





A citizen-informed and sustainable mental healthcare

How can citizen science help develop 'blue-green prescribing' in Scotland?

Julze Alejandro RND BSc PgC MSc
Doctoral Researcher, Implementation Scientist
Glasgow Caledonian University

Email: julze.alejandre@gcu.ac.uk
Twitter: @JulzeAlejandro

Image Source: Highlands2Hammocks

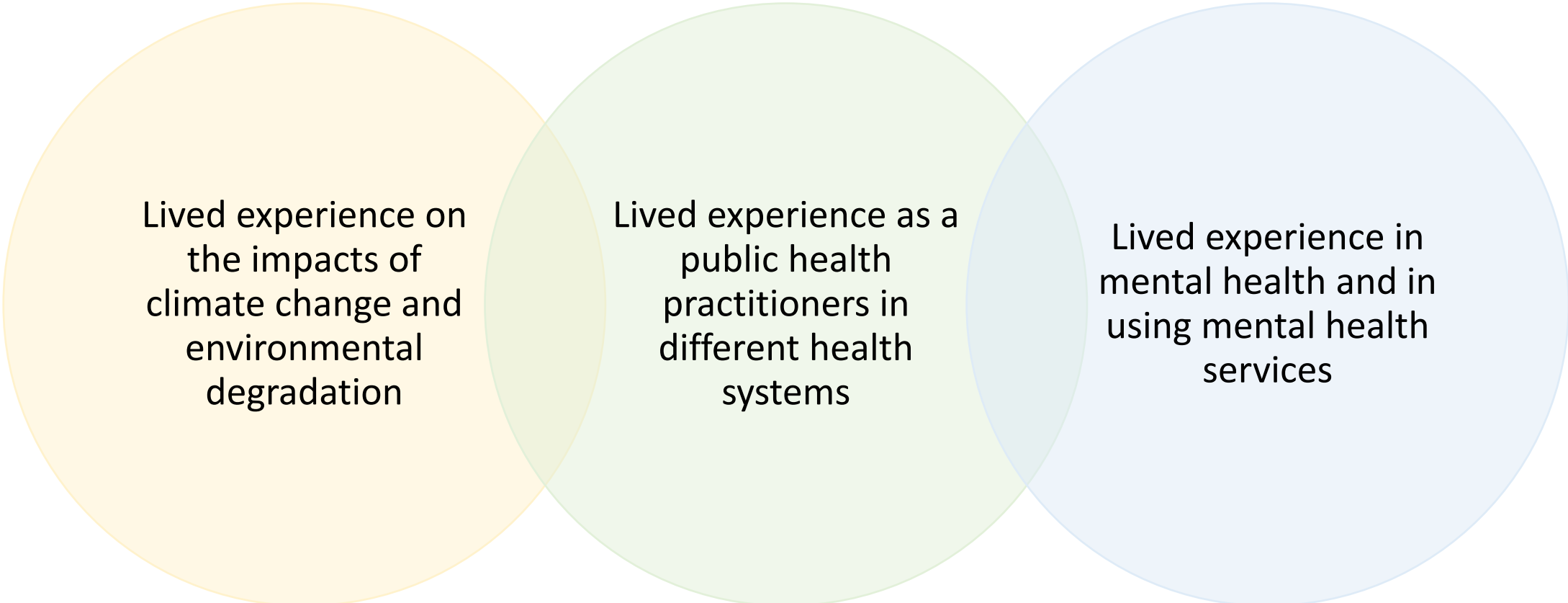


Hydro Nation Scholars Programme



University for the Common Good






Lived experience on
the impacts of
climate change and
environmental
degradation

Lived experience as a
public health
practitioner in
different health
systems

Lived experience in
mental health and in
using mental health
services



Mental health and pharmaceutical pollution are planetary health concerns

- Mental health is a major public health issue in Scotland
- Inequalities in mental health outcomes and services across Scottish population



