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HOPE E-news Bulletin 2023 #05 --- May 2023

The following items have been gathered from various e: newsletters received by HOPE in recent times; and/or prepared specifically by HOPE members and supporters. If you have any news to contribute, please forward to office@hopeaustralia.org.au . Deadline for articles is 15th day of the month.

Editorial

Welcome to the May Newsletter,

This month is International Composting Awareness Week (7th-13th) and is an opportunity to raise awareness about the benefits of composting as an effective way to reduce the amount of organic waste that goes into landfill, which can significantly reduce greenhouse gas emissions.

May is also the month for the International Day for Biological Diversity (22nd) - another critical event that highlights the importance of biodiversity to the health and wellbeing of our planet and is essential to maintaining healthy ecosystems.

We also acknowledge National Volunteer week (15-21st) and take this opportunity to thank our volunteers for all their great work! Thank you! We couldn't do it without you!

Regards,
Daniela Dal'Castel, Newsletter Editor – HOPE Inc.

2023 Environmental Observances

May
7-13 International Composting Awareness Week
11 Hairy Nosed (Wombat) Day
13 World Migratory Bird Day (and October 14)
15-21 National Volunteer Week
20 World Bee Day
22 International Day for Biological Diversity
23 World Turtle Day

June
5 World Environment Day
5 International Day for the Fight against Illegal, Unreported and Unregulated Fishing
7 World Food Safety Day
8 World Oceans Day
10 HOPE quarterly meeting (both physical and via ZOOM)
17 World Day to Combat Desertification and Drought

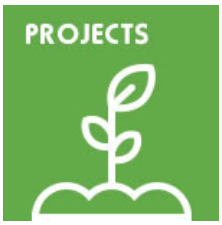
July
1-31 Plastic Free July
26 World Mangrove Day
28 Schools Tree Day
31 World Ranger Day
30 National Tree Day

Feature Article

Government funded reforestation projects

Written by Anna Kula, QLD HOPE Researcher

Green Army Program



The Green Army Program was a three-year program led by the Australian Government which ran from 2015 to June 2018. It supported over one thousand local and heritage conservation projects nationwide and included controlling invasive weeds in Alice Springs, storm recovery across nine city councils, restoring endangered woodlands and wetlands, habitat restoration for threatened species and many other practical conservation programs. The diversity of projects listed demonstrates the ongoing need for recurring support and funding across a wide range of climate issues and concern, such as vegetation, habitat and biodiversity loss, as well as damages done by fire, flooding and drought.

Communities, Landcare groups, local councils, indigenous organisations and other interested parties applied for grants and support in five rounds which included a special disaster recovery round. Projects were delivered to community groups by one of five Service Providers who managed health and safety onsite and provided training, project management and allowances to volunteers. Teams consisted of youth aged 17- 24, who received training, qualification and experience through program delivery, improving their opportunities for further study and work. 62% of projects occurred in regional areas, 27% in major cities and 11% in remote areas.

In 2017 Green Army Program gathered data on 550 projects to identify learnings and opportunities for improvement to better inform future environmental action programs. The evaluation had a heavy focus on volunteer participation and the projects' impacts on volunteers, perhaps because those effects easier to assess short-term while environmental conservation and reforestation outcomes could only be assessed years after completion. The four major areas for improvement were found to be data collection and monitoring (including seeking clarity on reasons why targets weren't met, collecting more data and following up for higher response rates), maintaining diversity in its volunteers, supporting further employment pathways (especially in indigenous communities) and maintaining high health and safety compliance. The program ended in 2018 and projects were handed over to their respective grant applicants and/or group.

20 Million Trees Program

The 20 Million Trees Program was launched by the Australian Government in 2014 in an attempt to re-establish green corridors, urban forests, endangered species and habitat. The program was formed part of the National Landcare Program and had four objectives like those of the Green Army; plant 20 million trees and vegetation by 2020, conserve existing vegetation which supports native species, engage with local communities and reduce greenhouse gas emissions. As of June 2021, over 2,500 varieties of native plants were planted with a total of 29 million trees planted over 30,000 hectares! The project encouraged planting of native species and understory plants appropriate to its region to ensure long lasting vegetation structure was maintained.

Applicants could apply for three categories of grants; competitive grants for smaller group and individual planting projects, Service Provider grants for larger-scale plantings nationwide as well as a number of discretionary grants. Discretionary grants were used to meet some existing government commitments such as supporting Cumberland Conservation Corridor in NSW, Greening the West of Melbourne and the Men of Trees project in WA which was also part of the Green Army program.

