How to enable transformative science during the International Decade of Ocean Science for Sustainable Development

"Transforming ourselves before we transform how we make decisions on the ocean"

Abstract – The One Ocean Hub can be considered a working prototype of transformative ocean science for sustainable development, which has been enabled by UK's Global Challenges Research Fund. The aim of this policy brief is to share our early experience in, and learning from, co-design and testing of the potential of a model for transformative change and the directions we are heading towards. We have experienced that clear roles and responsibilities on both the funding body and the community of researchers can create the conditions for transformative ocean science. These include explicit requirements for ensuring, monitoring and learning from inter-disciplinary research, co-development of knowledge and solutions with stakeholders, and advancement of fairness in partnerships. This brief highlights three specific lessons learned in this connection: mutual understanding of benefits for different partners; the creation of knowledge ecosystems; and the need to design research to address the science-policy interface at multiple scales.

Introduction

The One Ocean Hub is an independent collaborative research programme to transform our response to the urgent challenges facing our ocean. It is funded by UK Research and Innovation (UKRI) through the Global Challenges Research Fund (GCRF), a key component in delivering the UK AID strategy to tackle the Sustainable Development Goals. The Hub addresses the challenges and opportunities of South Africa, Namibia, Ghana, Fiji and Solomon Islands, and shares knowledge at regional (South Pacific, Africa and Caribbean) and international levels. It is led by the University of Strathclyde in partnership with 126 researchers, 21 research partners, and 18 project partner organisations,

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including UN bodies. The Hub has been conceived in itself as a lab for **testing the potential of a model for transformational change**. The early work to conceive the Hub and bring together research partners has already provided a test for understanding the extent to which engaging with researchers' ideological tensions can catalyse transformational change for sustainability, as a precursor to change in decision-making processes at different levels. The aim of this policy brief is to share the Hub's practice and learning to

KEY POINTS

Focusing on inter-connections among all threats to ocean health

Establishing a specific process to ensuring equitable partnerships among researchers and research partners

Understanding what went wrong in previous international ocean research collaborations

Ongoing assessment and learning of lessons on fair partnerships, including institutional responses and resource distribution

Highlighting multiple dimensions of fairness in co-designing and co-delivering research

Allowing sufficient time and opportunities to build friendships

Establishing connections for local voices that are often marginalised from decision making and for researchers from different disciplines with international ocean governance debates

date, with a view to engaging in a dialogue about shaping future funding programmes and research practice during the UN Decade on Ocean Science.

1. Co-developing Fair Partnerships through mutual understanding of benefits and ongoing learning

The Hub is rooted in the co-development of fair partnerships. The GCRF specifically required a process for how the Hub is ensuring equitable partnerships among researchers and research partners. According to UKRI, partnerships with researchers or others in resource-poor settings should be transparent, based on mutual respect and deliver mutual benefits. Further, the Overseas Development Assistance mandate of our work requires that our research must be relevant to the country in which it is carried out: our research objectives and design need to respond to specific sustainable development challenges that have been identified in country. There are also specific requirements for the Hub to acknowledge and address the power differentials that emerge from international development research and research that involves human participants.

As a starting point, the Hub co-developed with co-researchers and project partners a Code of Practice to set out specific approaches to fair partnerships. The Code of Practice, took inspiration and foundational principles from the San Code of Ethics and Global Code of Conduct. All researchers learnt from one another about what went wrong in previous international research collaborations through open discussions and anonymous submissions of inputs as part of inception workshops and online/in-person social learning processes entitled: "Living Aulas". They all then distilled lessons learnt and preferred approaches into a Code of Practice that was co-developed

and revised over 5 months. The Code of Practice also relied on researchers' own research on fairness and equity, and research ethics more generally. The Code of Practice was then made legally binding by being cross-referenced in all Hub Collaboration Agreements. In addition, all our Hub's Project Partners are also required to respect the Code of Practice. The Code of Practice was also agreed to become a living document, with further iterations through contextual learning over the life of the Hub, further deepening and enriching it's ethical rigour and epistemic agility across contexts, cultures and concerns.

