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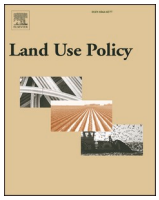

A co-design framework for natural resource policy making: Insights from tree health and fisheries in the United Kingdom

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ABSTRACT

Environmental and land use policy literature asserts the need for more holistic, participatory and co-designed forms of governance for the sustainable management of natural resources. Co-design is also increasingly recognised by government as a useful approach but is often applied with varying degrees of success. The purpose of this paper is to assess recent examples of policy co-design across three UK case studies focused on tree/woodland management and fisheries. The first set out to co-design criteria for 'low impact' fishing with fisheries stakeholders to inform new fisheries policy and management strategies. The second co-designed new policy options with tree/woodland stakeholders to replace existing tree health grants, as part of the UK government's broader Environment Land Management scheme. The third aimed to scope, with stakeholders, the potential for a new social survey of fishers. Despite the different contexts, all projects sought to apply principles of co-design by engaging with stakeholders during the early stages of policy development. A comparative assessment between the three case studies allows us to identify challenges for co-design and to provide recommendations for successfully applying co-design principles through stakeholder-researcher-policy maker partnerships. Challenges include building trust between stakeholders and policymakers, overcoming traditional modes of evidence-based policy making, accessing hard-to-reach groups, getting discussions to move beyond the general to the specific, and recognising that co-design takes time and is resource-intensive. A new co-design framework is presented, setting out five stages for incorporating the principles of co-design in natural resource policy making: scoping, co-design, testing, implementing and evaluation.

1. Introduction

Globally there is recognition of the need to develop and adopt more sustainable policies for land use and natural resource management that seek to mitigate and adapt to climate change, provide opportunities for nature recovery and deliver enhanced ecosystem services. Ecosystems can and do recover when sustainably managed and effective governance can support ecosystem regeneration. However, traditional 'top down' forms of governance can fail to incentivise long-term sustainable behaviours if those affected by the policy or management regime have little say or power in decision-making (Sorrentino et al., 2018; Gaymer et al., 2014). Collaborative solutions, such as co-designing policy with end users or those with a stake in the policy, are recognised as having the potential to support policies that are more responsive to the needs of those affected by the policies, improve compliance with regulation and policy, account for regional and local differences and lead to long-term sustainable behaviours (Jentoft and Chuenpagdee, 2015; Gaymer et al., 2014).

In response to this, policy makers increasingly recognise that land use and natural resource policies need to move towards more inclusive and participatory forms of governance. As a result, there is a growing interest in and application of more holistic, multi-level and interactive governance systems (Turnhout et al., 2010; Kooiman et al., 2008), reflecting Ostrom's (Ostrom, 2010, 2003) research revealing how communal groups of resource users can collaboratively develop and agree rules enabling the sustainable use of natural resources over long time periods. Such approaches adopt participatory methods and principles to engage with stakeholders to co-design policies that are

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innovative, reflect the needs of end users, foster trust between policy makers and stakeholders, include hard-to-reach groups and lead to better policy outcomes and/or compliance with regulations (Blomkamp, 2018). In this paper we define a 'stakeholder' as anyone who has, or perceives they have, a stake in the policy outcome. This could include those with an economic stake in the resource (e.g. commercial fishers, foresters), but also those who gain non-economic benefits (e.g. environmental non-governmental organisations, recreationists, local residents). However, deciding who should participate in the co-design process is crucial, as those with different stakes may have different preferences for how the resource should be managed (Pieraccini and Cardwell, 2016; Mikalsen and Jentoft, 2001). Stakeholder engagement can be undertaken directly between policy makers and stakeholders, or can be facilitated by a third party, such as social scientists, researchers or engagement specialists.