Discretionary grants were also given to a number of national and state specific organisations. Overall, the program supported 168 individual or group projects at a cost of approximately $13.3 million, Service Providers delivered 44 projects for $37.6 million and 23 projects costing $11 million were funded by discretionary grants. The total program cost was $61.775 million, $225,000 underbudget.

Some projects over delivered on the number of established trees by planting additional trees to avoid underdelivering on their contracted number of trees and having to replant. More trees germinated and survived than had been expected due to good land and climate evaluation as well as efficient planting methods. Seven projects terminated due to poor landowner support or resignation of an individual, group or organisation. Natural disasters, bushfire, drought and Covid 19 restrictions delayed several projects and provided poor delivery of those projects overall.

A review of the program found that the cost per tree increased in urban areas and in projects with higher volunteer participation. Urban tree planting cost 2-3 times that of regional planting and six times more than planting in remote areas. This may be due to the smaller size of planting sites in cities limiting the use of planting machinery and the increased use of tube stock planting, a more expensive method. Service Provider tree planting also cost less than those of smaller groups.

In many cases of land conservation land weed control was required, 74% of projects used chemical weed removal and 26% physical weed removal methods of varying rates of efficiency and effectiveness. Some of the chemical methods used carried risk of contaminating surrounding soil or plants and were not addressed in the review.

Grant applicants were required to maintain vegetation over the next 10 years to ensure sustained environmental benefits. It is assumed that high community engagement would result in better commitment to maintain vegetation down the line, so in theory projects led by ‘non-Service Providers’ are more likely to be maintained over time. The program reported ‘high’ volunteer participation with over 90,000 volunteers reported by 235 projects, however some volunteered in more than one project and individual volunteers were not counted.

It has been estimated that the program could help sequester 1.47- 2.95 million tonnes of CO2 by 2030, with the review summary stating that the Australian Government ‘will continue to invest in rehabilitating natural habitats” through the National Landcare Program. The Regional Land Partnerships Program has $450 million of funding for 2022-23 some of which will support revegetation. $200 million has been granted for bushfire recovery to native plants that are integral to the habitat of Australian wildlife which require revegetation, regeneration and weed control.

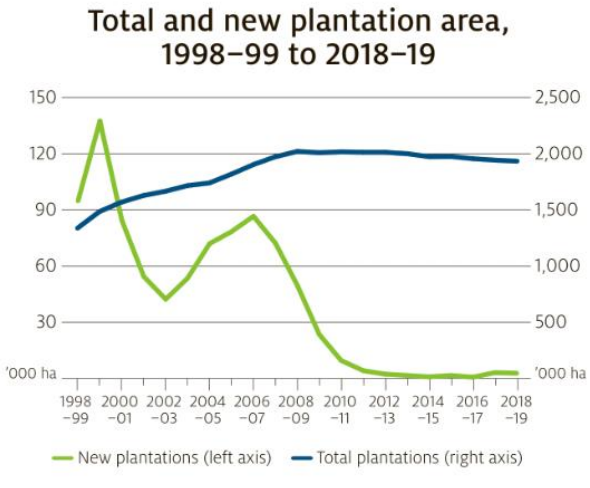
'Plant one billion trees' target

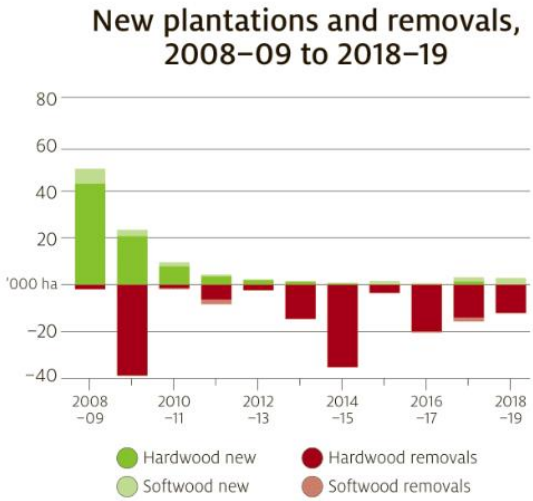
Nationally and internationally, there is greater demand for timber and wood-fibre products to build homes for a growing population as well as increased interest in the use of natural, renewable and recyclable materials. In fact, it is estimated that global demand for timber will *quadruple* by 2050. Increasing plantation and locally sourced structural timber is essential to ensuring our future supply chains into the future. Studies have shown that 400,000 hectares of new plantations are needed over the next 10 years just to meet growing national demand.
In 2018 the federal government pledged to plant one billion trees over a decade and provide $20.0 million over four years from 2018-19 to 2021-22 to grow Australia's renewable timber and wood-fibre industry. This funding aimed to:

- commercialise forestry farms supplying timber to Australia's forestry sector
- identify and improve the use of existing forest resources on Indigenous and privately owned and managed land
- support and develop new products and more efficient ways of using existing products within the forestry industry
- determine gaps in regional forestry hubs and identify new plantation opportunities
- provide policy and on-ground support for regional hubs
- reduce barriers to forestry expansion
- grow community understanding and support for sustainable forestry farming.

