Scottish Universities Insight Institute (SUII): ACCELERATING PROGRESS TOWARDS THE UN SUSTAINABLE DEVELOPMENT GOALS

Driving the transition to a resilient and inclusive future: the role of the ocean

Workshop Report

April 2021

Project Partners

Report prepared by
Dr Lucy Greenhill

Programme Team: Dr Chris Leakey (University of St Andrews / MASTS), Prof. Daniela Diz (Heriot Watt University), Dr Lucy Greenhill (Howell Marine Consulting), Dr Estelle Jones (Scottish Government), Prof. Murray Roberts (University of Edinburgh), Dr Ingrid Kelling (Heriot Watt University), Dr Clive Mitchell (NatureScot), Prof. Mike Heath (University of Strathclyde), Prof. Trevor Telfor (University of Stirling), Prof. Selina Stead (University of Stirling), Alex Kinninmonth (RSPB Scotland), Prof. Andrew Brierley (University of St Andrews), Dr Tim Stojanovic (University of St Andrews) and Dr Barbara Berx (Marine Scotland Science).

Table of Contents

Suggested citation: Greenhill, L., Leakey C. and Diz, D. 2021. Driving the transition to a resilient and inclusive future: the role of the ocean and policy coherence. Workshop Report (27th and 28th January January 2021). Scottish Universities Insights Institute, UK.

Executive Summary

Through a programme of activities from January to July 2021, this Scottish Universities Insight Institute (SUII) project seeks to accelerate progress towards the 'Just Transition' for an environmentally sustainable, resilient and equitable economy and society in Scotland, within the framework provided by the UN Sustainable Development Goals (SDGs). The programme aims to:

1. Develop our understanding of interdependencies between marine and cross-cutting policy themes to promote policy coherence, promoting synergies and managing trade-offs.
2. Mobilise the science and policy communities in co-developing knowledge for policy impact, including understanding data and evidence needs for innovation and measuring progress.

This report of Event 1 presents a synthesis of the virtual events held on the 27th and 28th January 2021, on policy coherence in Scotland. Through the themes of 'Climate' (Day 1) and 'Seafood' (Day 2), we identified connections between marine policy and a breadth of policy themes, including the just transition, the circular economy and the green recovery, along with key actions and opportunities to promote synergies and manage trade-offs.

Section 2 sets out the overarching issues and opportunities which emerged across both sessions. Fundamentally, there is a need for more explicit recognition of the **trade-offs** and acknowledgement of **limits to growth** of marine sectors to meaningfully address sustainability. Political will and **government ambition is positive**, with numerous cross-cutting policies and concepts which address social and ecological sustainability, such as the Just Transition and the Circular Economy, and focus is instead needed on the implementation of these approaches, including through integrated planning and management of marine activities. This includes focus on the role of **regional marine planning**, integration with land-based decision-making and ensuring that our **regulatory frameworks** adequately address trade-offs throughout decision-making at different scales. Progress towards local governance including in **Scotland's islands** provide opportunities for innovation in governance approaches based on adaptive capacity and local participation.

Existing frameworks could support coherence, including an **ecosystem-based approach** and the use of **natural capital approaches** to develop a common language around benefits and outcomes. Scotland's **National Performance Framework** (NPF) plays an important overarching role in this regard and provides a mechanism for relating national performance to the SDGs.

We need an **evolution in 'policy culture'** including enhancing the capacity of scientists to engage in policy development as well as develop understanding of scientific processes among policy makers**. Boundary organisations** and knowledge brokers play an important role in science policy integration with capacity to understand and communicate between a range of disciplines and policy areas.

In exploring the **ocean climate nexus** (**section 3**), we discussed the role of the ocean in mitigating and adapting to climate change, including nature-based solutions and 'blue carbon', coastal adaptation and food security, as well as the implications of climate change on the marine environment, businesses and people. There are **winners and losers**, with new possible economic opportunities but also negative implications with potential **inequalities**, including impact on vulnerable communities from climate-related weather extremes, and in accessing new opportunities.

Seafood consumption and production (**section 4**) represents a key **nexus topic** and interacts with a number of SDGs. A number of sustainability challenges are faced, including the current **over-reliance**

on import and export markets. Brexit also exposed the **vulnerability** of the sector to market changes, with significant impact on businesses and the processing capacity collapse in Scotland threatens the viability of the sector. **Changing the seafood sector** is not straightforward and must involve government intervention, collaboration with industry and other stakeholders, consideration of co-management options and market forcing. We need to better understand and change habits in relation to seafood consumption, including moving **consumer choice** towards more **locally caught and sustainable species**, through a combination of government policy and market approaches.

Significant progress is being made in Scotland, and key areas of opportunities are indicated:

a) The on-going development of Scottish Government's **Blue Economy Action Plan** (**BEAP)** is a crucial area of progress. To inform this, logic modelling is being used to consider (and demonstrate) how different policy areas and different interventions contribute to national shared outcomes and policy areas, and where they may contribute to other outcomes.
b) Additionally, if required, **revision of Scotland's National Marine Plan** presents an opportunity to enhance the role of marine planning in understanding and managing synergies and trade-offs, including providing stronger guidance for regional marine planning partnerships.
c) The **Scottish Future Fisheries Management Strategy** presents a critical opportunity for enhancing coherence and addressing synergies in fisheries operations and sustainability, including addressing discards, monitoring, and embracing the ecosystem approach to fisheries and the blue economy approach.
d) The **Just Transition** to net zero is an important and supportive policy context. However, a wider 'just transition' scope may be appropriate, broadening **beyond energy** to the wider transition in the context of trade-offs, including developing sustainable seafood systems. We need to recognise that there are conflicts and the need to support those who might lose in the short-term to adapt.

1 Background

The year of 2021 marks a crucial time for action with 2021-2030 declared as the United Nations Decade of Ocean Science for Sustainable Development and the UN Decade of Ecosystem Restoration, recognising the decline in ocean health and the need for global action. Attention is also building on the twin emergencies of climate change and biodiversity loss, with focus on the UN Framework Convention on Climate Change COP 26 in Glasgow and the Convention on Biological Diversity COP 15 in Kunming, along with leaving the European Union and 'building back better' in our recovery from the COVID-19 pandemic.

Through a programme of activities from January to July 2021, this project seeks to accelerate progress towards the 'Just Transition' for an environmentally sustainable, resilient and equitable economy and society in Scotland, within the framework provided by the UN Sustainable Development Goals (SDGs). The SDGs offers a vision of a fairer, more prosperous, peaceful and sustainable world in which no one is left behind, as it strives for a world that is just, rights-based, equitable and inclusive. The SDGs are truly transformative and interlinked, calling for new approaches and combinations in the ways policies, programmes, partnerships and investments pull together to achieve the common goals.

The SDGs are indivisible, and there remains a task to understand interdependencies, synergies and trade-offs in implementing them at national level. This includes fully recognising and acting upon the role of SDG 14: *Conservation and sustainable use of the ocean and seas* in achieving several inter-dependent SDG targets, in order to better consider the ocean in policy and decision-making. This requires cross-fertilisation of knowledge across academia, government and civil society to advance our understanding of shared goals, areas of synergy and trade-offs, and develop the co-operation needed to address them.

This SUII Project aims are to:

1. Develop our understanding of interdependencies between marine and cross-cutting policy themes to promote policy coherence, promoting synergies and managing trade-offs
2. Mobilise the science and policy communities in co-developing knowledge for policy impact, including understanding data and evidence needs for innovation and measuring progress.

To support this process, Event 1 enabled interaction between our science and policy communities in Scotland, bringing focus to the ocean and its critical role across a breadth of policy and social, environmental and economic ambitions. Building on this, a further online workshop (Event 2), to be held on the 15th June 2021, will seek to develop the knowledge and capacity to accelerate SDG implementation.