4 in 25 adults potentially have mental health problems



3 in 25 adults have 2 or more symptoms of depression



1 in 10 adults attempted suicide



2x more likely to have mental health problems



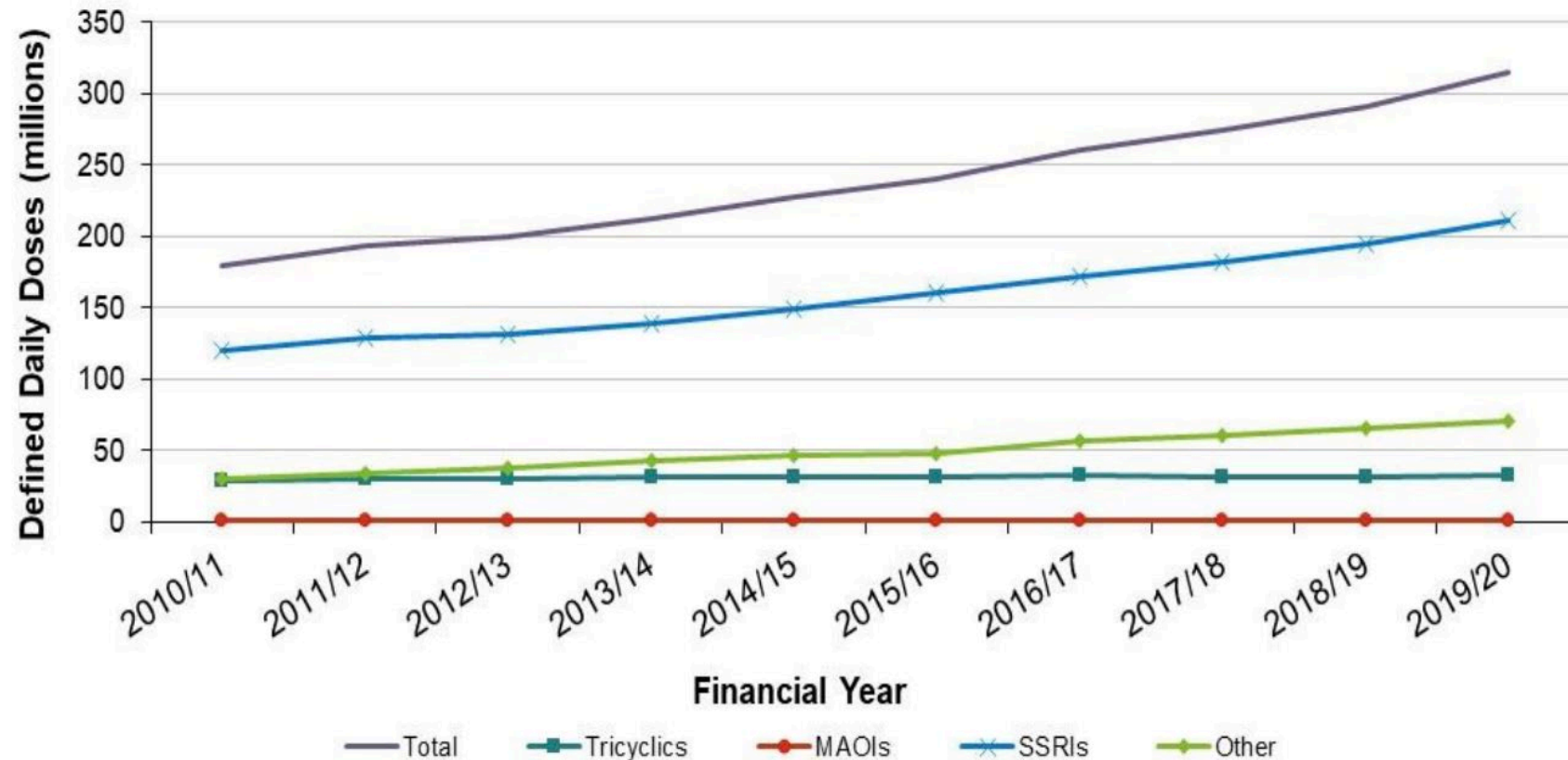
1 in 4 children turned away from specialist mental healthcare



1 in 5 adults waited more than 18 weeks before receiving psychological therapy

Mental health and pharmaceutical pollution are planetary health concerns

- There is high dependence on and increase use of antidepressants



Total amount of antidepressant prescription drugs dispensed (defined daily dose) between 2009 and 2020

Pharmaceutical pollution is a concern

- Pharmaceutical acquisition has significant contribution to healthcare sector's carbon emissions
- Pharmaceutical substances pose environmental risks to water quality and aquatic organisms
- Antibiotics, antidepressant, NSAID, beta-blockers, H2 blockers, diabetes, and birth control drugs were found in Scottish waters and pose high risk on ecotoxicity and antimicrobial resistance



Grinten EVD, Breure A, Lambooij M, Lette M. (2016). Towards balancing the Benefits of Pharmaceutical Care and Minimising its Environmental Harm: Identification of Potential Levers in the Medicinal Product Chain.

Pharmaceuticals in the environment: baseline for Scotland

- 60 pharmaceutical substances found in Scotland's water environments
- Antidepressants – fluoxetine, escitalopram, citalopram
- Fluoxetine – could contribute to the growth of AMR organisms in the environment