In 2018, 0.06% of native forests were harvested annually and then regenerated across 2 million hectares of plantation forests. However, one million more hectares will need to be planted to reach the billion-tree target. Ideally trees will be planted on low yield agricultural land or crown land, which is currently at risk of being sold to residential developers for profit while new plantations will require government subsidy and land acquisition.

Unfortunately, as of August 2021 only 1% of the 20 million tree target has been met, with 2,800 hectares of new trees planted. Poor progress has been attributed to the Black Summer fires of 2019, which burned 24 million hectares of land and 130,000 hectares of commercial plantations. Since the fires NSW have achieved planting just 4,000 hectares a mix of replacement and new trees. However, data shows low reforestation rates from 2010, with tree removal rates consistently higher than replantation since 2013.





Given these setbacks the next steps for the Government to meet the goal of planting one billion trees is unclear, with no official updates or announcements given on progress since the 2019 bushfires. In an interview with ABC news in 2021 Jonathon Duniam, the Assistant Minister for Forestry states that "respective state forestry ministers…want to stick to the goal". Perhaps the incoming Minister of Forestry will be able to update us on the target later this year…

Queensland News

Bimblebox art, science, nature camp 2022

By Malcolm Paterson

What do a group of artists, naturalists and writers do if they camp out in an isolated and precious ‘island’ refuge of the Desert Uplands in central Queensland?

They become inspired by this ecosystem, experience its subtle beauty and riches, share creativity and ideas with each other and find ways to express their response to this place. Their time on this country brings knowledge, connection and care, while their creative work may then go on to communicate and advocate for its protection and preservation.

In September this year, about 20 artists, writers, photographers, musicians and naturalists gravitated to Bimblebox Nature Refuge, nearly 8000 hectares of woodland, heath and grassland, for a very different kind of outdoor experience.

Camping out in a well-catered bush setting allowed participants to experience and explore this peaceful haven for wildlife while they pursued their areas of creative work and study.

The art, science, nature camps have been happening here since 2012 and the outputs have included exhibitions like *Bimblebox 153 Birds*, currently showing at Dogwood Crossing, Miles (till 28 October) and *Bimblebox: art – science – nature,* an exhibition that toured nationally from 2014 – 2017.

It’s a special opportunity for sharing ideas and art techniques. Peta Lloyd, who travelled from her coastal home near Rockhampton, said “Bimblebox Nature Refuge is a magical experience. The cross fertilisation with the other artists and campers was wonderfully exciting! I cannot wait to return again.”

Photographer and printmaker Sally North appreciated the special setting.

“The art camp provides the quiet serenity of the surrounding bush that is teeming with life. The deeper you look, the more it reveals. It gets into your soul and will stay with you forever,” she said.

Painter Judith Sinnamon has been more than once. She reflected on how precious this place is.

“Being at Bimblebox art and science camp made me realise just how important it is to protect this precious 'Noah's Ark' of biodiversity in this era of mass species extinction. Sharing this experience with others who care too was pretty special.”

The nature refuge certainly is special in the eyes of researchers and ecologists too. It is a recognised biodiversity ‘hotspot’, with an impressively wide range of animal and plant species packed into this solitary remnant of one of Australia’s unique habitats.

Bimblebox Nature Refuge has never been cleared, making it an ‘island’ in a sea of cleared farm land. It was bought for the explicit purpose of saving it from land clearing in 2000 by a group of concerned citizens and the Federal Government contributed to its purchase in recognition of the property’s high conservation values. It now forms part of the National Reserve System of Protected Areas.

Although it was supposed to be protected for perpetuity, Paola Cassoni and allies have instead been fighting against big coal for 15 years. Currently the Bimblebox Alliance is in the Land Court of Queensland objecting to Waratah Coal’s application to destroy part of the refuge to extract coal.

Introducing artists to Bimblebox is a creative way to add their voice to those of scientists and naturalists in speaking up to protect this refuge. Their work and their advocacy have contributed to raising awareness in Australian communities and International networks about the beauty and threats to Bimblebox. Individual creativity combines with collective action to speak out for Bimblebox.