The SUII project is being led by Prof Daniela Diz (Heriot-Watt University / Lyell Centre), Dr Chris Leakey (University of St Andrews) and Dr Lucy Greenhill (HMC), supported by a Project Team from Marine Scotland Science, Scottish Government (International Development), NatureScot, University of Edinburgh, University of St Andrews, RSPB and the University of Stirling.

1.1 Workshop description

By supporting interaction between our science and policy communities, Event 1 brought focus to the ocean and the interactions with marine and non-marine policy, in the context of the SDGs. Focussing

on the themes of 'Climate' (Day 1) and 'Seafood' (Day 2), we identified connections between the marine environment, maritime sectors and the breadth of ecosystem services provided by the ocean, to a wide range of SDGs and policy areas, including energy, production and consumption, natural capital, resource use and the circular economy, supply chain transparency, employment and nutritional health.

The workshop was designed in line with the Policy Coherence for Sustainable Development (PCSD) concept which aims to ensure that different parts of government - or society more broadly - work together to identify common goals while ensuring one area of work does not undermine that of another. Positive steps have been taken to enhance PCSD in Scotland, including improving Scotland's National Performance Framework (NPF) which presents a national vision for achieving social outcomes, including the SDGs.

The programme for Event 1 is shown below:

<table>
<tr><th colspan="2">EVENT 1 – PROGRAMME OUTLINE</th></tr>
<tr><th>DAY 1: OCEANS AND CLIMATE
27th January 2021, 09:30-13:30</th><th>DAY 2: SEAFOOD
28th January 2021, 13:00-17:00</th></tr>
<tr><td colspan="2">Introduction to the Project and Event 1 – Prof Dani Diz and Dr Chris Leakey</td></tr>
<tr><td colspan="2">Keynote 1: Annabel Turpie, Director, Marine Scotland – "Approach to the SDGs in Scotland and the role of marine science"</td></tr>
<tr><td>Keynote 2: Professor Martin Visbeck, GEOMAR Helmholtz Centre for Ocean Research - "Oceans, climate and the SDGs"</td><td>Keynote 2: Dr Jake Rice, Chief Scientist Emeritus, Department of Fisheries and Oceans Canada - "Seafood and Society – A Sustainable Future?"</td></tr>
<tr><td colspan="2">Approaching Policy Coherence in Scotland: Dr Lucy Greenhill, Howell Marine Consulting, with Dr Estellle Jones, Deputy Team Lead, International Development, Scottish Government</td></tr>
<tr><th>UNDERSTANDING THE OCEAN CLIMATE NEXUS
(Facilitated breakout sessions)</th><th>SEAFOOD & THE SDGs
(Facilitated breakout sessions)</th></tr>
<tr><td>Session 1. What are the interlinkages between ocean and climate at different scales (local, national, international)?
Exploring topics such as mitigation, adaptation, resilience and ecosystem services.</td><td>Session 1. How does seafood intersect with SDG targets and relevant policy areas at different scales (local, national and international)?
Exploring topics such as production and consumption, trade & supply chains, skills and rural economies, nutrition and implications of/for climate.</td></tr>
<tr><td>Session 2. What are the synergies and trade-offs in ocean and climate policy?
Considering key and supporting policy areas, links to biodiversity and the Just Transition, implications of/for Green/Blue Recovery and EU Exit.</td><td>Session 2. What are the synergies and trade-offs in achieving sustainable seafood production and consumption and the SDGs?
Considering key and supporting policy areas, links to biodiversity and the Just Transition, and implications of/for Green/Blue Recovery and EU Exit.</td></tr>
<tr><td>Session 3. What action is needed to address the synergies / trade-offs at the ocean-climate nexus?
Develop ideas and actions to improve coherence and synergy and address challenges to achieving integration, identify mechanisms for progress and consider international dimensions.</td><td>Session 3. What action is needed to address the synergies / trade-offs in sustainable seafood production and consumption and wider SDGs?
Develop ideas and actions to improve coherence and synergy and address challenges to achieving integration, identify mechanisms for progress and consider international dimensions.</td></tr>
</table>

The workshops were attended by a wide range of academics from across Scottish universities, Scottish Government including Marine Scotland Science as well as other relevant departments across government, Crown Estate Scotland, Nature Scot, the Centre for Ecology and Hydrology, Fisheries Innovation Scotland and ENGOs including RSPB, Marine Conservation Society and Scottish Wildlife Trust.

Members of the project team supported facilitation of the online sessions, including Dr Estelle Jones (Scottish Government), Dr Ingrid Kelling (Heriot-Watt University), Dr Clive Mitchell (NatureScot), Prof Murray Roberts (University of Edinburgh). We are also grateful to the Early Career Researchers who volunteered to help in the interactive sessions: Danielle de Jonge, Valentina Da Costa and Deborah Shinoda (Heriot-Watt University), Tom Grove, Kelsey Barnhill and Alyssa Stoller (University of Edinburgh), Kristin Burmeister (Scottish Association for Marine Science), and Hannah-Ladd Jones (MASTS) for technical support.

2 Addressing policy coherence in Scotland

This section summarises the overall observations and considerations for approaching policy coherence in Scotland emerging from online workshops held on the 27th and 28th January 2021, across both the Seafood and Climate sessions.

2.1 Getting the policy right

There needs to be recognition of **trade-offs** at the political level and acknowledgement of limits to growth of marine sectors to address sustainability. Government policy could more clearly acknowledge the challenges of achieving this, and that there will be **winners and losers**. For example, in addressing the Blue Economy, we need to consider how this approach will move us away from the incompatible growth paradigm (as set out in the Dasgupta Review[1]).

Leadership is essential to promote coherence and support transition to sustainability in Scotland, and this must be **realistic and honest** about long-term ambitions and the difficult decisions that need to be made. Understanding the logic behind these decisions, as well as how alternatives are considered should provide transparency and help build trust across stakeholders. Transparency and leadership could send a strong signal that drives timely business and investment in innovation and adaptation as necessary.

Political will and **government ambition is positive,** with cross-cutting policies addressing social and ecological sustainability, such as the well-being economy and the just transition, but **implementation is slow**. Scotland has sufficient policies, action plans and legal frameworks, and there is a need to **join up and streamline** approaches rather than create new mechanisms, and understand **barriers** where they exist.

Government plays an important role in creating **incentives to change**, in order to maximise synergies and minimise trade-offs, supported by meaningful engagement. Proactive, **solutions-oriented dialogue** is needed in relation to trade-offs through **collaboration** with industry, NGOs, civil society

[1] "The Economics of Biodiversity: The Dasgupta Review" https://www.gov.uk/government/collections/the-economics-of-biodiversity-the-dasgupta-review

and others. **Inclusive growth** requires inclusion from policy level to management and ensuring that benefits and gains are shared.

Post-Brexit, there is a rare opportunity for change to the fundamental governance (constitutional) systems, to reflect on what is not working, form a new vision and develop new approaches. **Internationally**, new trade policy and agreements need to consider fisheries, environment, and climate issues, requiring best practices from industries and driving new standards. There is opportunity for a proactive approach to **sustainable trade and cross-border co-operation** post-Brexit.

2.1.1 Implementation

A **whole-of-government** approach is needed to promote integration and coherence across multiple departments. Institutional structures (within government) can limit understanding and fostering of synergies, due to 'silos' as well as short-term perspectives. There also needs to be better linking of SDGs to domestic policy, which could be supported by nominating **SDG Champions** within government.

There is a need to ensure greater awareness and presence of **ocean policy in non-marine departments** of government more broadly, and vice versa. Developing evidence-based policies require **cross-ministerial engagement and coordination** and key cross-ministry groups, such as the **Just Transition Commission**[2] and the Ministerial Working group on Policy Coherence for Sustainable Development, could play a stronger role. **Structural changes** already underway within Scottish Government can support coherence, such as introducing 'Portfolios' – areas of interest – which can bridge different departments, but more could be done.

