

Scottish One-Health Research Alliance

Innovative working between institutions and across disciplines towards a healthy, prosperous, and sustainable post-covid Scotland

Partnership

Leads: University of the Highlands and Islands & Glasgow Caledonian University

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Partner organisations:

The **Scottish One-Health Research Alliance** would seek to provide a collaborative research platform promoting demand led research and innovation across disciplinary boundaries and be open the participation and contribution of all Scottish HEIs. However, in assessing the potential of the 'Alliance', at this initial, expression of interest stage the following Institutions have provided support:

- Edinburgh Napier University
- University of Glasgow
- Robert Gordon University
- Glasgow Caledonian University
- University of the Highlands and Islands
- James Hutton Institute
- SRUC

If the EoI is approved, the first stage of development will be the open invitation to engagement of all other Scottish HEIs (including Universities of Edinburgh, Aberdeen, St Andrews, Dundee, Abertay and Strathclyde)

To ensure the focus is securely upon demand-led research, and to optimise pathways to impact, **agencies and organisations** including the following have already or will be engaged: Scottish Environmental Protection Agency, Scottish Water, Scottish Government HydroNation Programme; Scottish Antimicrobial Prescribing Group; Public Health Scotland; Scotland's Centre of Expertise for Waters, Highlands and Islands Enterprise etc.

International: Engagement has also been established with OneHealth research initiatives in Sweden, Serbia and the USA.

Disciplines that would be included: Life Sciences esp. microbiology and infection control; Medical/Clinical sciences; Environmental sciences, engineering and management; Data science and visualisations; Health / Environmental economics; Chemical and biological analytics including advanced (physical) sensor technology; Social sciences; Population health and behaviour; Veterinary medicine and animal health; Food science etc.

OneHealth Scotland

OneHealth: An integrative paradigm

Scotland, Europe, and the World faces considerable social, economic, and scientific challenges by environmental and health threats that may be linked to biological agents (bacteria and viruses), persistent pollutants or the effects of climate change.

The **One Health** concept recognises that the health of humans, the environment, and animals are closely interdependent and interconnected. Global issues such as food and water security, climate change, antimicrobial resistance, and environmental pollution are key examples of One Health issues at the interface between environmental, human, and animal health.

One-Health issues are complex and interconnected, and span across multiple sectors, and as such can only be addressed by working together. The importance of One-Health as a collaborative, multi-disciplinary, and cross-sectoral approach in addressing these issues has become apparent – particularly drawn into sharp focus with the coronavirus pandemic.

Whilst communities are fearful of the aforementioned impacts, and governments try to react to present (perceived) risks, there is a lack of truly integrated approaches to these environmental and health risks, connecting key socio-scientific components that are currently under-researched:



Figure: One Health concept (uaf.edu/onehealth/)

‘The One Health approach supports global health security by improving coordination, collaboration and communication at the human-animal-environment interface to address shared health threats such as zoonotic diseases, antimicrobial resistance, food safety and others. Over the past decade, country after country has implemented the One Health approach and demonstrated recognised benefits.

*However, One Health champions and implementers need to collect and provide government decision-makers with country-level data on One Health's impact to help justify policy decisions and resource allocations. Due to the broad, often seemingly all encompassing, nature of One Health in promoting synergies of multiple disciplines and sectors, the One Health community has faced **difficulties in determining specific One Health impact indicators for formally evaluating One Health successes**¹.’*

The natural and social science underpinning our understanding of human and environmental health, and in particular the causal interlinkages between the quality of our environment and human health, is immensely data rich and wicked in its complex social, biological and physical interactions. For example, trying to understand the myriad of effects that any mix of the 10,000 chemical substances licenced in Europe could have on human, animal or environmental health, whether chronic or acute, is beyond human comprehension and scientific verification.