To find out more about the refuge, visit https://bimblebox.org and more on the art, science, nature camps, https://bimbleboxartproject.com

	
Participants were passionate about understanding and appreciating this fragile ark of biodiversity	Frida Forsberg came from Toowoomba to make art in this island of biodiversity
	
Jenny Fitzgibbon is from Maleny - “I had a peaceful time connecting with nature and some wonderful people. I sketched, wrote, observed and learned.”	The group took many opportunities to learn from each other – Peta Lloyd explained printing methods with locally collected fragments of plants.
	
Artist Emma Scragg’s developing linocut of the Bimblebox Nature Refuge flora.	Dianne Brown, an artist from Maleny, printed from her linocut under a large marquee

Birds Queensland 2022

The aim of Birds Queensland is to share and promote the joy of bird watching and support the conservation and scientific study of bird life with particular reference to the birds of Queensland (https://birdsqueensland.org.au). Our logo is the brightly coloured and beautiful Sunbird which is normally found only between Normanton and Bundaberg.

Olive Backed Sunbird (Anthony Edwards)

Birds Queensland is a very active organisation run entirely by volunteers. Our major activities are a Monthly meeting with presentations on avian biology and ecology by guest speakers, regular walks and camps. The Society holds its monthly Meetings in the Brunswick Room, Merthyr Road Uniting Church, 52 Merthyr Road, New Farm at 7.30PM on the first Thursday of each month (except January). The evening's main address is followed by a light supper and gives members and guests the opportunity to meet new members, chat, browse or buy bird-related merchandise. These activities provide a wealth of opportunities for members to interact and to share information, knowledge and expertise.

Conservation and enhancing protection of avian and wildlife habitat is an important part of our operations. We undertake this through a citizen science program and regular structured surveys at various parks, reserves and habitat under threat. We conduct these activities in partnerships with a range of other organisations. We support community groups in activities aimed at protecting threatened habitat, make submissions to Governments, local, State and Commonwealth, on conservation matters that affect birds and important habitat more generally.

Birds Queensland publishes a monthly newsletter which covers a wide variety of topics from avian biology, interesting sightings and the ever-popular Bird of the Month. It also includes a list of forthcoming activities and reports on recent ones. Birds Queensland also publishes a scientific journal, "The Sunbird" that covers more detailed articles on avian ecology. In collaboration with our partners, we also develop and publish brochures that outline the best places to find birds in Queensland.

Birds Queensland has two Special Interest Groups whose members have extensive expertise. These are the Wader Study Group (https://waders.org.au) and the Bird Research and Banding Group. These groups generate and provide extensive data and expertise in support of conservation and avian study endeavours.

Education is an important component of our activities. Along with partner organisations we have a bird education program.

This encompasses a website that was created to support anyone who wants to learn more about the birds of South East Queensland (www.ourlocalbirds.com). Visits to schools are also an important part of our educational activities. We also attend various events around South East Queensland where we have displays promoting birdwatching, and Members in attendance to answer questions from visitors partaking in these events.

Birds Queensland is a non-profit incorporated association that finances its own activities and has been operating for over 50 years. The administration and operation of all our activities are overseen by a Management Committee, which is elected by and from members, annually at the Annual General Meeting.

National News

Citizen Science Opportunities

By James Ahern, HOPE researcher SA

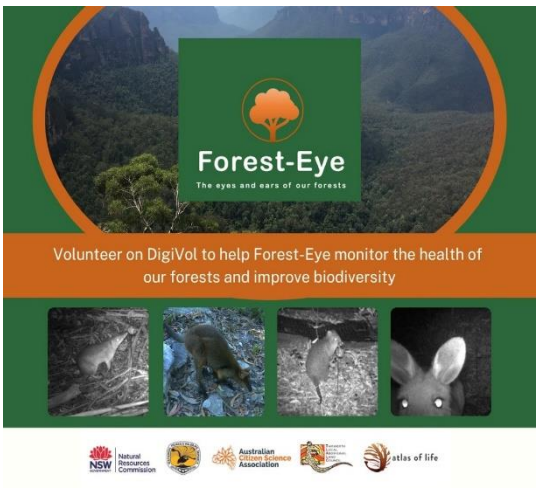
Citizen Science is recognised as a useful tool to advance scientific goals, aid with sustainable development, and increase interest in science among the general public. Established scientific bodies such as CSIRO are increasingly looking to citizen science as a means to achieve their goals, and organisations whose specific purpose is to encourage citizen science are becoming more common throughout the world.

But what is citizen science? Why is it useful? And how can people who may be interested get involved with citizen science projects?