Using agreed frameworks and approaches to coherence in policy development would support coherence, for example **an ecosystem-based approach** to sectoral and business policy/strategy work could develop synergies with nature/conservation policies, and the use of **natural capital approaches** to develop a common currency / language around benefits and outcomes. Scotland's **National Performance Framework** (NPF) plays an important overarching role particularly as it steers national progress across all policy areas and relates national performance to the SDGs.

There is a key opportunity in the development of Scotland's new **Blue Economy Action Plan** (**BEAP)**, where **logic modelling** is being used to consider (and demonstrate) how different policy areas and different interventions may contribute to national shared outcomes and policy areas, and where they may contribute to other outcomes. Laying bare the complexities and multiple connections should help achieve **mutual understanding** across stakeholder interests as well as a way to measure progress towards shared outcomes and in managing policy interactions, positive and negative. Clarity is needed around how growth supported by the BEAP addresses and balances social, environmental and economic goals on different timescales. The NPF can support focus on attaining broader objectives and **shared outcomes**, rather than economic growth only, but the importance of business activity in delivering these outcomes is noted.

There are **funding challenges** and implementing policy across multiple themes means there may be competition between areas – how is public spending prioritised? **Areas of synergy can be underfunded** if there is not clarity on the roles of linked policy areas and limited funding constrains agencies in strategic, long-term thinking and influence.

[2] https://www.gov.scot/groups/just-transition-commission/

2.1.2 Science / policy integration

The **science / policy interface** is crucial in developing our ability to address policy coherence. For **evidence-based decision-making** we need a timely flow of scientific evidence to inform policy development and implementation at multiple tiers of governance (international, national, regional/local). A consistent **long-term evidence development framework** is needed which could be reactive to short term requirements of policy makers, but also develop sound science over longer timeframes.

The fundamentally different worlds of scientists and policy makers makes communication and interaction between them difficult. Scientists can better tailor their contribution when they have a better understanding of policy development, to ensure they are **equipped to cross the science-policy-practice** interface. Addressing this interface is supported in Scotland by research-pooling initiatives to support policy including the Marine Alliance for Science and Technology in Scotland (MASTS)[3] and SAGES[4]. This could be supported by further **training** of students and early career researchers to embed **science translation** into policy and practice briefings, supporting science communication skills including collaboration, outreach and education. The recent growth in opportunities for early career researchers are welcomed, but there would also be merit in **secondment opportunities** for more senior scientists to play an active role in policy development and implementation. Scientists within government should be facilitating **knowledge transfer** from non-government scientists. From the policy makers side, policy experts could be supported in gaining greater **understanding of the scientific process** and emerging research.

Fundamentally, there is a need for **evolution in 'policy culture'** – how we develop and implement policy including relationships with science and links across **diverse disciplines**, and to move away from 'linear thinking' of science developed separately and passed into policy to a more collaborative approach to understanding complex problems.

There is an important role for **knowledge brokers** and **boundary organisations** in providing a recognised and informed interface for developing scientific advice for policy, with capacity to understand and communicate between a range of disciplines and policy areas. Such 'think-tanks' and workshops like these, in line with the objectives of SUII, can enable the deep-thinking that can inform policy culture and more effective **science - policy integration**.

2.2 Economics and the market

Policy can provide strong levers, however, we must also consider **economics and market-led** drivers, including in relation to aspects of well-being economy that can support a sustainable transition. We need to create new markets to **protect the social values** we associate with some ocean features while allowing the **private sector to benefit and thrive**. There is a need to re-think application of economic models – how we think, act and measure success as set out in the Dasgupta review.

There is an **over-reliance on economic metrics** in valuing the ocean, e.g. "Scotland's Marine Economic Statistics 2018" suggest marine sectors are under 3% of Scotland's GDP, ignoring natural capital benefits. We need to shift to more qualitative targets and consider wider social values and wellbeing

[3] https://www.masts.ac.uk/
[4] https://www.sages.ac.uk/

and social outcomes, by measuring success through social and natural capital. This may include integrating **marine natural capital assessment** under the National Performance Framework, as it is for terrestrial natural capital with the Natural Capital Asset Index, if it can be sufficiently robust and integrated with policy development. Marine economic assessments should overlay economic value with a **sustainability index**.

Some banks are now supporting natural capital approaches within businesses. Other blue/nature-based investment include Blue Impact Fund - Finance Earth[5], the Scottish Marine Environmental Enhancement Fund (SMEEF)[6] and the ScottishPower Foundation Marine Biodiversity Fund[7]. Other initiatives include the South West Partnership for Environmental and Economic Prosperity (SWEEP)[8] which includes work on natural-capital-led growth, new markets for natural capital and social benefits/resilience from nature. In understanding the value of the ocean in providing benefits, relevant reports include the Dynamic Coast[9] project which demonstrated that Scotland's beaches and salt marshes protect £13 billion of coastal buildings and infrastructure (compared to £5 billion protected by engineered sea walls). There is potential for **private-public cooperation** for wellbeing outcomes (e.g. community benefit clauses) and there will be **new economic opportunities** arising.

2.3 Implementation

Coherence at the policy level requires implementation through **integrated planning and management** tools. This includes effective and integrated MPA management and **marine planning** with meaningful **integration of land-based** strategy and decision-making. To implement policy and address interactions, **regulatory frameworks** need to adequately address the trade-offs, for example the ocean health implications of net zero policy, throughout decision-making at different scales.

2.3.1 Multi-scale governance and local approaches

Governance and management at sub-national scales is relevant for understanding and managing these issues, including **Regional Marine Planning** nested within national processes. There is extensive policy emphasis on devolution within Scotland, and opportunities to develop **bottom-up, place-based approaches** to decision-making. **Community empowerment** is central in government policy and approaches such as regional marine planning should be a key part of delivering the BEAP, including understanding synergies and trade-offs.

We need to evaluate whether **devolution of decision-making** to local levels is working, through Scottish legislation that includes the Islands Act 2018, Planning Act 2019, Community Empowerment Act 2015 and the Marine Act 2010. Is this leading to more **democratised marine governance** and can it be improved? There are some examples of co-management of MPAs or coastal areas with communities, and in the initial wave of MPA designations there was an opportunity for proposals from communities. However, there is not a clear or consistent model for ongoing community participation or input into marine conservation and management.

[5] https://finance.earth/fund/blue-impact-fund/
[6] https://www.nature.scot/funding-and-projects/scottish-marine-environmental-enhancement-fund-smeef
[7] https://www.scottishpower.com/pages/scottishpower_foundation_marine_biodiversity_fund.aspx
[8] https://sweep.ac.uk/about-us/
[9] http://www.dynamiccoast.com/

Scotland's **islands** are important in more readily understanding the role of 'marine' across society given the close interactions with the marine area and vulnerability to impacts, including the impacts of climate change. They potentially also provide an appropriate scale of governance for innovation in addressing coherence, through strong engagement of local communities and inclusion of **local knowledge**. Implementation of the **National Islands Plan**[10] is enhancing island-scale governance in Scotland and could support innovative approaches for understanding interlinkages between different policy outcomes at island scale.

Adaptive approaches and a **culture of experimenting** is needed to respond to changing context, including within central government, supported by local scale planning and management, such as in islands or at regional scale in marine planning partnerships.

2.3.2 Participation and engagement

We need more effective, inclusive, balanced and equitable stakeholder and public engagement through **participatory processes** to incorporate values in decision-making. Ensuring the effectiveness of participation is complex: are **individual values** relevant and useful, and how do these relate to **collective societal values** for the long-term? Engagement needs to be improved (through governance as in 2.3.1) including through **ocean literacy and marine citizenship**.