As a result, there is an inherent silo thinking and micro-evaluation of individual substances, diseases, abatement measures, clinical intervention etc, that delivers clear(er) messages to policy makers and practitioners but necessarily loses sight of the bigger picture: synergies in attempts to improve human and environmental health, to halt the spread of pollutants and fight biological infections are almost systematically ignored, so much so that there is little knowledge of any trans-disciplinary benefits for society at large. Exploratory endeavours are hindered by the inherent lack of data on the complex cause-and-effect networks, and initiatives such as the Swiss steps towards 80% micropollutants removal²³ via advanced wastewater treatment as a precautionary measure to reduce water pollution, improve overall environmental quality and reduce (largely unspecified) risks to human and animal health, are by far the exception rather than the norm.

² FOEN, Federal Office for the Environment (2012). Micropollutants: Modification of Swiss ordinance on water protection in consultation. <http://www.bafu.admin.ch/dokumentation/medieninformation/00962/index.html?lang=de&msg-id=30514>

³ Bundesamt für Umwelt (BAFU) (2016). Mikroverunreinigungen: Startschuss zum Ausbau der Kläranlagen. (19.05.2016) <https://www.bafu.admin.ch/bafu/de/home/themen/wasser/dossiers/mikroverunreinigungen-ausbau-klaeranlagen.html>

Research challenge and opportunity: The OneHealth paradigm

The need for One-Health approaches has been intensified through the Covid pandemic; 'green' recovery initiatives; the 'ticking time-bomb of AMR'; global climate and biodiversity emergencies; is embedded in the Scottish Government's new sustainability policies and net-zero targets; UN 2030 Agenda for Sustainable Development etc. and resonates with sustainable concepts such as green and social prescribing, blue-green healthy spaces, and active lifestyles.

Whilst there is an established research infrastructure on medical and pharmaceutical aspects of One Health, this Challenge proposal argues for the need of a research alliance that supports a sustainable, socially innovative framework of One Health integration in science and technology, which is embedded in stakeholder- and community-engagement. And, that leads to empowerment of communities locally, regionally and nationally, including citizens, policymakers, businesses, health, science, and the third sector. To achieve this overarching aim, the alliance will adopt connected, trans-disciplinary objectives, that centre on the human and wider environmental health whilst acknowledging the impact that may arise from animal husbandry and veterinary interventions.

Scottish One-Health Research Alliance

In Scotland, the One Health approach has been demonstrated through the formation and ongoing activity of the One Health Breakthrough Partnership (OHBP). Formed in 2017, The OHBP has brought together key regional and national stakeholders across the environment, healthcare, and water with a commitment to generate positive One Health outcomes and create a 'non-toxic' environment.

Partnership

The Scottish One-Health Research Alliance will build on this foundation through development of a multi-institutional interdisciplinary research alliance open to all Scottish Universities and be led by the University of the Highlands and Islands and Glasgow Caledonian University (see cover page). It will promote partnership beyond engagement with key agencies and organisations (see cover) to ensure that research is demand led and of societal value and impactful.