CREW CENTRE OF
EXPERTISE
FOR WATERS

**Pharmaceuticals in the water
environment: baseline assessment
and recommendations**

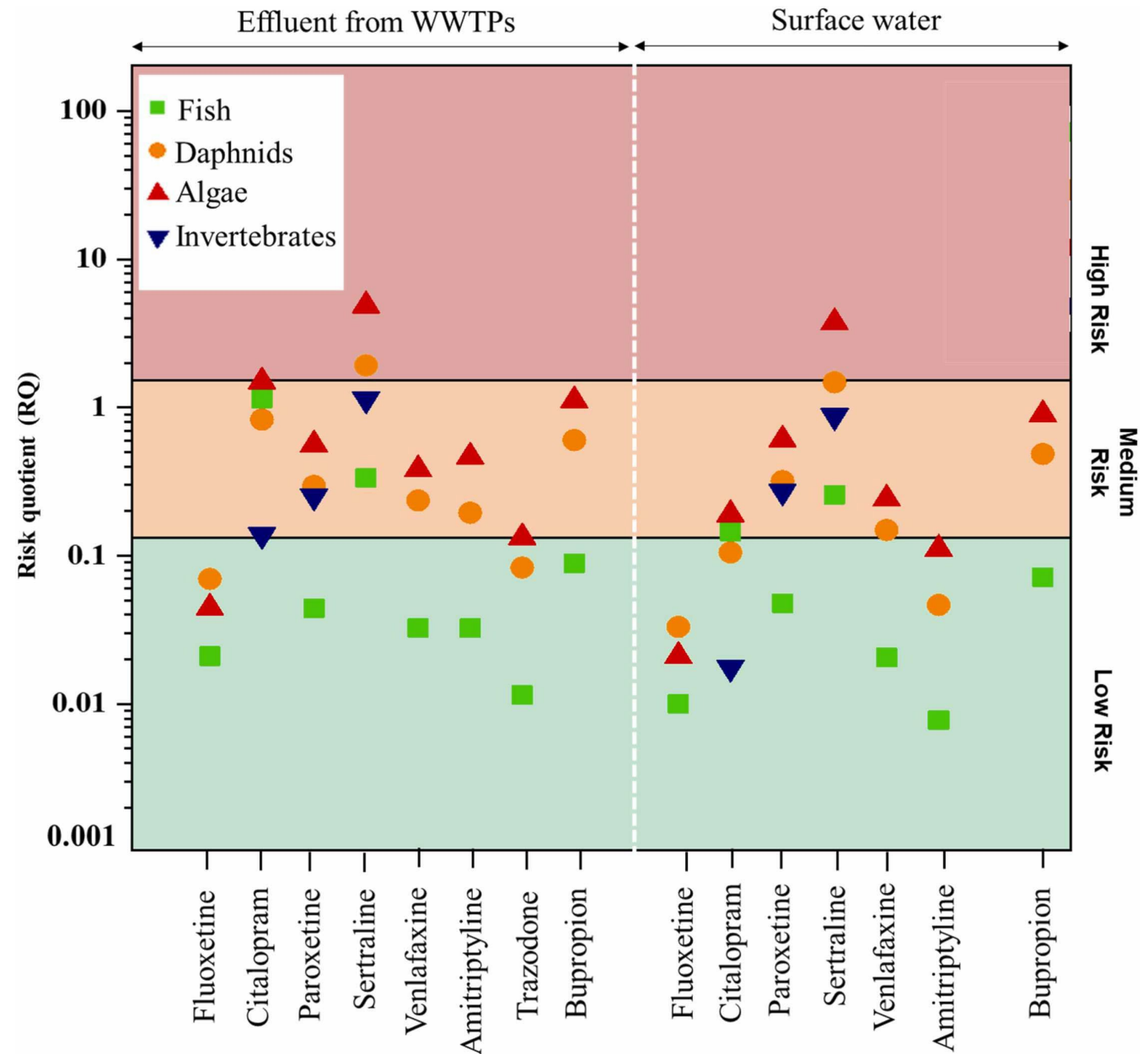
Main report



Helwig L, Aderemi A, Donnelly D, Gibb S, Gozdziewska L, Harrower J, et al. (2022).
Pharmaceuticals in the water environment: baseline assessment and recommendations.

Occurrence and environmental impact of antidepressants: global perspective

- Antidepressants alter the behaviour, reproduction, and development of aquatic organisms
- Sertraline posed maximum toxicity to aquatic biota



Singh et al. (2022). Occurrence and fate of antidepressants in the aquatic environment: Insights into toxicological effects on the aquatic life, analytical methods, and removal techniques

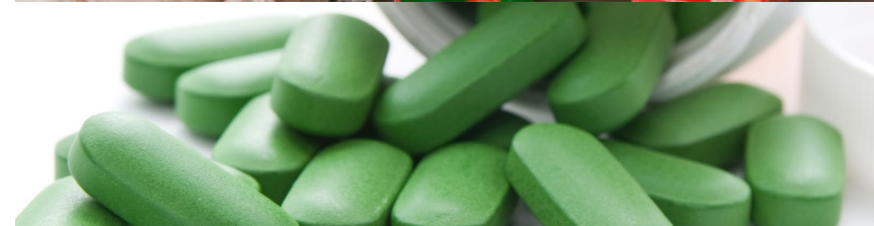
Nature-based social prescribing in Scotland

- Individual or group activities in nature that could promote physical, mental, and social health
- NHS Greenspace
- Green Health Partnership (i.e., nature prescriptions, green social prescribing)
- Wave Project
- Requires a change in prescribing behaviour

