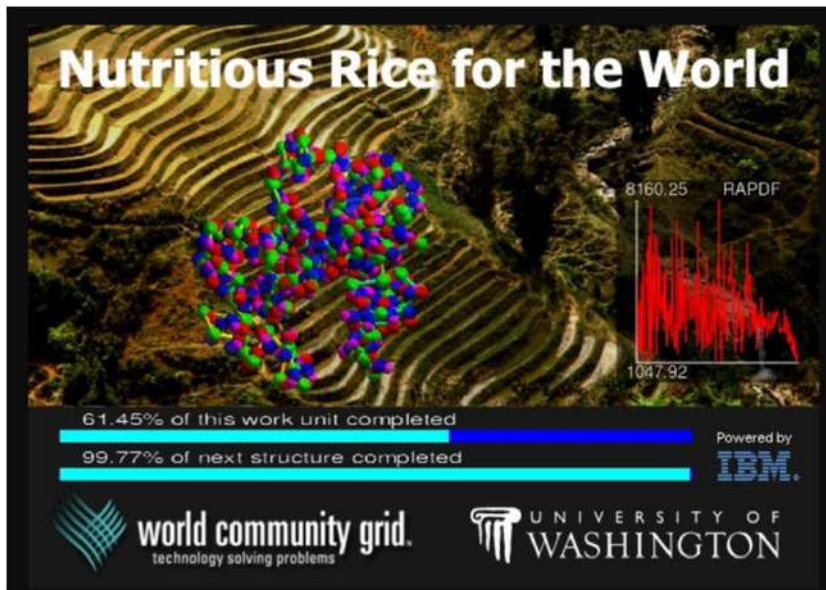
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# VOLUNTEER COMPUTING

**Participants donate their spare computing resources (processing power, storage and Internet connection) to one or more research projects.**

*(time and CPU intensive simulations)*

# Volunteer Computing Example

**Nutritious Rice for the World** - improve global rice yields and quality by predicting the structure of proteins of major strains of rice - help farmers breed better rice strains with higher crop yields and greater disease and pest resistance, to eventually improve global rice yields and quality.

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## VOLUNTEER THINKING

**Participants carry out tasks (typically on a web interface) that are usually unsuitable or extremely difficult for computers**

*(image analysis, pattern recognition, text transcription, mapping)*

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**Deforest Action - Earth Watchers**

Over 75% of deforestation in Indonesia is illegal and difficult to identify and locate - participants from around the world can monitor the forests of Borneo and help stop deforestation.

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# **VOLUNTEER SENSING**

**Participants as "sensors", willing to provide data in a passive way or collect data in an active way**

***(photos, samples, annotations)***

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# Volunteer Sensing Example

**What's in your backyard?** A soil collection project to find new drug-like molecules from fungi - natural products that hold tremendous promise for for treating human diseases. Citizens send samples of dirt from their backyard.
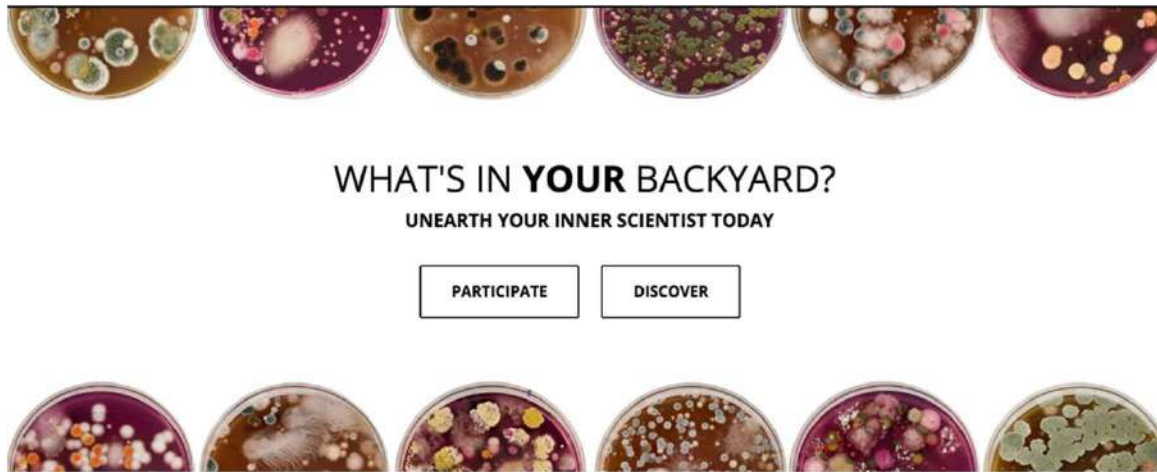
**Benefits for Scientists**

- **Resource efficiency** of research activities (larger datasets gathered across a wider geographical area and over a longer period of time at lower cost)
- Opportunity to **widen dissemination** and **impact** of their work
- **New perspectives** on topics (including new discoveries!)

**Benefits for Citizens**

- Personal development and opportunity to gain new **knowledge and skills** (education)
- Personal satisfaction from **contributing to science** and to the wider public good (altruism)
- Opportunity to establish connections with similarly minded people (**social networking**)
- Personal enjoyment (**fun**) from participating in enriching activities

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# CS & Agriculture

Monitor pests and pathogens

Preserve (agricultural) biodiversity and ecosystem services

Enhancing food safety, nutrition, and flavour

Improving food and food security

Social justice

*S. F. Ryan et Al. (2018) The role of citizen science in addressing grand challenges in food and agriculture research*

# Data Quality

Research shows that data meets or surpasses generally accepted quality standards

Many methods for each project phase

Includes statistics, training, cross-checking, comparison, …

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Enabling

**RESEARCHERS** and **CITIZENS**

to create and conduct

**RESEARCH COLLABORATIONS**

that produce

**EXCELLENT SCIENCE**

while

**SUPPORTING THE UN SDGs**

# Platform

Web
Mobile
Single sign-on
Database
API

# Community

Citizens
Scientists

# Knowledge

Methodology
Teaching/coaching
PWA
Seed grants

# Network

Partnerships
Collaborations

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