Participatory approaches recognise that no one actor (e.g. policy maker, scientist, stakeholder) is likely to have complete knowledge for the effective management of a socio-ecological system (Gelcich, 2014), and that 'co-design' of policies with end users or stakeholders can lead to more equitable, transparent and cost-effective policy making that enables more sustainable forms of natural resource management (Finkbeiner and Basurto, 2015). As such, co-design (i.e. involving stakeholders in the design of, for instance, incentives, regulations or information provision) has become an important tool for policy makers to engage with stakeholders and wider publics to find solutions to complex problems and to ensure that policies have citizen support (Blomkamp, 2018). Tsouvalis and Little (2019), drawing on Fiorino (1990), assert that there are normative, instrumental and substantive arguments for adopting co-design in policy making. Normative arguments include views that enhanced participation is ethical, democratic, empowering and a right which fosters social justice and equity; instrumental arguments highlight that participation is a better way to achieve desired ends and legitimises decision-making; while substantive arguments indicate that participation leads to more effective policies. However, of course, if co-design is not applied well and appropriately resourced it can be undemocratic, disempowering and inequitable, leading to mistrust, power imbalances and ineffective implementation of policies (Ni She and Harrison, 2021; Cockbill, May and Mitchell, 2019).

Co-design of policy[1] in government is not new; it has been a key strategy within public services such as healthcare and social services since the mid-1990s (Brandsen et al., 2018; Realpe and Wallace, 2010; Boyle et al., 2006). As applied here, co-design often involves service users being involved at different stages of designing a public service such as social care, including involvement through the different stages of planning, design, delivery and audit. Despite the popularity of co-design within public service delivery, participation of stakeholders in the co-design of land use and natural resource policy remains under-developed and ad hoc. However, in the United Kingdom (UK) there are ambitions and early examples of more inclusive forms of governance in land use and natural resource policies, where it is recognised that approaches to governance of these resources needs to be co-developed in partnership with stakeholders and others impacted by the policies. For example, the UK government's 25 Year Environmental Plan (HM Government, 2018) sets out the need for partnership working and the Department for Environment, Food and Rural Affairs' (Defra) Agricultural Transition Plan specifically notes that, "we will be more flexible and will co-design our policies with farmers and other experts" (p. 6). Within the marine space, the UK government's draft Joint Fisheries Statement indicated a need for active engagement of the fishing sector in "co-designing future policy" and management decisions that are made jointly with fisheries stakeholders (Government, 2022). Reflecting this move to more participatory and inclusive forms of governance, Defra established a co-design team within its organisational structure and has also sought to embed co-design into the development of the new Environmental Land Management (ELM) scheme.[2]

While policy makers recognise co-design and stakeholder participation can result in more effective policies, there are also challenges to successful implementation of co-design approaches, and a disconnect between the recommendations for co-design in the literature and application in practice. For instance, recent reviews of the ELM scheme suggest unequal inclusion in co-design processes due to closed invitations to participate or a lack of support for those who wish to participate but do not have the resources (de Boon et al., 2022) and inadequate feedback on how stakeholder contributions had been used, which threatened to undermine trust in the co-design process (NAO, 2021). In addition, there are issues with staff capability within Defra, with many civil servants lacking a background in agriculture or natural resources, poor retention of institutional memory and an institutional structure of multi-layered teams and or divisions in responsibility across policy teams that foster poor connectivity and coordination with their peers.

The aim of this paper is to contribute to the growing body of evidence on co-design through critical reflection on the application of co-design principles through the lens of land-use and marine fisheries policy contexts in the UK. While previous work has provided principles and best practice guidelines for participation and co-design (Tsouvalis and Little, 2019; Voorberg et al., 2018; Ansell et al., 2017; Fung, 2006), there is a need for better understanding of the role of co-design in policy making and how it can be practically applied to avoid, as Blomkamp (2018) asserts, co-design "being little more than a buzzword in the public sector" (p. 730). We, therefore, develop an operational framework for policy co-design in the context of natural resource management, drawing on an evaluation of three recent applied research projects, publicly tendered for and funded by Defra, that involved engaging with stakeholders from the early stages of policy development. In this paper we do not present specific research findings from each project, but discuss the challenges we encountered while undertaking co-design within government-funded research projects, evaluating these in relation to the extensive body of literature on participatory decision-making. We subsequently present a new co-design framework which, although developed within the context of tree health and fisheries policy in England, has wider applicability for improving participatory approaches to policy making for land use and natural resource management in other geographical and policy contexts. The following section outlines the literature on co-design and participatory decision-making, and how this can lead to improved decision-making. We then briefly present the three projects that inform the development of the framework and our evaluation approach, followed by reflections on our learning from applying co-design. The co-design framework is then outlined, together with our final conclusions which suggest how some of the barriers for different actors in the co-design process (i.e. policy makers, stakeholders and researchers) may be overcome.