However, effective stakeholder engagement and participatory processes require significant resources. To support engagement, we could consider expanding the **use of technology** for literacy and engagement, and provide financial support for small business and community engagement in public decision making. Existing guidance is relevant such as Scottish Government Guidance for socioeconomic assessment which aims to understand impacts on communities and include all voices. Marine planning should play an important role in community engagement.

We note **complexities on participation, inclusion and representation** in ensuring that policy decisions are based on the best information and there are significant **resource implications** of meaningful stakeholder engagement and community perceptions to ensure **inclusion and contribution**. Focus on **achieving consensus** is often time consuming and often unrealistic. Sometimes decisions are needed rapidly, and it may not be possible to please everyone: **leadership** plays a key role in this regard.

2.3.3 The role of marine planning

Marine planning should provide a key process for identifying synergies and steering compatibility while addressing trade-offs – from national to local levels. In theory, it is a space for **setting visions, balancing trade-offs and optimising synergies** and implementing regional marine planning should be a key focus. To contribute effectively, it needs to be underpinned and driven by an ecosystem approach which considers short and long-term social benefits, not just spatial planning. Regional marine planning could support, for example, management of fisheries and renewables, steering compatibility and synergies while managing trade-offs and transitions on defined timescales.

However, marine planning is underdeveloped, often narrowly focussed on maintaining the status quo and perceived as not yet meeting its potential as a major enabler of positive change. There is a need to examine the role and procedures of the marine planning system and whether it is fit-for-purpose:

[10] https://www.gov.scot/publications/national-plan-scotlands-islands/

a governance system that should set long term vision, balance trade-offs and optimise synergies and just transitions.

The potential **revision of Scotland's National Marine Plan** presents an opportunity to steer and enhance the role of marine planning in understanding and managing synergies and trade-offs. There also needs to be stronger **guidance** for regional marine planning partnerships to promote coherence across policy objectives, including between national and regional levels.

2.4 The Science We Need

Understanding trade-offs and identifying action requires **agreeing what is at stake and what is desirable**. Fundamental requirements for ocean health need to be established in relation to resilience and biodiversity[11], across the range of marine sectors, related to a natural capital approach.

Understanding cumulative effects is fundamental to understanding trade-offs in the context of environmental implications. **Systems approaches** are essential to understand the different pressures on the marine environment, ecosystem resilience, carrying capacity and tipping points, in order to fully understand synergies and trade-offs. An **ecosystem approach** is needed but must translate into to policy and practice.

We need to better understand spatial distribution of **blue carbon habitats**, and how their functions vary under different conditions including deeper understanding of the fate of sequestered carbon (short vs. long-term). This will inform the **value** we should place on them for different functions/services, and the implications of damage to blue carbon habitats. Funding of blue carbon stock enhancement is a significant challenge, with the temporal and spatial scales necessary for meaningful difference being considerable.

There is a need for greater applied role for **social science**, not just a focus on natural science and technology. **Social science and humanities** including art can play a role in addressing the science / policy divide, by challenging assumptions and forcing us to see our work through different lenses. Social science skills can support stakeholder engagement and addressing social licence to support of positive change, considering visions for future use of the sea and balanced decision-making, but there is a lack of funding.

We need to fund and emphasise **social research** to support policy development and implementation of solutions (e.g. the New Zealand approach to tourism[12] which shifted perception of the implication of policies for well-being, driving optimism for people-centred approaches). **Interdisciplinarity** remains a challenge and there needs to be better support for active collaboration as well as the development of '**generalist'** skillsets that straddle and help connect different fields of expertise. We should support interdisciplinary research and support the role of the humanities, including social practice, arts, and engagement, working alongside natural and technical sciences to address complex policy such as the Just Transition. Cross-institutional and disciplinary **partnerships and collaboration** could be supported through partnering with communities/society (e.g. Scotland's Coastal

[11] e.g. P. Tett work showing importance of redundancy at each trophic level for resilience, and transfer of energy between trophic levels as an indicator of health.
[12] https://www.mbie.govt.nz/immigration-and-tourism/tourism/tourism-recovery/tourism-futures-taskforce/

Communities Network[13] groups engaging with science and policy development / implementation), aligning efforts and funds across organisations/sectors.

Science is critical in **measuring progress,** noting the importance of **qualitative monitoring indicators** alongside quantitative ones. There are **resource challenges** and the cost of some marine research, monitoring and surveillance is inhibitive to provision of the best possible information for management. This could be in part supported through the use of **industry data** to support management of marine resources and activities. The delivery of science can be affected by competition between **government scientific bodies** (e.g. Marine Scotland Science and Cefas) with the academic sector for research funds or the provision of advice for policy or management.

[13] https://www.communitiesforseas.scot/

3 Oceans and climate

This section summarises the outputs of the oceans and climate session held on 27th January 2021.

3.1 Interlinkages - the relationship between the ocean and climate

The ocean plays an important role in **mitigating** climate change by: absorbing and circulating heat; buffering climate and weather impacts by subduction of surface water; absorbing CO_2 (ocean acidification consequences notwithstanding) and providing nature-based solutions (Blue Carbon and the role of marine ecosystems in carbon storage and climate regulation, including phytoplankton and the 'biological pump' of nature, e.g. large mesopelagic fish populations). It is important to protect living but also buried carbon, for example studies show dredging can release carbon back to atmosphere.

It also supports **adapting** to climate change by: providing options (seafood) for food security and nutrition; coastal adaptation and natural shoreline protection; and marine ecosystems by their nature are adaptable based on dynamic, biodiverse systems (e.g. larval fecundity & transport systems) which are resilient to stressors. The ocean also has an important role in our choices in **energy generation and consumption**, including transportation of goods and services around the globe, as well as resources for marine renewable energy capture.

Climate change has **implications** for the marine environment, businesses and people. There will be fundamental and complex changes to ecosystems, including: ocean circulation changes; regional cooling in Europe; ocean acidification and the implications of warmer temperatures and higher acidity on marine organisms; effects on primary production and the composition and distribution of plankton communities with consequent effects on foodwebs, including fish and seabirds; deoxygenation linked to sea temperature and nutrient loss from land; changes in habitat and species distribution & thermal stress on species if unable to change distribution; change in nutrient concentration / distribution / cycles; changes to the 'biological pump' of carbon sequestration/cycling.

Climate change pressures can **reduce natural resilience** to other pressures (particularly at the coast), e.g. to underwater noise, overexploitation, food-web disruptions. Even activities to address climate change, including windfarm construction, have their own environmental footprint that must be managed. Extreme weather events can also damage seabed habitats, some of which are slow to recover. Sea level rise, storm surges and coastal change is already putting at risk businesses, homes and infrastructure, with increased unpredictable/extreme weather potentially affecting the safety of marine industry personnel. Health and well-being of coastal communities can also be negatively affected.

Changing ecosystems may provide **new economic opportunities** (such as different aquaculture practices) and affect distribution of fish populations in ways which may create **winners and losers**, for both the fish and the fishers. New opportunities may help lift many coastal communities out of structural, economic and social deprivation and associated health and well-being issues. However, there is potential **inequality** in negative impacts, including impact on vulnerable communities from climate-related weather extremes, and in the accessibility of new opportunities.