What is citizen science and what are some current and past projects?

The Australian Citizen Science Association defines citizen science on their website as "public participation and collaboration in scientific research with the aim to increase scientific knowledge." In other words, where every day citizens provide meaningful contributions to scientific research, this is citizen science. People can participate in projects in a number of ways, such as helping to gather data on wildlife and natural phenomena, or observing the impact of particular changes in the natural world.

For example, the Northern Territory WildWatch Program is just one of many programmes which encourage participants to monitor and record sightings of wildlife, with the aim to improve understanding of local species by creating a comprehensive data log.



Elsewhere, the Australian Marine Debris Initiative (AMDI) encourages participants to remove debris from marine environments and record findings while they do. This helps to identify the types of debris which most commonly end up in marine environments, which can in turn help to improve strategies to both prevent marine debris and to remove existing debris from marine environments.

There are also multiple projects being operated by CSIRO and similar agencies, which encourage citizens to monitor the recoveries of fire grounds affected by the Black Summer bushfires. This can help scientists to better understand the impacts of bushfires on the environment and how habitats recover from that impact, which can itself aid with future recovery efforts.

What benefit does citizen science bring?

Citizen science can have a wide range of benefits for both the scientific community and the participants themselves.

As mentioned above, citizens' participation can help to advance scientific understanding by harnessing the passion, knowledge and experience of people who interact with specific environments on a regular basis.

At the same time, engaging communities in scientific projects can help to foster a trusting and collaborative attitude towards such projects in the future. This, combined with general enjoyment to participants, can encourage more people to engage with science generally, and to seek out opportunities to participate in future projects.

Moreover, citizen science can build a better appreciation for natural environments, as well as a deeper understanding of the challenges facing those environments. Each of these factors can then encourage positive behavioural changes among the wider public, aiding in ongoing conservation efforts.

How can I get involved?

The Australian Citizen Science Association has a comprehensive list of ongoing projects on their website, here. There are hundreds of projects listed, spanning every state and territory in Australia, and new projects are starting constantly. There are also projects listed on the websites of organisations such as CSIRO, as well as some government websites. Many projects are free and participation is completely voluntary. All of this means people can participate whenever and however they like.

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Environmental Defenders Office

Objectives:

The Environmental Defenders Office's (EDO) is the largest environmental legal centre in the Australia-Pacific region. It undertakes legal work in the form of litigation, law reform activities, and community engagement with the overarching aim of protecting wildlife, culture, community, and the climate.

Founded as separate Offices in 1996, and merged into a single national organisation in 2019, the EDO has undertaken many ground-breaking court cases in Australia, contributed to environmental law reform, and provided access to justice for citizens and the environment. Their activities are spread across the areas of protecting Country, culture, habitats and wildlife, tackling climate change, supporting sustainable water sharing, promoting healthy communities, and defending those who defend the environment.

Activities and Achievements

Litigation

As a highly reputable organisation, the EDO has undertaken litigation work on behalf of clients such as community and environmental groups, and has taken a number of Australia's major environmental cases to court, with major successes in holding the Government and powerful corporations to account. For example, the EDO was behind fighting Adani's proposed Carmichael coal mine, securing measures to protect endangered loggerhead turtles from coastal developments at Yaroomba, Queensland, and obstructing a proposed large-scale bauxite mine on behalf of the people of Wagina, the Solomon Islands, to list a few. They have also represented many Aboriginal clients for cultural heritage protection.

In a recent win, the EDO successfully held the NSW Environment Protection Agency (EPA) legally accountable for protecting NSW communities from climate change impacts, on behalf of the Bushfire Survivors for Climate Action group. This case has not only placed pressure on the NSW EPA to "develop policies, objectives and guidelines to regulate greenhouse gas emissions" in NSW, but could potentially act as a catalyst for EPAs across Australia's other states and territories to act responsibly to reduce the impacts of climate change by fulfilling their duties to lead emissions reductions.

Law Reform

In addition to litigation work, the EDO provides submissions to Inquiries, investigations and drafts for legislation, and generates research and recommendations for law reform. Recently, the Office has published reports on climate law and policy reform, protecting First Nations' cultural heritage, best practice environmental laws, marine and ocean laws reform, and recognizing the right to a healthy environment in Australia. EDO lawyers are also participating in the consultation process for establishing a national Environmental Protection Authority in Australia. All of this contributes to systemic change in environmental governance in Australia.

The EDO has also been providing expert input into the statutory review of Australia's main environmental legislation, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The opportunity to review this legislation occurs only once every decade. The primary recommendation from the review is for a complete overhaul of the Act, and the creation of new, legally enforceable national standards for protecting Australia's environmental values (Walmsley 2021).