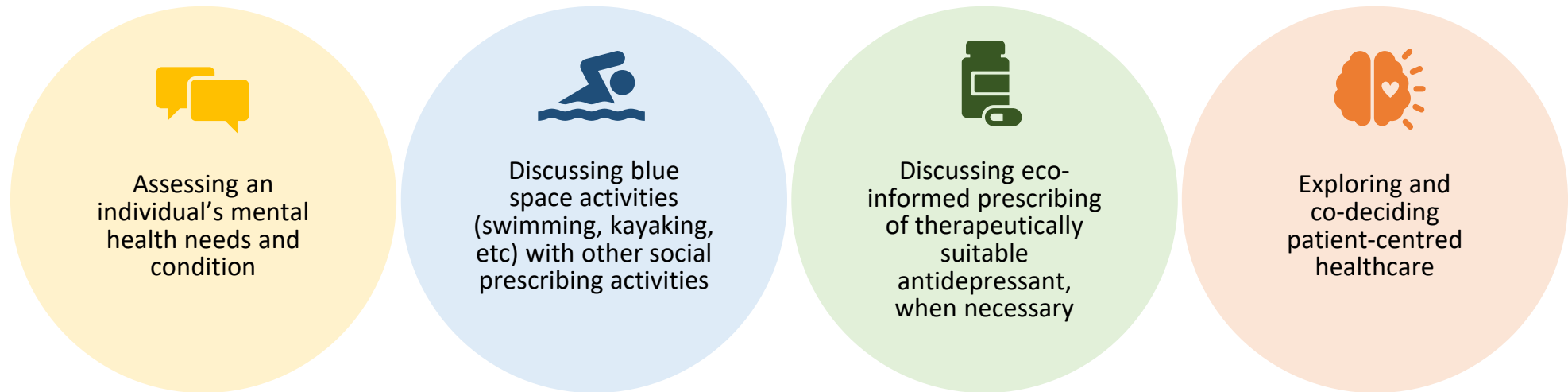


Eco-informed prescribing of antidepressants

- Regular environmental monitoring of prescribed antidepressants
- Environmental classification of antidepressants
- Development and use of a Green Formulary
- Requires a change in prescribing behaviour



What is Blue-Green Prescribing?



Core Programme Components of Blue-Green Prescribing Programme for Primary Mental Healthcare

Co-created Model of Scotland's Blue-Green Prescribing Programme for Primary Mental Healthcare



Accessible and Equitable
Blue Space Activities for
Mental Health



Environmental
Considerations in Quality
Improvement of Mental
Healthcare



Synergies and Collaboration
for Evidence-Based
Blue-Green Prescribing



Socio-Ecological Investment
for Mental Health



Barriers to the development of blue-green prescribing in Scotland

Low stakeholders' awareness on the environmental impact of pharmaceuticals and the health benefits of nature connections

Low stakeholders' interest at the policy level to take concrete actions on mainstreaming blue-green prescribing

Limited knowledge on the scale of nature-based social prescribing providers across the country