3.1.1 Synergies

Clear synergies (where action in one area can support progress in another and / or where progress can be achieved in multiple areas simultaneously) include:

- **Nature-based solutions** for mitigation and adaptation, including blue carbon and incorporating climate refugia in MPAs, noting that focus on Blue Carbon shouldn't overshadow solutions which could deliver results on the shorter timescales necessary. Biodiversity enhancement and restoration of inland habitats could play a stronger role due to the downstream consequences for coastal waters.
- **Renewable energy generation** and opportunities for marine renewables, offshore wind and hydrogen, as well as land-based sources, energy storage solutions and distribution networks.
- **Decommissioning** is relevant, as oil rig infrastructure could be important as climate refuges for some species which should be a consideration in decommissioning policy. Rigs may be left in situ for other uses such as for carbon capture and storage (CCS) or hydrogen production, although there are also trade-offs to resolve (see below).
- **Exclusion of fishing** (some gear types) around energy infrastructure can create de facto stock regeneration/nursery ground. These can be supported / enhanced by co-ordinating planning of offshore wind with fisheries management and supporting science, also recognising that not all fishing is incompatible with energy production.
- **Transport systems** (including maritime) and focussing on decarbonisation, efficiencies and shared facilities, including future storage facilities for hydrogen fuel. Cleaner fuels in maritime sector should be pursued, including quality of bunker fuels and engine improvements.
- **A natural capital** approach is key in understanding synergies and trade-offs.
- **Green finance** can also support paying for protection and enhancement of marine environment.

Other potential synergies which require a clear policy direction and implementation strategies to ensure positive outcomes (beyond climate or less clear relationship) include:

- **Skills and employment** arising from marine activities such as decommissioning and CCS as well as renewables. Climate action under the blue economy could bring employment and skills opportunities including to coastal communities.
- **The green recovery** could include decentralised infrastructure for distributed work forces which could build resilience in coastal communities while also improving quality of life (digital / internet access in remote communities is part of this).
- **Social justice and social welfare, including health and well-being** – addressing the enhanced climate vulnerabilities of some minority groups and marginalised communities.
- **Education** – embedding more comprehensive ocean and climate literacy outcomes in the curriculum
- **Market-led incentives** and **trade** policy have a long-history of driving patterns of over-consumption, excessive energy use and waste, but could equally be leveraged for the opposite outcomes.

- **Multiple use of marine space (co-location)** – such as aquaculture & wind farms, also noting potential for restoration (e.g. native oyster reefs) around sectoral infrastructure. The outputs of the MUSES project are relevant here[14].
- **Marine tourism** is currently limited by lack of institutional or governance structure (entirely market-based). There is untapped potential for ecosystem services and socio-economic benefits that market-led levers do not take full advantage of. In tourism, there should be a focus on low-carbon infrastructure.
- **Community empowerment** – marine policy supporting democratizing and devolving decision-making, potentially achieving social goals and promoting stewardship.
- **Community benefit policies** from marine developments in supporting social objectives (e.g. Scotland's sustainable community fund)
- **Protected areas and conservation** for climate adaptation and mitigation based on protection of blue carbon habitats (but need to get the management right and be able to adapt with changing climate)

3.1.2 Trade-offs

Areas where action in one area could conflict with progress in another include:

Blue Carbon:

- There are **biosecurity risks** associated with blue carbon stock enhancement, for example oyster & seagrass restoration.
- Carbon sequestration may cause **hypoxia** in some areas – there may be risks associated with high reliance on sequestration as a climate solution
- Focus on protection of blue carbon may **exclude access** to other benefits/ecosystem services from those habitats
- Implementation of Blue Carbon is **slow** and should not be a substitute for other measures that can be implemented more quickly.

Renewable energy and decarbonisation

- There are consequences of **net zero** and trade-offs with other policy areas, including the potential for negative impacts of **offshore wind energy on the environment** where these cannot be mitigated, as well as **competition** with other marine users, particularly **fishing**. There may be increased demand for minerals for some renewable devices and other low-carbon technologies, including a surge in demand for **deep seabed mining**.
- In **decarbonising**, encouraging seafood as low-carbon protein (relative to beef, pork, etc) could lead to more overexploitation and marine biodiversity impacts.
- **Climate/carbon inefficiency** of tourism (and other environmental and social impacts, e.g. North Coast 500 example) is a significant challenge (are Virtual Reality solutions feasible for ocean literacy outcomes without the travel and wildlife disturbance impacts?)
- **Carbon offsetting** – intended to enhance synergies but significant risk of trade-off
- **Target-based policy** could lead us to manage carbon at the expense of other co-benefits of nature-based solutions. For instance, harvest of kelp with end uses that lock away its embodied carbon or delay its cycling could contribute to annual off-take of carbon, but could

[14] https://muses-project.com/

leading to increased coastal erosion and the loss of many other benefits from nature. If the marine/coastal system is complex and interconnected, can it be adequately described by simple measures/targets?

3.2 Approaching coherence for oceans / climate

3.2.1 Getting the policy right

The urgency of the climate problem means that there is **no time** to fully understand the trade-offs and there is a **risk of inaction** while understanding is developed. We need to act urgently, given the imperative nature of climate change / biodiversity concerns and work with uncertainty in our understanding of the interlinkages as well as the implications of interventions. An **adaptive approach** is required to enable rapid decision-making and adjusting approaches over time.

In general, **climate change policy** has a limited consideration of marine, particularly on the mitigation side (i.e. Blue Carbon) and the need for marine industries to adapt. There is a need to better integrate of the role of the oceans in climate in climate change policy. However, it is also important that existing policy is adapted as necessary and **not abandoned** in light of climate policy and action.

Long-term thinking is needed across governance processes, and governance at different scales (national, local and international - particularly as climate / oceans issues are highly transboundary and balancing global benefits with local disruption (economic, social or environmental) requires multiple scales of governance.

In terms of the Just Transition, impacts on people from transition to net zero need to be handled very carefully while ensuring urgency of action. Will we see a shift from traditional industries to **high-tech marine industries**? This raises conflicts and trade-offs, but which could be managed and actively guided through a 'just transition'. This requires funding the Just Transition - financial support for maritime industries to timely transition to net zero. In some cases, **compensation** mechanisms may be relevant, noting that there are associated costs, ethics and logistical issues. For instance, financial support for sectors such as oil and gas may be viewed negatively. The 'Just transition' is not just about numbers of jobs but also the quality of those jobs and outcomes for equality, social justice and well-being. The focus of the current Just Transition policy is on giving job security to oil and gas workers moving to other employment, while coastal communities need more immediate support to tackle deprivation and poor well-being (in this case '**Green Recovery'** policy should also provide an accelerator).

3.2.2 Implementation

3.2.2.1 Adaptive management

Some existing management goals and tools may be **too rigid** to adapt to climate change scenarios as they emerge. Some of our governance tools (regulations and industry standards) and foundational legislation are outdated. Management approaches are required which are adaptable/responsive, including management of MPAs given changes in species and habitat distribution. Policy also needs to be able to accommodate our evolving understanding of what is 'acceptable' e.g. the impacts of renewables on environment and renewables, for the longer-term good, which may not fit with current conservation legislation. For example, in relation to offshore wind, is there a need to re-evaluate what are 'overriding issues of public interest' (IROPI) in light of climate change? Similarly, how do we

reconcile conflict between (a) the desire for preservation of the heritage/traditional values of an extractive or impactful practice, and (b) measures to support environmentally sustainable outcomes?

3.2.2.2 Participation / Engagement

Engaging people can be difficult, even where risk is high or predictions are relatively clear (such as coastal change), or where there is unwillingness to accept the human cause of climate change ('heads-in-sand'), which also contributes to a **risk of inaction**. Dealing with 'fake science' also remains a huge challenge for climate action. Better **communication** is needed to convey the need for healthy oceans for ecosystem services (including climate mitigation and adaptation) to the public, stakeholders and industry. We need to expand **ocean and climate literacy** efforts to help people understand social and well-being value of a just transition and ocean health, and the scale of the challenge. **Education** should be used to communicate and develop understanding of the role of the ocean in climate change, to encourage shifting perceptions and **promote behaviour change**. The marine and climate content of **education** curriculum is poor and there needs to be more emphasis on marine and climate science in primary and secondary school curriculums.