The Code of Practice highlights multiple dimensions of fairness in the process of co-designing and co-delivering research programme and outputs, with a view to identifying collective approaches to fairness, including towards: 1) vulnerable groups; 2) each region and across regions; 3) each researcher (taking into account also gender, age, race, career stage); 4) partners; and 5) the funders and tax-payers vis-à-vis the

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Hub budget and in-kind contributions. The Code acknowledges that co-research is designed, not to be extractive and cautions. It is designed with the understanding that that ethics protocols can erode agency (i.e. the ability of people to make choices independently). The Code also acknowledges different preferences and approaches across a vast international collaboration. The Code therefore seeks to promote, not prevent, ongoing mutual learning through collaboration among researchers and with participant communities.

In addition, specific funder guidelines, guided researchers in tackling barriers to fair partnerships at the grant-design stage. These included

Box 1 Co-development of Partnerships in Ghana

From the start of the Hub implementation, researchers in Ghana have ensured that relevant stakeholders are included in the development of research questions and objectives. An inception workshop was held in Cape Coast and Accra in 2019 and included a range of stakeholders such as Ghana Fisheries Commission, local and district council officers, and traditional authorities. These stakeholders helped to define priority areas for research in Ghana. The initial contacts made at the inception workshop have also led to collaborations. For instance, representatives of the Fisheries Commission in various regions have contributed to the design and practical elements of the Hub's field work. The Environmental Protection Agency of Ghana is providing logistical support, including offering a vessel for Hub research on sustainable fisheries and sharing scientific and socio-legal data relevant to the research. The team is also building strong civil society connections with Hen Mpoano, an NGO involved in community-based fisheries projects in the western region of Ghana. Hen Mpoano is contributing to the Hub's customary law work and facilitating access to community leaders and traditional fisheries authorities.

requirements to: 1) demonstrate that the research agenda was co-developed; 2) ensure a balance of budget allocation and administrative resources across regions (and Global North/South); 3) specifically support mutual learning and mutual benefits between Global North and Global South; and 4) explicitly address power imbalances in research.

The last two requirements implied also carrying out regular reviews of the health of the partnership and developing a Code of Practice to explicitly address fairness in the project publication strategy and data management (such as ensuring that research results are properly owned and controlled by local stakeholders, addressing problems and conflicts that may arise from the outset). To that end, a Monitoring, Evaluation, and Learning (MEL) team including a dedicated Responsible Research Fellow helps the Hub to assess its strategy and institutional responses, explore the lessons on fair partnerships, and resource mobilisation and distribution to assist and foster participation from partners and co-researchers. Our MEL processes and criteria have also been co-developed during Work Package Zero (WP0) with stakeholders and iteratively reviewed by our researchers. Our WP0 was designed to undertake a preliminary, contextual ethnographic analysis of power and capacities in the selected countries to co-define matters of concern (issues, struggles and knowledge gaps: Latour, 2004) across all sectors and groups that Hub researchers will work with. In addition, WP0 allowed us all researchers to start in a shared direction (not the exact same path) towards trans-disciplinarity, while developing and testing methodologies to engage in self-critical, iterative and challenge-driven research. It then shaped the Hub's research ethics, data management plan, theory of change, protocols for fair partnerships and mediation, and capacity-support and training activities for Hub researchers and partners. This, in turn, supported us in better understanding each Hub researchers' expertise and contributions, actual and potential synergies within and across research programmes, as well as within and across regions. Furthermore, it allowed to plan establish a geographically phased approach to research activities and deliverables, embedding flexibility into the programme *(see Box 1)*.

2. Creation of Knowledge Ecosystems

We were able to set up the Hub as a transformative inter- and trans-disciplinary research prototype by focusing on complexity and the inter-connections that support ocean health. Ocean systems are highly interconnected from local to global scales, unconstrained by the arbitrary boundaries delimited by our governance of the ocean. In addition, the multiple threats to the ocean are also multiscale and interconnected, and include often overlooked land-based issues. These multiple threats act in complex, non-linear ways to create cumulative impacts which are difficult to assess and predict. Dealing with these entangled problems in interconnected systems and threats, through a governance system which is predicated towards sectoral knowledge, policy, and institutions, has led to incomplete solutions. Whilst these problems are not intractable on their own, a shift to transformative approaches is required to address them in a holistic, adaptive and contextually relevant way.