Current state and knowledge on the quality of water environments

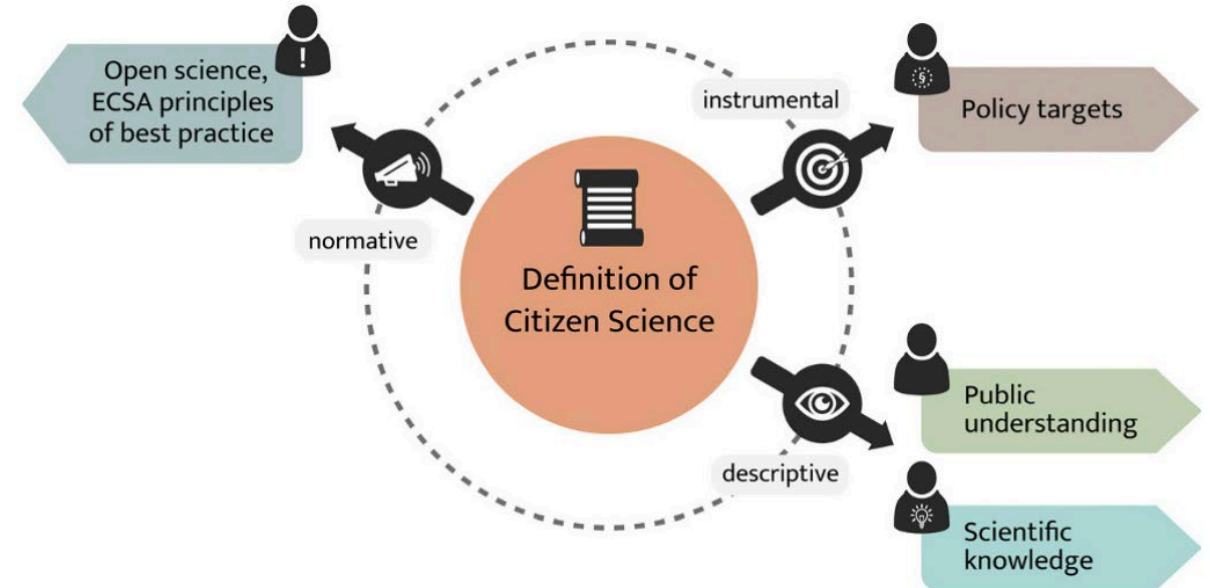


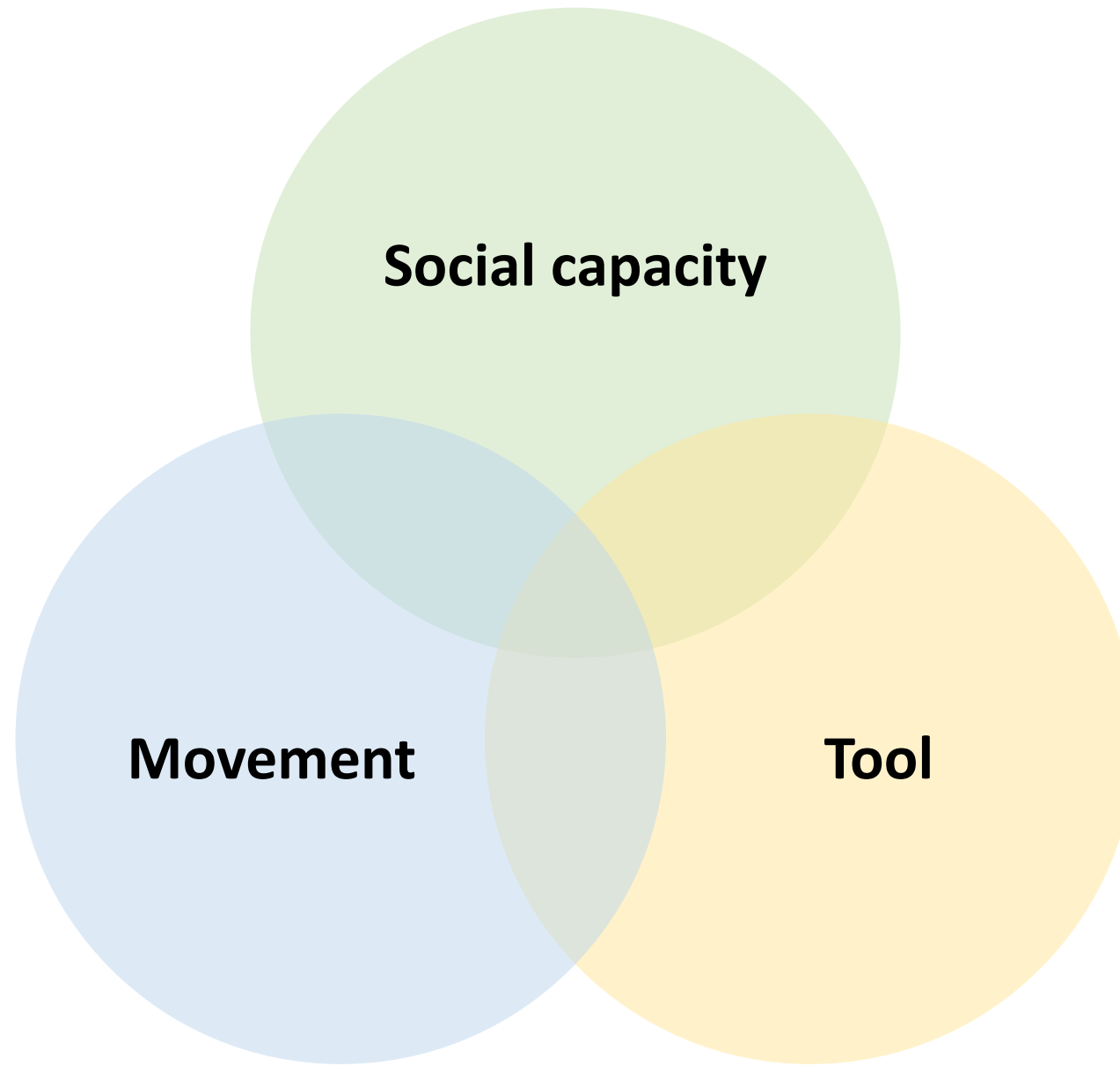
How can citizen science help develop blue-green prescribing in Scotland?



What is citizen science?