Engaging **young people** in tackling climate change (e.g. workshops, conferences, educational spaces[15]) should be a priority **to give 'voice' and due influence to future generations** who will inherit the consequences of our choices and actions[16]. Securing their involvement will bring a long-term view to policy making and ensure the next generation of environmental professionals. **Citizen science** and **community engagement** (all ages) in projects can be very effective for social engagement, inspiration, promotion (such as Sea Search), in turn, changing behaviours and support for environmental enhancement. Can we make better use of existing platforms to promote citizen science projects (such as through British Science Week)? **Outdoor learning** for sustainable development is key and **marine tourism** could be similarly developed for educational purposes. There is ambition from many sectors and disciplines wanting to connect with schools, communities and families; how can we connect this up for **Learning for Sustainability** (LfS) rather than lots of disjointed programmes? How we work across the Scottish Government Directorates to coordinate/collaborate around SDGs and LfS?

3.3 Relevant policy areas and opportunities

Relevant policy areas include:

- **Climate change** policy - Blue Carbon can be included in Nationally Determined Contributions (NDCs), and management to reduce impacts/loss having a relationship with NDC targets.
- Relevance of the **circular economy** in reducing consumption and waste at source
- The **Just Transition** is key in supporting societal change and equity.
- New **Future Fisheries Management Strategy**
- **River Basin Management Strategy** (water quality)
- **Community empowerment** and the place principle
- **Ocean literacy** in raising awareness, engagement and behavioural change outcomes

[15] See example from North Sea Commission at https://aberdeenshirecldservice.wordpress.com/2020/10/21/changing-tides-and-making-waves-youth-participation-event/

[16] See Devenport *et al* 2021. *Insights and recommendations for involving young people in decision making for the marine environment*

- **Natural capital** and **Nature-Based Solutions**
- **SG Climate Emergency Skills Action Plan** (published late 2020), noting very little mention of marine-based skills and employment

Specific opportunities exist and could be considered in relation to understanding and promoting policy coherence and the role of marine across policy areas.

- While challenging, the **post-covid context** is also a significant opportunity in making coastal/remote communities more feasible places for people to live and work, building economic and social stability and resilience through more distributed work forces. Can we decentralise critical infrastructure / make places more self-reliant and in the process boost health, well-being and connection with nature? (Noting the associated risks of increased property prices or attrition of the special qualities of remote areas)
- The **Just Transition** is a crucial and supportive policy context but its' scope could be expanded to managing trade-offs more broadly across transitions to sustainability and the SDGs. This includes broadening **beyond energy** and net zero to the wider transition in the context of trade-offs, including developing sustainable seafood systems. Acknowledging trade-offs and ensuring a just transition requires supporting those who will lose in the short-term to adapt. We need to recognise that there are conflicts (especially in short-term) and that we need to help those that need to adapt including financial support.
- **Scottish Vision for Trade**[17]: trade can lead adaptation to climate change. We currently have a rare opportunity to have influence on the role/contribution of future trade to net zero outcomes and ocean health.
- **Scotland's Future Fisheries Strategy**: Future fisheries management is important and provides an opportunity to consider and address complex interlinkages with climate issues. Investing in emissions reduction from fishing vessels can support a synergy
- **Sector decarbonisation** goals are good but more needs to be considered. In the long-term, is modern fishing compatible with the need for low-C food systems (compared to aquaculture), both in terms of removal of biomass from the sea and the energy consumption of fishing vessels? We may need to see a shift away from wild-caught fisheries to almost entirely **aquaculture-based seafood systems** in order to adequately lower energy demands and loss of marine biomass.
- This leads to an economic and employment **transition**, as well as a cultural conflict (fishing traditions) and there is work to do on framing and planning for social and well-being aspects of this transition. **Science questions** also remain on whether meso-pelagic fishing compromises the 'biological pump' of carbon sequestration and cycling.

[17] https://www.gov.scot/publications/scottish-government-vision-trade/

4 Seafood consumption and production

This section summarises the seafood session held on 28th January 2021.

4.1 Interlinkages

Seafood is made up of consumption and production made up of diverse sectors including wild capture fisheries of various types and scales as well as aquaculture. Seafood represents a **key nexus topic** which interacts with a number of SDGs, including SDG1: No Poverty; SDG 2: Zero Hunger; SDG 3: Good Health and Wellbeing; SDG 8: Decent Employment; SDG 14: Life Below Water and SDG 15: Climate Action, and with implications across policy topics in Scotland and globally.

Positive interactions are clear at a national scale, with seafood production and consumption making an important contribution to Scotland's economy and particularly socio-economic and cultural benefits in rural and remote regions. However, a number of sustainability challenges are faced, including the current **over-reliance on import and export markets**. Most of the fish caught in Scotland is exported and most of the fish consumed in Scotland is imported. Fish are also imported to feed farmed species, while much produce is shipped abroad for processing. Supply chains are therefore inefficient and carbon intensive.

There are wide and complex **international** aspects, including the implications of **trade**, for example incentivising low-income countries to sell to high-income countries can compromise food security and lead to the impoverishment of local communities in producer countries. Much of the Scottish seafood sector also relies on incoming workers from other nations.

It is also a heavily **market-influenced** and Brexit exposed the **vulnerability** of the sector to market changes, with significant impact on businesses and the processing capacity collapse in Scotland threatens the viability of the sector. Global supply chains are also vulnerable (as shown through C-19 pandemic) and there is a need to ensure supply chain resilience.

There are **climate change** implications for seafood and support in adaptation needed, including changing distribution of target species, overall reduction in productivity, new disease, algal blooms and the effects of increased extreme weather and flooding on infrastructure and operations at sea.

Changing and modernising the seafood sector is not straightforward and must involve government intervention, collaboration with industry and other stakeholders, consideration of co-management options and market forcing. We need to understand the current models and **incentivise, educate and support** to make changes at the sector level to address ethical trade, health and ecological challenges. We need to better understand and change habits in relation to seafood consumption, to move **consumer choice** towards more **locally caught and sustainable species**, through a combination of government policy and market forcing.

4.1.1 Synergies

Key positive interactions include:

- **Socio-economic benefits** including employment and good jobs in rural areas which are increased through an expanding seafood sector. Jobs across value chains, including pharmaceuticals, veterinary, food standards and retail, could support a Green Recovery.
- **Health and nutrition** where seafood consumption supports healthier diets, noting that the market currently incentivises less nutritious seafood.

- **Tourism** where focus on locally caught products can create seafood destinations.
- **Environmental goals** which also support the sector, including addressing water quality and coastal pollution which improves shellfish harvesting and growing areas.
- **Circular economy** is relevant in addressing waste reduction and management of energy sources from on-site to refrigeration, processing and transportation.
- **Technological innovation** in e.g. gear (e.g. reduction of bycatch) or underwater noise (e.g. propellors), fuel (reducing carbon footprint) supports wider employment in R&D science and industry
- **Green recovery** including support the use of cleaner fuels and energy sources.
- **Climate change adaptation** policy should support sectors to adapt.
- **Trade rules and standards** including transport to market and which can be more strongly shaped post-Brexit and made more compatible with sustainability.
- **Community empowerment,** particularly in islands, and greater local decision-making can lead to synergies in sector expansion with local benefits.
- **Addressing poverty and education** in society can change consumption patterns and create market drivers for a more sustainable seafood sector.
- **Co-location**, for example aquaculture with offshore wind, could contribute to reducing competition for space with fisheries, as well as potentially positive contribution to fish stocks through *de facto* exclusion of mobile fishing gear and possible nursery areas.