The creation of inter-and trans-disciplinary knowledge system that is needed to transform the way we understand our ocean and its governance systems, is enabled by both our funder and the Hub's own practices. The GCRF is unique in funding challenge-led interdisciplinary research that strengthens research capacity and fosters innovation and knowledge exchange. On the one hand, most funders still tend to support research within research disciplines,

Box 2 On Creation of Knowledge Ecosystem: Coastal Justice 'Knowledge Action Network' in South Africa

Hub researchers in South Africa have developed a Coastal Justice 'Knowledge Action Network' for citizen monitoring of Blue Economy initiatives through the contextual scoping phase of Hub research. In 2020, this emerging network has focussed on monitoring, documenting, and overcoming the obstacles that small-scale fishers faced in trying to participate in ocean decision-making processes at the time of COVID-19. Strong relationships based on solidarity and mutual learning have been established between a group of researchers and a group of small-scale fisher leaders. This formed the first layer of the network, which is now growing to include more researchers, civil society organisations and other coastal users. In addition to prioritising the building of solidarity between researchers in the Hub, approaches such as the Coastal Justice Knowledge Action Network aim to build solidarity between researchers and community-based partners. They encourage researchers to practice 'pro-active solidarity' with community-based partners, which is both politically engaged and awake to pressing matters of injustice, and collaborate in responding to these problems (Juris 2008).

reflecting the institutional structures of grant-giving entities (e.g. Natural Environment Research Council, Economic and Social Research Council) and usual array of university departments and faculties. On the other hand, it is also more common to undertake development through development specialist agencies, such as the Foreign, Commonwealth, and Development Office of the UK government. Specific funder guidelines, guided researchers in tackling barriers to inter-disciplinarity at the grant-design stage, notably requiring "more-than-sum-of-the-parts" approaches and outcomes. The Hub relies on law research (focusing on the 2018 UN Framework Principles on Human Rights and the Environment) to integrate social and natural sciences. In particular, we are relying on human rights to support more integrated and inclusive decision making on the ocean, to the benefit of the most marginalised, by integrating natural and social science findings (data or methods) so that authorities incentivise change based upon these findings, while enabling marginalized actors to voice their demands as legal entitlements.

Moving beyond the GCRF inter-disciplinary research's requirement, in the development of the project, the Hub has taken a transdisciplinary approach. This has focused on developing human-centred solutions and bringing together ocean experts from law, arts, social and marine natural sciences, and non-academic experts and stakeholders in the co-production of knowledge (Wahome, Hills, and Morgera, 2020). The Hub's novelty lies in using the law and arts-based ethnographic approaches to drive, focus and iteratively develop custom trans-disciplinary research with research partners.

The Hub's Code of Practice refers to the "Rosetta Stone" as an approach to inter- and trans-disciplinarity. This served to underline that individual

Box 3 Ocean-Related Policy Modelling and Analysis in the South Pacific

Hub researchers from various backgrounds and disciplines (law, sociology, anthropology, and marine science) assessed the links across dozens of national (Fiji, Solomon Islands) and regional (Pacific) public policies to understand if they are considering specific societal issues to support coherent implementation from the local to the national and regional levels and back. Using Natural Language Processing techniques (a sub-branch of artificial intelligence) and algorithmic inputs derived from mathematical theories, particularly on graphs and networks, Hub researchers analysed sources of information in dialogue with decision-makers, political leaders and government bodies. Text mining from a single-issue perspective – the sustainable management of the oceans, their resources and marine ecosystems – opened up a world of mathematical structures revealing deep, little understood but manageable, properties and interdependencies between these policies, and between these policies and regulatory frameworks. The research contributed to parallel discussions on Fiji's National Ocean Policy, the first integrated national ocean policy in this country and the Blue Pacific Ocean Report (2021) an integrated assessment by the Pacific Ocean Commissioner.

researchers may contribute to inter- and trans-disciplinarity in different ways and to different extents. In addition, this serves to convey the idea that we do not aim at translating all other disciplines into the terms of one chosen discipline, but rather supporting effective communication and mutual understanding across disciplines (and gradually across knowledge systems). This is to avoid the risk of something being "lost in translation." Instead, the Hub uses different formats (e.g., maps, modelling, theatre scripts) and approaches from different disciplines at the same time, so that different researchers can interact with the format with which they feel more comfortable and their inputs can be reflected in other formats that other researchers prefer.