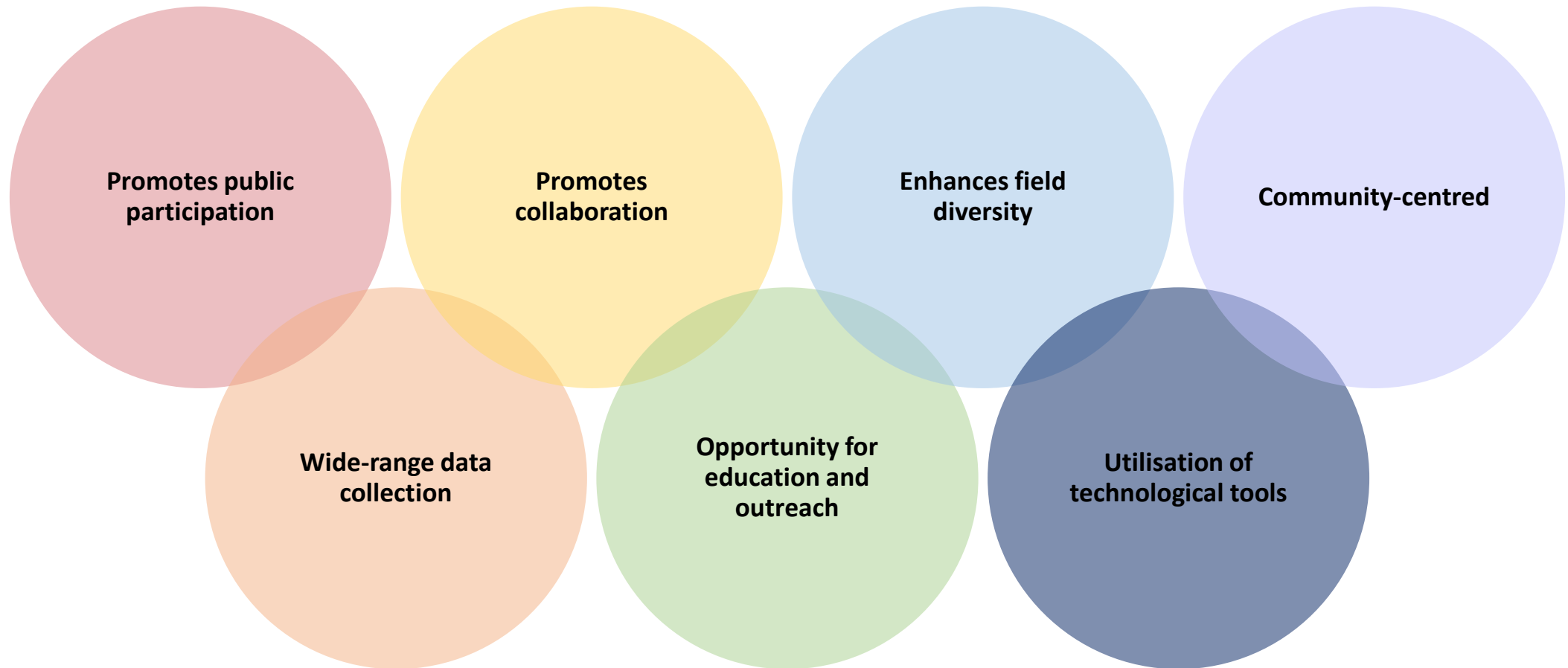
- [Environmental citizen science] is the **involvement of volunteers** in environmental monitoring (UK Post, 2014)
- **Involvement of volunteers** in research (UK Environmental Observation Framework, 2012)
- Participatory project where the driver is the resulting **benefit** to be gained by the participants (scientists and public)









Why use citizen science?



Citizen science in planetary health research

User centered design of a citizen science air-quality monitoring project

Yaela N. Golumbic ^{a,b}, Barak Fishbain^b and Ayelet Baram-Tsabari ^a

^aFaculty of Education in Science and Technology, Technion – Israel Institute of Technology, Haifa, Israel; ^bFaculty of Civil and Environmental Engineering, Technion – Israel Institute of Technology, Haifa, Israel

Monitoring surface water quality using social media in the context of citizen science

Hang Zheng^{1,2}, Yang Hong³, Di Long³, and Hua Jing³





¹School of Environment and Civil Engineering, Dongguan University of Technology, Dongguan, Guangdong, 523106, China

²School of Earth and Environmental Science, The University of Queensland, 4072 Brisbane, Australia

³State Key Laboratory of Hydrosience and Engineering, Department of Hydraulic Engineering, Tsinghua University, Beijing, 100084, China

Review

Nature-Based Citizen Science as a Mechanism to Improve Human Health in Urban Areas

Craig R. Williams ^{1,*}, Sophie M. Burnell ¹, Michelle Rogers ¹, Emily J. Flies ² and Katherine L. Baldock ³

¹ UniSA Clinical and Health Science, University of South Australia, GPO Box 2471, Adelaide, SA 5001, Australia; a1846305@student.adelaide.edu.au (S.M.B.); Michelle.Rogers@unisa.edu.au (M.R.)