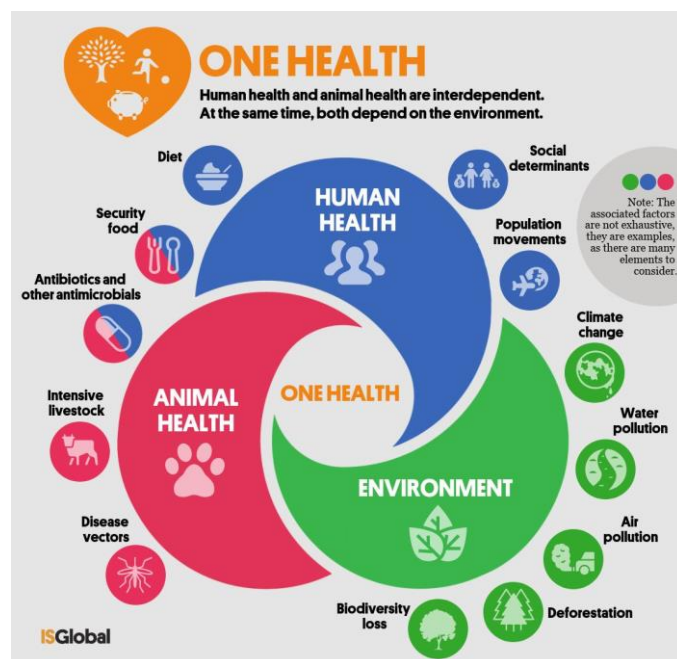
It will seek input and benefit from collaboration with the SEFARI Antimicrobial resistance network, the NHS National Service Scotland AHPs Quality and Healthcare Associated Infection group, existing research pools (SULSA - Life sciences) and SICSA - Informatics and Computer science), innovation centres (DHI - Digital Health and Care Innovation Centre; [CENSIS](#) - Scotland's Innovation Centre for sensing, imaging and IoT technologies) and research partnerships (CREW - Scotland's Centre of Expertise for Waters including the CREW Scottish One Health AMR Register (SOHAR); the Forth Environmental Resilience Array (Forth-ERA)).

Objective 1: Common understanding

Engage scientists, policymakers, health professionals, business leaders, and community activists to map – and ultimately verify – an integrated systematic approach towards One Health benefits. Supporting activities will have three main aims: to establish baseline understandings of policy, scientific and technical understandings; to develop capacity for understanding, intervention, and change; and to test and explore with these different communities of practice as they action realistic options for change in the aspect of One Health that is currently under-researched: integrated evaluation of human-environmental health impacts

Objective 2: Prioritisation and targeting

The Alliance will promote pan-organisational and interdisciplinary approaches that focus researchers and innovators on 'wicked' issues using the One Health paradigm. By way of illustration, there is a general understanding that human-environmental health impacts arise from persistent environmental pollutants (PEP) emissions, but very little quantitative data on the evaluation of the magnitude of this impact. This is partially due to



the sheer number of possible pollutants ‘cocktails’ and the inability of ‘conventional’ scientific data to underpin policy decisions and new, innovative research directions are required.

Alliance partners, together with external agencies and organisations, will prioritise and focus upon ‘big ticket’ challenges with greatest societal need. Those identified in preliminary work include issues around:

- Pharmaceuticals in the environment
- Anti-microbial resistance
- Micro-plastics
- Non target impacts of veterinary medicine s

Objective 3: Synergistic exploitation of One-Health benefits.

This objective is to reach a synergistic exploitation of resources and results through joint verification activities with a broad range of stakeholders and aims to provide (economic) models of the integrated value of intervention taking account of the lack of concerted action due to limited ‘value’ attachment in the often-isolated paradigms of for example, human health, AMR, environmental protection etc.

Objective 4: Funding

Through the Alliance we aim to enhance the grant capture and recognition of all contributing researcher and their organisations. For example, we recognise opportunity in recent UK and EU calls for transdisciplinary research such as n topics for example: EU JPI (Joint Programmes Initiative) Aquatic Pollutants call 2020 (ECGA No. 869178- AquaticPollutants); zero-pollution solutions to protect health, environment and natural resources from persistent and mobile chemicals call LC-GD-8-1-2020; the upcoming call HORIZON-CL6-2023-BIODIV: Better understanding of routes of exposure and toxicological and ecological impacts of chemical pollution on terrestrial biodiversity; the current Understanding changes in quality of UK freshwaters NERC call

Structures

The Alliance will operate through a basic operating structure of co-ordination group (universities and research organisations) and steering group (research users and beneficiaries). Additional grouping will be established as the Alliance evolves e.g. postgraduate research student group, international engagement forum

Values

The OneHealth approach is a fundamental requisite for action in a world in which the interconnectedness and interdependencies of people, animals, plants, and environment are acknowledged and valued. The Scottish OneHealth Research Alliance will be recognised through the following value characteristics.