Community Legal Engagement

The EDO provides factsheets relating to specific laws and legal-environmental matters for individuals, explainers, workshops, handbooks and other resources to assist people to understand the law and participate in legal processes. They also provide legal advice for environmental matters.

For more information, stories, articles, resources, and to subscribe to the EDO's free monthly newsletter, please click here: https://www.edo.org.au/what-we-do-2/

Source:

Environmental Defenders Office 2022, *What We Do blog*, EDO, viewed 1 October 2022, < https://www.edo.org.au/what-we-do-2/>.

International News

The Club of Rome - www.clubofrome.org

Lauren Dogan, HOPE Researcher NSW
Completing Environmental Science & Management (Applied Earth Sciences) degree.

Main aims

The Club of Rome was formed to address the numerous issues facing humanity and planet Earth. This international think-tank is a collective of more than 35 national associations and 100 thought leaders comprised of scientists, economists, business leaders and former politicians who identify holistic resolutions to complex global issues and promote policy initiatives and action. The Club of Rome prioritises five key areas of impact:

Emerging New Civilisations; Planetary Emergency; Reframing Economics; Rethinking Finance; and Youth Leadership and Intergenerational Dialogues. The organisation has published more than 45 peer-reviewed "Reports to the Club of Rome" articles. The Club of Rome's five impact hubs (shown below) serve as a creative space where Club of Rome members, associations and partners share life-changing thought leadership and co-design solutions for impact.

1. Planetary Emergency Plan
2. Emerging New Civilisations
3. Reframing Economics
4. Rethinking Finance
5. Youth Leadership and Intergenerational Dialogues

In addition, the Club of Rome aims to:

- Enhance and promote intergenerational thought leadership
- Provide the space for tough conversations and conflict resolution
- Promote greater gender, ethnic, geographic and age diversity across government and business in order to enhance the capacity for complex decision making
- Continuous promotion of a contemplative culture related to core global crises whilst offering space for co-creation of solutions and hope
- Translate the Club of Rome's thought leadership across the globe through education, knowledge exchange and publications
- Develop partnerships between members, associations and leaders from the business, policy, and NGO communities

Achievements

2019 Planetary Emergency Plan

This plan was drafted in partnership with the Potsdam Institute for Climate Impact Research (PIK) and provides key policy controls addressing challenges of climate change, loss of biodiversity, human health, and well-being. The plan provides a roadmap for governments to implement over the next decade that benefit all living things in light of climate change.

Read more here:

- https://www.clubofrome.org/publication/the-planetary-emergency-plan/

Current Projects

Emerging New Civilisations

This initiative reimagines the narratives about Africa and most of the world to challenge the dominant narrative of universality and Afro-pessimism with a mission towards global equity for a healthy biosphere. The Club of Rome in partnership with the Learning Planet platform (a network of more than 90 institutions) engaged in new ways of collective learning, creating several learning circles including Ubuntu, to learn from and with Africa.

Read more here: https://www.clubofrome.org/publication/learning-new-ways-of-becoming-human/

Reframing Economics

The objectives of this Impact Hub are to encourage economic thinking that promotes the well-being of all humans and the planet to reverse negative impacts to ecosystems and climate caused by anthropogenic desires for economic growth. Earth4All is an international initiative by The Club of Rome and its partners to accelerate the systems-changes needed for an equitable future on a finite planet. The Club of Rome aims to publish a report that will focus on transformational economics and five essential policy reversals to achieve the UN's Sustainable Development Goals within Planetary Boundaries.

Read more here: https://www.earth4all.life/

Rethinking Finance

The objectives of this Impact Hub are to re-visit the monetisation of all transactions to improve the equitable distribution of wealth and safeguard the broader well-being of all people. This finance hub was launched in 2020 and assembled European Institutions, EIB, ECB, Central Banks, Impact Investors, Finance Institutes, Foundations, Academics, and Members of the Club of Rome to explore key areas of change and begin a co-creation partnership where calls were made to shift away from conventional finance models to one of mutual prosperity for people and the planet.

Read more here: https://www.clubofrome.org/impact-hubs/reframing-economics/

Youth Leadership and Intergenerational Dialogues

The Club of Rome has established a global young leadership programme, based on three key areas – Education, Engagement and Action to give a voice to youth. The initiative is run in partnership with Penn State University's Sustainability Institute. Through "The 50 Percent" (formally the Global Youth Engagement Program), the Club of Rome aims to ensure that the perspectives of young people are heard by policymakers, business and academic leaders with sessions designed for improved understanding of the areas of concern and excitement that young people aged 18-30 have about the future.