We have learnt, based on prior research collaborations, that solidarity and friendship are essential elements for transformative transdisciplinary research. Accordingly, we have included in the Code of Practice the principle of "nourishing," to capture

the commitment of researchers to support one another through peer-learning and constructive peer-review, giving equal weight to the Hub's and the individual researchers' needs.

In addition, we have adopted the practice of "Living Aulas". Living Aulas (living classrooms) are a gathering of a wide representation of Hub researchers and project partners to share their "lived experience" and reflect on how the Hub is progressing towards its objectives, supporting inter-disciplinary research, nurturing equitable partnerships, and achieving impact. Living Aulas support: iterative research co-design in response to shifting challenges across regions and countries; ongoing social learning and capacity development across disciplines, drawing on research findings from across the Hub and focusing on "nexus issues" (interlinked and intersectional concerns that involve complexity and trade-offs); and joint assessment by researchers and practitioners of progress towards the Hub's objectives.

We have also learnt that trust, partnerships, relationships take time and rushing in or not giving it time can result in negative and unintended consequences such as increasing the disciplinary divide, missing key partners, and lose strategic focus. The Hub addresses this by having open dialogue with our partners and be clear from the start of what each side considers fair with a view to developing shared understanding of each other's expectations. We then translated this agreed notion of fairness and expectations into our partnership agreements *(see Box 2)*.

3. Working at multiple scales of the Ocean Science-Policy Interface

The connection between ocean science and policy has received particular attention by both our funder and our own practice. GCRF has placed on us monitoring, evaluation and learning (MEL) requirements, which, for instance, allow us to capture not only the intended outcomes of the research programme, but also the emergent opportunities and unexpected learning that is taking place at research and policy domains.

Our collective understanding of the current ocean science-policy disconnects at different scales has informed the creation of the Hub's network of 39 diverse project partners from international to local levels, that have co-defined the policy challenges to which the Hub research will respond. Among these, the Hub and its international partners have identified opportunities for the research to be shared or have policy influence across scales. For instance, the Hub has collaborated with the United Nations Division for Ocean Affairs and the Law of the Sea to share experiences and research findings among researchers and policy makers in the Global South through the UN-Nippon Fellows and Alumni programme. These exchanges have

contributed to both groups better understanding the relevance of ocean research for national practices, as well as for international negotiations. They have also led to joint reflections and new insight on how researchers can contribute to intergovernmental negotiations, and how local research partners can participate or be appropriately represented in international dialogues (such as the World Ocean Week, to which the Hub contributed in 2020) with a view to networking and co-identify opportunities for transformative change across scales.

Our collaboration with the United Nations Division for Ocean Affairs and the Law of the Sea and World Oceans Week also serve as valuable opportunities for Hub researchers to share local insights on the challenges faced by ocean governance with international audiences. We are experimenting with different ways to bring voices from local contexts that are often marginalised from decision making into international ocean governance debates *(see Box 3)*.

We are at an early stage of piloting a transformative approach to oceans governance. Through the steps we have taken, we are in the processes of transforming ourselves. On the basis of what we have learnt so far, we can make the following recommendations to international and national ocean research funding bodies"

1. to put in place special requirements for research that emphasise equitable partnerships among researchers and research partners and identify specific development challenges.

2. to ensure sustained funding for challenge-led interdisciplinary research that strengthens research capacity and fosters innovation and knowledge exchange.

3. to put in place monitoring, evaluation and learning (MEL) requirements, that allow researchers to identify emergent opportunities and unexpected.

ONE OCEAN HUB