- Leadership – providing vision and promoting trust to develop and implement a shared, coherent OneHealth Strategy for Scotland
- Collaborative – promoting engagement between organisations and individuals, working across disciplines and organisational and boundaries regionally, nationally, and internationally. Forming effective working networks and relationships that contribute to mission and objectives
- Innovative – bringing collaborative practice and creative thinking into practice
- Adaptability – flexible, being responsive to changing needs of our global society, national agencies and evolving OneHealth challenges
- Integrity – informed by robust, high-quality science and evidence based in all activity, communications, projects, and practices
- Stewardship –responsible management practices that ensure the highest standards of accountability regarding our work and funding
- Recognition – regionally, nationally, and internationally for excellence and innovation in in our approached and the impacts and achievements of our work

Impacts

The ARC will establish a **Scottish One-Health Research Alliance** that supports the vision of a healthy, prosperous, and sustainable Scotland. The Alliance will:

- encapsulate existing areas of discrete expertise within an integrated One-Health framework (see Figure)
- enhance collaborative research competitions in these discrete areas, thus linking UKRI strategic priorities of environment, biology, AI, health and digital⁴.
- stimulate novel collaborative links between disciplinary areas and across organisational boundaries
- provide co-ordination of One-Health activity in Scotland uniting forces and overcoming fragmentation and barriers, thus directly supporting the UK Research and Development Roadmap target to “engage in new and imaginative ways to ensure that our science, research and innovation system is responsive to the needs and aspirations of our society⁵”
- ensure connectivity with institutional strategies, national policies and international agendas e.g., Scottish Government’s HydroNation, sustainability and ‘net zero targets and UN SDGs
- provide a platform for international engagement

The Alliance will seek to:

- advance the health of humans, animals and the environment through a integrated One-Health approach
- promote Scottish Government outcomes
- support Scotland’s National Performance Framework outcomes of environment (value, protect and enjoy), health (healthy and active) and economy (sustainable) and communities (empowered and resilient)⁶.
- promote Scotland’s reputation as a global leader on issues of climate, environment, energy and One Health in direct support of Scotland's National Strategy for Economic Transformation target to become fairer and more equal society and a wealthier, greener economy⁷.

Adding value

The **Scottish One-Health Research Alliance** will extend SFC investments to establish and develop a build a ‘next-generation’ network through inter-disciplinary and cross-partner collaborative research. It will be rooted in a strong foundation of existing informal collaborations and seek to grow a partnership that the challenge outline and builds international recognition in doing so.

The Alliance will provide equitable opportunity for all interested HEIs in Scotland and seek to develop truly integrated, collegiate, and coherent approaches to research and innovation learning lessons from participation in research pools such as SAGES and MASTS. The Alliance will also seek to act as a conduit for engagement with adjacent pools and ARCs to ensure gaps do not emerge in the research landscape.

We recognise the ambition, and challenge in tackling the One-Health, but believe that we can unlock the potential within the academic community in Scotland to establishing international recognition and leadership and to develop competitiveness in securing funding toward achieving this ambition (e.g. joint funding opportunities, facilitation of consortia bids; and multi-institution, transdisciplinary and cross-sectoral network building).

This ARC would pool the existing knowledge and approaches and will provide a truly trans-disciplinary One Health research network that will lead to a more integrated evaluation of source, impact, remediation and cost benefit across the main stakeholder fields of human health, clinical and hospital management, environmental health and veterinary science, even if funding sources remain somewhat grounded in their respective main discipline.

⁴ <https://www.ukri.org/what-we-offer/our-main-funds/strategic-priorities-fund/>

⁵ <https://www.gov.uk/government/publications/uk-research-and-development-roadmap/uk-research-and-development-roadmap#developing-world-leading-infrastructure-and-institutions>

⁶ <https://nationalperformance.gov.scot/national-outcomes>

⁷ <https://www.gov.scot/publications/scotlands-national-strategy-economic-transformation/pages/8/>