Read more here: https://the50percent.org/

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Pharmaceutical pollution of the world's rivers research article by J Wilkinson, A, Boxall, D Kolphin et al (2021)

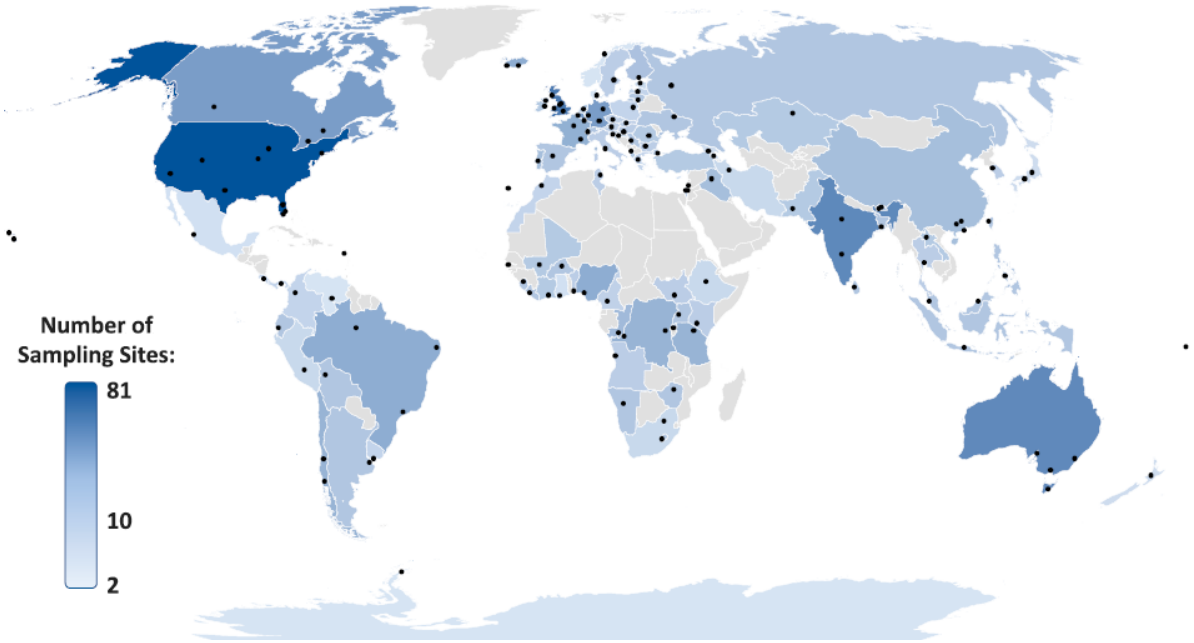
Critique and discussion by Anna Kula, HOPE researcher QLD

Active pharmaceutical ingredients (APIs) are biologically active molecules designed to interact with biochemical pathways. Many APIs are conserved in aquatic and terrestrial organisms when pharmaceuticals inevitably leak into rivers through human and pharmaceutical manufacturing waste dumping. Concerns have been raised over the ecological implications of APIs in the aquatic environment of rivers. For antimicrobial APIs there is also concern that environmental exposures could add to the rising issue of antimicrobial resistance (AMR) in microorganisms.

API presence in rivers has been measured using different methodologies in a variety of regions, inconsistently across different period of time making it impossible to compare and estimate the scale of environmental impact. This article attempts to provide a global-scale study of 258 rivers of 104 (of 196) countries populated by some 471.4 million people, across all seven continents.