4.1.2 Potential trade-offs

In **expansion** of the seafood sector in Scotland, there are potentially negative interactions:

- Expanding aquaculture production (finfish in particular) is unlikely to be environmentally sustainable under current production practices, creating tension between **biodiversity goals** and goals for sector growth. Designating **MPAs** for conservation and ecosystem protection also creates impacts such as no-take zones on small-scale fisheries.
- Increasing the sustainability of the sector may mean there are losers requiring businesses to adapt or reduce activities. What are the alternatives for diversification in rural and remote areas?
- Impacts of fishing on blue carbon habitats affects **climate change** goals by reducing sequestration potential, and also compromising the multitude of other benefits provided by these habitats, often including as key habitats supporting sustainability of the fishing itself.
- **Waste** is a big challenge in aquaculture and fisheries, including fish farm debris and mortality in aquaculture; energy sources from on-site refrigeration, processing, transportation and food waste along the market chain.
- There is potential for **spatial conflict**, for example between renewables and fisheries, aquaculture / fisheries / conservation.
- **Visual impacts** of aquaculture are a problem, noting that there may be inequalities in this: already wealthy communities tend to oppose development, whereas poorer communities may be swayed by employment opportunities.
- **Tourism** in particular marine tourism/ wildlife tourism where growth is supported but there is potential for incompatibility with aquaculture expansion.

In seeking to make the sector more **sustainable**, other negative implications to manage include:

- There is a trade-off between short-term **economic efficiency** which might support industrial fishing, and the more jobs and wider **social and community benefits** of incentivising small-scale fishing activity.
- There are also potential trade-offs in changing practices (e.g. closed system aquaculture or different target species for fisheries) to address ecological goals but which may be more **energy demanding** and potentially compromise net zero outcomes.
- Care is needed in supporting expansion in seafood production where this may lead to unsustainable fishing, as in the Newfoundland cod stock crash which was partly linked to government funded shoreside processing facilities which increased catch.
- Changing the Scottish seafood sector for sustainability reasons may have unintended **international consequences** including for nations such as Peru and communities in developing countries. Need to consider **ethical standards**: equity and fairness along supply chains.
- Promoting high fish diets and seafood as **low carbon consumption** may lead to overexploitation
- There are also **equity issues** to be considered in consumer access to sustainable seafood where cost and wealth inequalities affect choices.
- **Seafood systems** – there are complex dynamics (often at a global scale) between fisheries and aquaculture which need to be considered in our vision for sustainable seafood systems, e.g. we could seek a reduction in use of primary catch for making aquaculture feed and encourage use of waste from fish processing instead. However, reduction in the size of the domestic wild-caught sector for sustainability could result in growth in unsustainable fisheries practices abroad to meet the demand for aquaculture feed.

4.2 Approaching coherence for seafood

4.2.1 Getting the policy right

A strategic approach is essential to ensure coherence particularly in relation to ecosystem protection (and enhancement) and seafood sector expansion. We need a **vision** of how seafood production should develop, based on possible scenarios, which are realistic and recognise trade-offs. This vision, and the synergies involved, should be implemented through the BEAP, Green Recovery, Future Fisheries Management Strategy (FFMS), next iteration of the NMP regional marine plans and other governance mechanisms. A **sector transition plan** is needed which recognises potentially negative implications, compensating and supporting where possible to sectors and businesses who are at risk. The complex interactions between different seafood sectors need to be considered, for example small-scale vs industrial fisheries (e.g. rights allocation, access, quotas). We also need to incorporate **marine natural capital** into policy planning to understand impacts and inform decision-making, as supported by the BEAP.

We should address **disconnects** between national policy making and what is desirable / feasible at the local level in relation to seafood. **Policy development** could be more **inclusive of local concerns** and communicated more effectively, but there are challenges in achieving balanced and truly representative views. There is also a lack of **cohesion between terrestrial and seafood policy and planning** at the strategic level.

There is often a disconnect between the pace of policy making, science and market-drivers. Greater consideration of the interactions between **policy making and economics** is needed given the role of the market in production and consumption. We need to understand the **economic and social** drivers

of the current model, how these are changing and how these could adapt towards more sustainable practice. Financing is needed to support transition to sustainable operations.

4.2.2 Implementation

Fisheries is not adequately captured by existing cross-sectoral planning and management, making it difficult to understand relative ecosystem effects. Better understanding of the **spatial distribution** of fishing would support integrated planning and management and understanding of cumulative stressors. This also requires appropriate use of **environmental assessment tools** for fisheries, such as Environmental Impact Assessments (EIA) and Strategic Environmental Assessments (SEA), to capture the full range of impacts including those on blue carbon habitats. This should provide a consistent assessment methodology for all sectors.

Regional management / local processes should be more collaborative, including **co-management** arrangements and more active engagement of civil society, business, NGOs and others. **Community engagement** would enable collaboration and co-production, where stakeholders are included and involved in understanding winners and losers. Co-management, and **results-based management**, is critical using learning-based approaches at a relevant scale. Local management needs to be empowered with transfer of power away from the centre, with the challenges in achieving this identified.

Marine planning plays a role in understanding shared space and informing multi-sector management. This includes supporting identifying and managing trade-offs with renewables and linking this use of space to fisheries management, and integrating with terrestrial planning including shoreline facilities, processing and transport of produce. **Regional Inshore Fisheries Groups** (RIFGs) provide opportunity to benefit from local institutions and co-management which can be transparent, responsive and at an appropriate scale. However, RIFGs lack statutory powers or broad involvement of stakeholders. Can we learn from other examples e.g. IFCAs which have statutory powers and more capacity to influence local management (also the SSMO in Shetland)? Learning can be supported by **twinning** of coastal towns in Scotland with coastal towns elsewhere where challenges could be similar in order to build common ground and cultural context/understanding[18].

Transparency is needed in relation to compliance as well as effectiveness of management measures and can be supported through use of accessible indicator dashboards informed by robust monitoring. Accessibility is improving including transparency of aquaculture performance – sea lice etc – in response to public opinion. Increasing transparency and visibility to businesses and end consumers, even where not mandated by government, can enhance the role of consumer-driven sustainability. Transparency must include the supply chain to understand use of materials / products and export.

Effective **monitoring** of fisheries and aquaculture management measures and **well-resourced** management authorities (e.g. SEPA) is a significant challenge. Similarly, **enforcement** also needs to be adequately resourced including focus on import of prohibited products, policies around customs, labelling, integrity, inspections, control, etc. Involvement of citizens in reporting could be enabled, as supported in the **National Islands Plan** and could be expanded to other regions. Support is needed for **data ownership** (beyond accessibility) e.g. an app for fishermen to collect and share bycatch data so they can engage with their own data.

[18] Link to work in the Philippines by Mike Park, CEO of Scottish White Fish Producers Association

Co-existence of multiple industries is feasible and could support synergies, such as aquaculture and renewable energy infrastructure, but there is currently very little industry interest in multi-use/co-location of infrastructure. This needs to be supported through planning and deliberate design, develop appropriate enabling policies, invest in innovation as well as considering insurance issues for multi-use of space around infrastructure.

We need to consider the **Just Transition** in a broader sense than addressing adaptation of the energy sector to meet climate targets, including support for fishermen etc where stocks or biodiversity concerns require a change / reduction in practices. This can be supported by **adaptable vessel licensing** which allows fishers to switch target species when climate change affects stock distribution/availability which make their usual target unviable.

Research is needed to understand the **relative sustainability** of small-scale fisheries and industrial fisheries, including intensity and spatial distribution of activity, to inform sustainable models. Analyses which can represent synergies / trade-offs is important, such as in Norway and Sweden where the GHG emissions associated with different seafoods, relative to their nutritional value, have been calculated and provide important tools for addressing 'win wins'.

4.2.3 Economics / markets

Economics play a key role in informing consumption and production patterns and, given the power of market-led initiatives where regulatory tools are limited, there needs to be a closer link between policy making, markets and consumption. This includes better understanding of supply and demand and disaggregation of markets across the UK to reflect regionalisation and different fishing practices. Within Scotland, there is a need to consider **market implications** across the supply chain in an expanding sector, including the effects on, and interests of, coastal communities associated with production and trade-offs faced in sector growth, for example in changing landscapes.