² School of Natural Sciences, University of Tasmania, Private Bag 55, Hobart, TAS 7001, Australia; emily.flies@utas.edu.au

³ UniSA Allied Health and Human Performance, University of South Australia, GPO Box 2471, Adelaide, SA 5001, Australia; Katherine.Baldock@unisa.edu.au

* Correspondence: craig.williams@unisa.edu.au

OPEN

Smartphone-based ecological momentary assessment reveals mental health benefits of birdlife

Ryan Hammoud¹, Stefania Tognin¹, Lucie Burgess¹, Nicol Bergou¹, Michael Smythe², Johanna Gibbons³, Neil Davidson³, Alia Affi¹, Ioannis Bakolis^{4,5} & Andrea Mechelli¹



Citizen-informed and sustainable mental healthcare: citizen science for blue-green prescribing

Go to [menti.com](https://www.menti.com) and
use code 1112 6885



Citizen-informed and sustainable mental healthcare: citizen science for blue-green prescribing

What nature-based social prescribing organisations can you find in your communities?

What kind of medicine packaging can you find littering your neighbourhood or community parks? How many of these can you find?

What types of nature-based activities do they offer? For how long?

Where are they located?

Who are their beneficiaries?

What nature-based activities help you cope during the COVID-19 pandemic? How often did you engage with the activity? Who were with you?



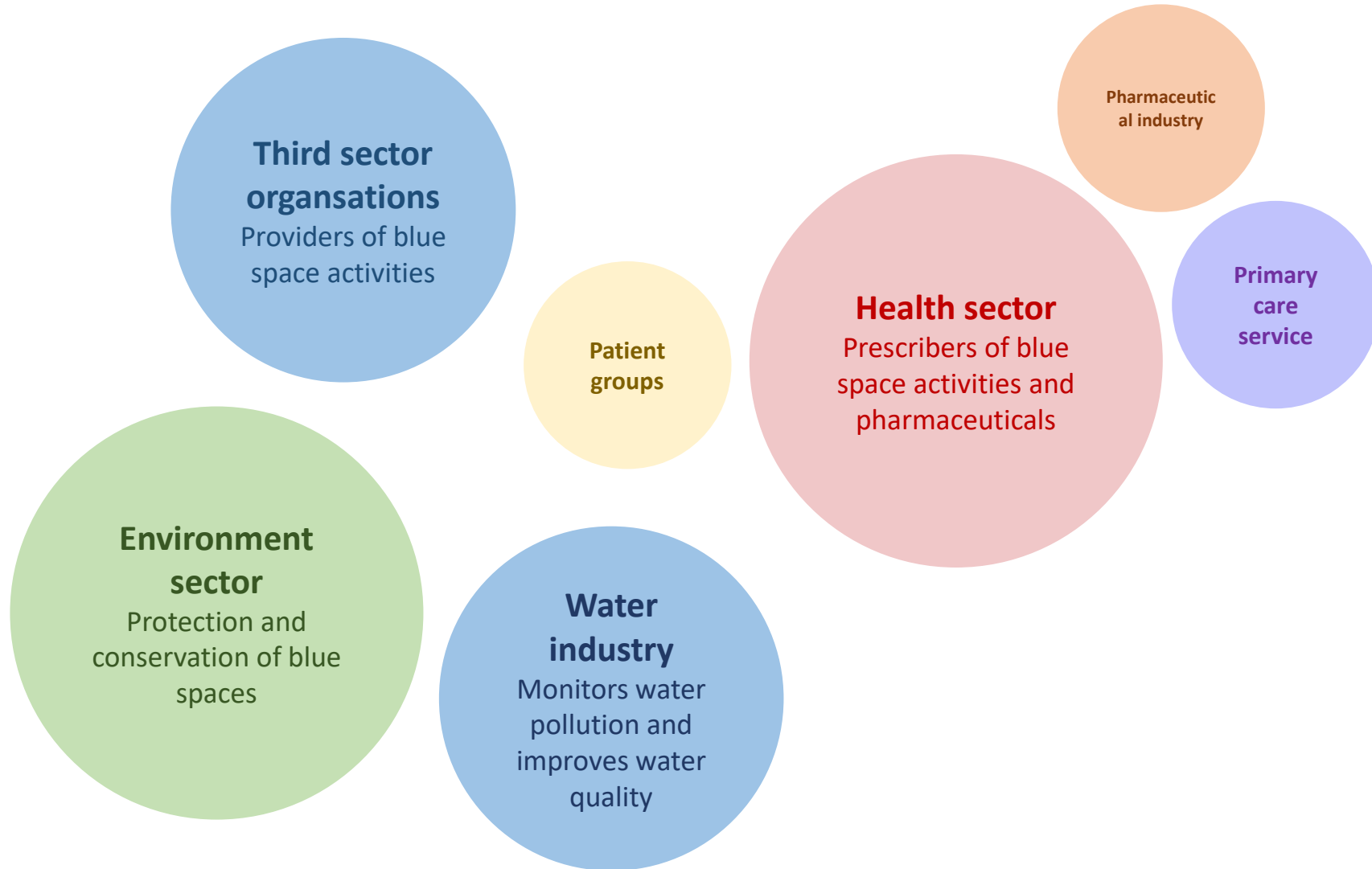
Being an ethical citizen science project for planetary health