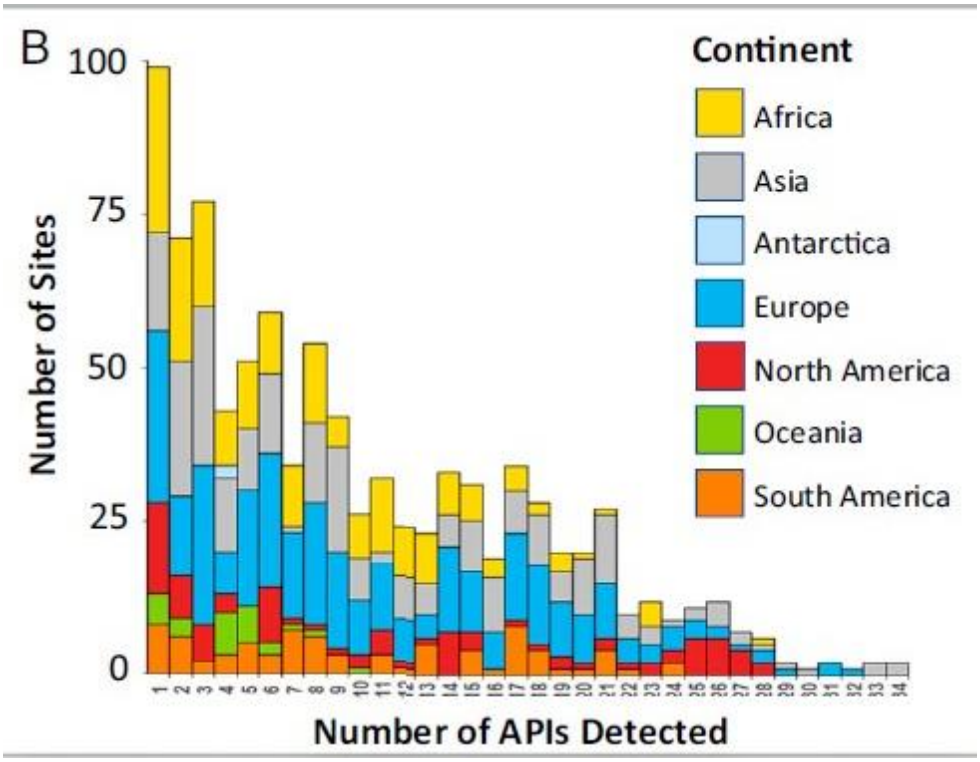
Surface-level water samples were collected in duplicate from 1,052 sampling sites. The study is unclear how the number of sample sites per river were determined, whether this was done by river volume (X samples per X square kilometres) or some other determinant which could affect results. These samples were then analysed for 61 APIs prioritised in other studies which were expected to occur and to be of potential environmental concern in rivers.

The study does not discuss the potential limitations of analysing surface level water (sediment) and not lower or bed sediment contaminants, which will contain different chemicals and toxins deposited further back in time. These may have a more lasting presence and impact on its aquatic environment over time. The authors do discuss expanding this approach to other environmental media in the future such as sediments, soils and biota.



The study found that across the 104 rivers sampled 25.7% had at least one API above the level considered safe for aquatic organisms or is considered 'of concern' adding to the issue of antimicrobial resistance (AMR).

Somewhat unsurprisingly higher concentrations of APIs were found in rivers of sub-Saharan Africa, South Asia and South America. Areas infamous for cheap labour, corruption and less regulated health and safety protocols. High concentrations were also found in countries with limited or no previous API monitoring in rivers. The most contaminated sites were generally receiving input from pharmaceutical manufacturing, discharge of untreated sewage, exhauster truck emissions, or were in areas of waste dumping or located in arid climates. Sites with lowest API concentrations typically had low human influence, limited use of modern medicine by society, good wastewater treatment infrastructure and regulation or high river flow and dilution. Unsurprisingly API detection frequencies for Oceania (with low population concentration and pharmaceutical production) were generally lower than in Europe, North America and South America.



The most frequently found APIs were carbamazepine (an anti-epileptic drug), metformin (used to treat high blood sugar levels) and caffeine disposed by coffee drinkers at over 50% of sites analysed. Of the four APIs detected across all continents all were considered lifestyle compounds or easily accessible over-the-counter pharmaceuticals.

The study shows some clear global geographical patterns in the API concentrations found of certain therapeutic classes, based on what pharmaceuticals were commonly produced or used by the local population. Total concentrations of some APIs, such as beta-blockers and antihistamines showed up in limited 2-3 orders of magnitude global range. The largest global concentration range was observed for APIs from the analgesic, antibiotic and anticonvulsant medications at approximately 4-5 orders of magnitude each possibly due to the relative affordability and accessibility to these medications. Regions with less regulated access to medicines (such as in African countries where antibiotics are available over the counter) revealed greater variability and range of API concentrations.

The study gives an in-depth discussion about the socioeconomical relationship between societies and concentration of APIs found in local rivers, in particular the impact of affordable and accessible medicine and wastewater connectivity on river pollution. However, countries with well-regulated waste management infrastructure had the lowest levels of API pollution overall.

The authors encourage further testing using this approach to sample other classes of pollutants, such as personal care products, endocrine disrupting chemicals, pesticides and metals. Such data would help provide global-scale datasets on pollution, which would aide in measuring United Nations' Sustainable Development Goals- Goal 6.3 to improve water quality via a reduction in pollution, elimination of dumping, and to minimize the release of hazardous chemical material and untreated wastewater into the aquatic environment.