Changing business models can be supported by financing of sustainable production businesses. Supporting funding of sustainable development more strategically through, for example, **green finance** and **Scotland's National Investment Bank**, or grants under the BEAP. The industry and the private sector play a key role in **creating positive change** in the sector, including Fisheries Innovation Scotland.

4.2.3.1 Consumption patterns

Diversifying the catch is needed to address sustainability issues including species consumed and to reduce food miles. This requires **incentivising local consumption** of seafood including through collaboration with chefs/restaurants, noting that consumption patterns are resistant to change and new approaches are needed. **Retail and marketing** play a role in promoting local provenance and sustainable eating, as well as **media** – mainstream and social – to understand and change perceptions, and **education** at all ages. **Landing obligations** could drive changes in target species but would likely need to be coupled with market-led levers.

However, there are **equity issues** to be considered in **consumer access** to sustainable seafood where cost and wealth inequalities affect choices - sustainable fish can be expensive or is at least perceived to be. There is an opportunity to increase demand and promote different species to consumers by providing pre-made seafood meals for families, as well as **addressing poverty in society** to increase citizen choice and spending power (e.g. social reform in Finland, how did this affect the economy?)

4.2.3.2 Certification / standards

Certification and standards play an important role as market drivers for sustainability. Certification of vessels through the **Responsible Fishing Vessel Standard (RFVS)** enables fishing operations to provide assurance of decent working conditions and operational best practice[19]. This supports market steer on workers' rights and wellbeing, leading to best practice and social norms (and which regulations must respond to).

Food certification needs overhaul to promote sustainability in production and consumption from all perspectives (including climate impact). This should include supply chain transparency and incentives for sustainable production reaching all the way to the fisher/fish-farmer. **Labelling** is important, noting that this a confusing area for consumers as many are marketing schemes. Certification must be easy to communicate / understand. In **changing trade arrangements** post-Brexit (e.g. World Trade Organisation (WTO) rules) provides opportunity to develop certification for international trade, noting potential for divergence with EU.

4.2.4 Capacity Building / Skills and Employment

Skills development and training is required to support expansion of seafood production but there are noted challenges around attracting people to the industry, particularly women and young people. The food production industry (capture, growth, processing, etc) is not an attractive career choice. There are notable differences in the **demographics** of across different sectors (inshore, pelagics, aquaculture, creelers, etc.) with different ages represented. A lack of certainty on fisheries viability limits new entrants to seafood industry (particularly catch sector) due to lack of **perceived job security**. Consideration to whether financial support is required to stabilise the industry during bad periods and maintain job security would be useful, but needs to avoid any risk of perpetuating any overexploitation.

New schemes are needed to attract **young people** and women into seafood industries. New business models and target species can attract new interest - can we learn from approaches taken in agriculture? **Technological innovation** in the sector, including to address sustainability, can promote employment opportunities with skilled and well-paid employment, including wider employment across the value chain, including for example, pharmaceuticals, veterinary, food standards, retail. This requires **investing in people** to support training, including re-skilling, and funding for **communities to help themselves**, such as loan schemes, credit unions, third sector funding, grants.

Achieving 'inclusive' growth in seafood is difficult and requires broadening opportunities and increasing gender diversity, which may be easier in aquaculture (with evidence of this being supported in Scotland). For fisheries, we need to understand and develop the role of women in managerial roles and ownership of fleets. Empowering and **employing women** has wider social benefits, for global context see value of this from Project Drawdown[20].

[19] http://www.seafoodassurances.org/ProgramStandards/RFVS

[20] https://www.resilience.org/stories/2020-02-24/educating-girls-is-more-effective-in-the-climate-emergency-than-many-green-technologies/

4.3 Relevant Policy areas and Opportunities / actions

- The **Blue Economy Action Plan (BEAP)** has a key role in addressing issues related to seafood and the interaction with other policy areas and promoting synergies. Need to consider what the **BEAP** and its' outcomes across sectors look like in reality, including the **Future Fisheries Management Strategy**.
- The **Scottish Future Fisheries Management Strategy** is a critical opportunity for enhanced coherence/synergies in fisheries operations and sustainability by addressing discards, monitoring, and embracing the ecosystem approach to fisheries and the blue economy approach. The UK Fisheries Act includes climate change in relation to fisheries. Review of the Common Fisheries Policy (CFP) is also relevant.
    - This includes **focussing on** regionalisation and seafood production and productivity in the UK/Scotland. Processing jobs and markets are often abroad and a **long-term vision** is required to moderate the boom-and-bust nature of many fisheries and establish processing facilities within Scotland/UK. For example, in Iceland the government took a strategic approach on fisheries that provided more certainty and created in-country processing and jobs. However, there were also losers in small communities and inequalities were amongst the unintended consequences.
    - **Developing incentives** for transformational change in seafood industry for sustainability, nutrition and ethical trade.
    - **Addressing deeper questions on** future seafood systems: should we be continuing wild-catch fishing at all?
    - Consider whether Scottish fisheries could implement a **SWEEP** approach.
    - Explore '**rewilding'** in the sea, potentially linked to unlocking supply chains for native species (such as 'ranching' of shellfish)
- Development of **Scotland's Environment Strategy** and **Scottish Biodiversity Strategy Post-2020** is critical in setting out requirements for environmental protection and enhancement (in natural capital terms)
- Future development of an Aquaculture Sustainability Strategy
- **Circular Economy** and focus on waste
- **Trade Vision** plays a key role
- **Post-Brexit** there is an opportunity to change national standards which can be higher than international standards, where this still addresses WTO rules
- **Scotland's vision as a 'Good Food Nation**' which includes goals for education and outreach and provides an opportunity to influence food systems and consumer behaviour and could be amended to specifically address seafood. Could guidance and standards be adjusted to reflect the need to change eating habits for ecological reasons or adaptation of the seafood sector (diversification for resilience)? Good Food Nation is currently not joined up with Fisheries Management Strategy or Aquaculture Policy – these need to be mutually informing and supporting (possible link also to NHS Dietary Guidelines)
- **Green Recovery**: Aquaculture should be emphasised more strongly through the Green Recovery (post-Covid) in the development of sustainable jobs. Also, the public support of businesses means that there is opportunity for greater public control to steer more sustainable approaches.
- The **European Green Deal** and the notion of externality de-coupling that it embraces could create new values in fisheries operations.

5 Summary

The rich discussions supported through these workshops raised wide-ranging insights into the issues of policy coherence, demonstrating the complexity of the challenge, but also the wealth of knowledge and expertise that exists across Scotland's marine community to support progress. This report is intended to provide a reference to support action, further collaboration and research to advance policy coherence and understanding the role of the ocean across multiple policy goals. In line with the aims of SUII, we aim to support the development of a community of practice, linking academia to the policy and practice, and understanding pathways to impact for research.

The progress towards policy coherence and sustainable development in Scottish Government is evident, with the 'guiding light' of the NPF, steering activities across all Government activities, within the context of the SDGs, as well as on-going development within Scottish Government to better co-ordinate across policy areas in achieving overall aims for society. On the marine side, the action being taken by Scottish Government in development of the Blue Economy Action Plan, initiated as this SUII programme was underway, is highly relevant to pursuing policy coherence and integrating marine policy with broader policy themes including the Just Transition, the circular economy and achieving sustainable economic growth. Ensuring effective engagement and contribution of science to these processes is essential.

To support this, at Event 2 (15th June 2021) we will develop our practical understanding of the data and evidence needed to inform indicators and measure progress, enabling ongoing innovation for policy coherence and implementation of the SDGs. We will consider the principles of the UN Decade of Ocean Science for Sustainable Development include enhancing scientific capacity, bridging the science-policy interface and strengthening international co-operation.