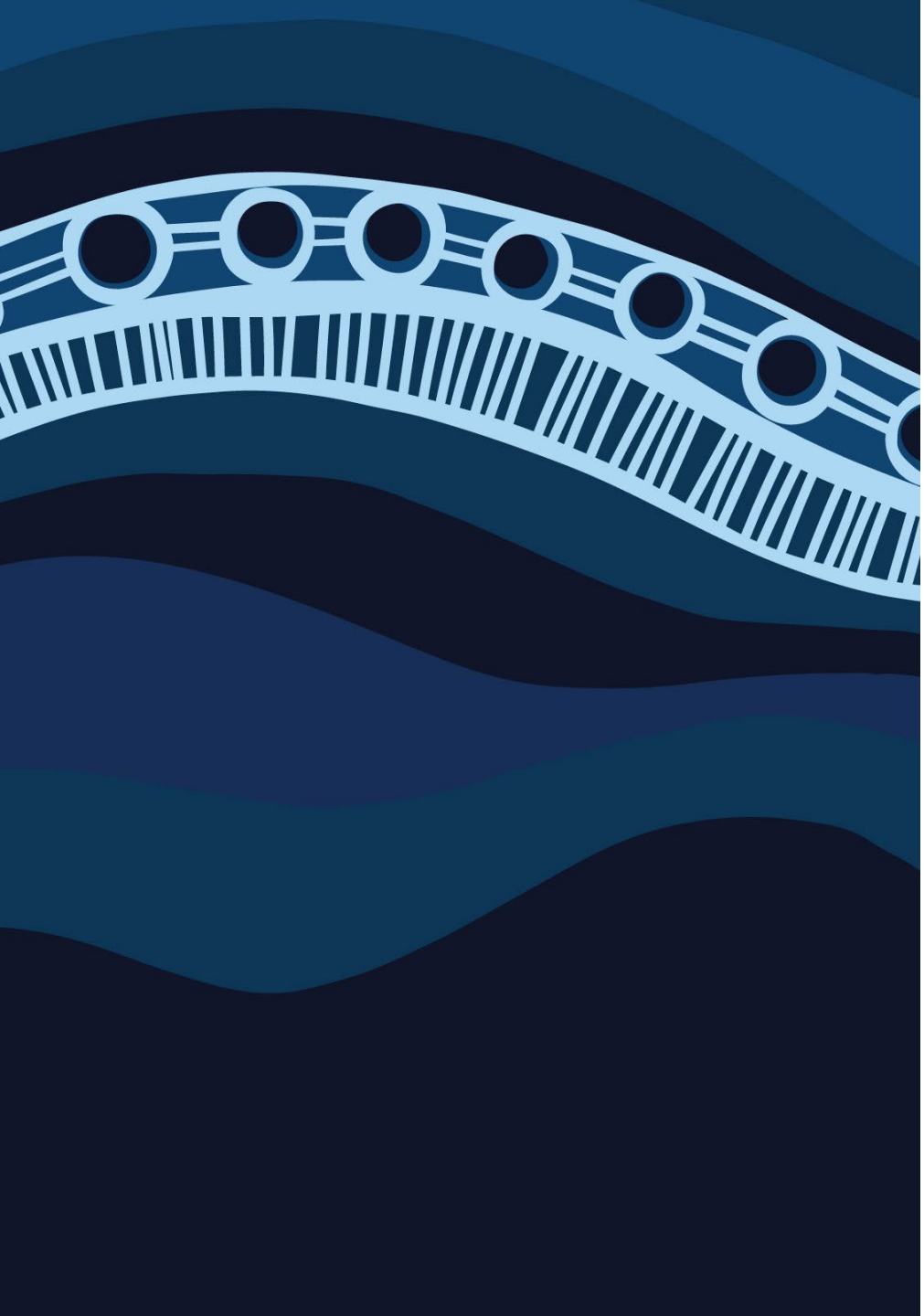
- Incentivising volunteers for citizen science projects, especially in LMICs – training, education, tools
- Use of technology especially in areas with problems in connectivity
- Data validity, security, and accessibility
- Biases of citizen scientists
- Power imbalances (project managers vs citizen scientists)
- Ownership of the project
- Demanding time and resources

Image Source: Project Curma, Philippines



Building Scotland's blue-green prescribing initiative through citizen science and multisectoral collaboration





Thank you

Water Research Group, School of Computing, Engineering & Built Environment
Glasgow Caledonian University, Scotland, United Kingdom

Email: julze.alejandre@gcu.ac.uk
Twitter: @JulzeAlejandre



Scottish
Government
gov.scot

Hydro Nation Scholars Programme



Glasgow Caledonian
University

University for the Common Good



**Blue-Green
Prescribing
Research**

Protecting blue spaces to protect mental health