2. Participatory decision-making and co-design

Co-design is part of a suite of approaches that involves engaging with stakeholders and end users of policy in participatory processes to design and/or deliver public policy, services or products, and includes co-

[1] Government policy is defined as the government's position, intent or action. In this context, we focus on policies that are aimed at influencing or changing behaviours, either through regulation, incentivisation or information provision.

[2] The UK was part of the European Union's Common Agricultural Policy (CAP) until its withdrawal from the EU in 2020. The CAP provided financial support to farmers and rural development funding. The Environmental Land Management Scheme replaces the CAP in the UK, and will focus on environmental improvement by paying farmers for delivering environmental benefits on their land.

creation, co-management, co-planning and co-production (Durose et al., 2017). The terms co-design and co-production originate from work in the 1970s by Elinor Ostrom and her colleagues in the context of the role of the public in successful policing in Chicago (Tsouvalis and Little, 2019; Ostrom, 1996; Parks et al., 1981). Ostrom defined co-production as the "process through which inputs used to produce a good or service are contributed by individuals who are not 'in' the same organisation" (1996, p. 1073). Since then the concept has been implemented in a range of contexts and there are many definitions of co-design and co-production (for example, Voorberg et al., 2018; Horne and Shirley, 2009; Bovaird, 2007) mostly focused on notions of empowerment, partnership working and some form of sharing assets and expertise.

Arnstein's 'Ladder of Participation' (Arnstein, 1969) is often used to illustrate different levels of involvement of people and communities and the New Economics Foundation (NEF) adapted this into a 'ladder of co-production' (Nef, 2014) in their guide for local authorities for service delivery (Fig. 2.1). While NEF's ladder of co-production was developed in the context of service delivery, and its application to policy formulation might look somewhat different, it nonetheless provides a useful heuristic to demonstrate a continuum of stakeholder engagement that moves from 'doing to' (educating, coercing) on the lower rungs, through to 'doing for' (informing, consulting, engaging) and ultimately 'doing with' on the upper rungs (co-designing, co-producing). 'Doing with' consists of processes of co-design and co-production, with co-design involving listening to (and valuing) stakeholder views, deliberating in a forum of trust and then, crucially, acting upon the outcomes of deliberations. 'Co-production' goes one step further, with stakeholders having a role in the delivery of the services they have helped design. This shift in focus of engagement requires valuing people as knowledge providers, promoting reciprocity and building social networks based on trust (Bovaird and Loeffler, 2012; Horne and Shirley, 2009; Boyle et al., 2006).

Most of the literature on co-design relates to co-designing public services, rather than policy, but co-design has gained traction in policy making, despite the lack of evidence regarding its efficacy (Tsouvalis and Little, 2019; Voorberg et al., 2018; Durose et al., 2017) and the lack of a clear and shared definition (Blomkamp, 2018) or consistent approach. Although there may be a lack of evidence on policy co-design, there is an extensive and established literature on participation and collaboration in public policy and planning (Blomkamp, 2018). Participatory policy-making involves recognising that the lived experience of those affected by policies are valid forms of knowledge and expertise (Blomkamp, 2018; Durose and Richardson, 2016). This challenges conventional approaches to policy making as it requires stakeholder involvement at a stage in policy development that allows for stakeholder input to both problem definition and the development of solutions rather than simply consulting stakeholders once a policy has been designed (Blomkamp, 2018). Participation is (or should be) a democratic process whereby those who are affected by a policy are directly involved in the design of the policy (Bell and Reed, 2021; Cabinet Office, 2017; Sanders, 2008; Sanoff, 1990). As such, participatory policy making, including co-design, goes beyond *consultation* by involving stakeholders across all phases of policy development through participatory and consensus-building approaches. However, participation is not always a 'democratic' process as it depends on who is 'allowed' or enabled' to engage, and the power relations between them. Therefore, understanding what Ostrom (2007) terms the 'action arena', the social space where individuals interact is crucial.

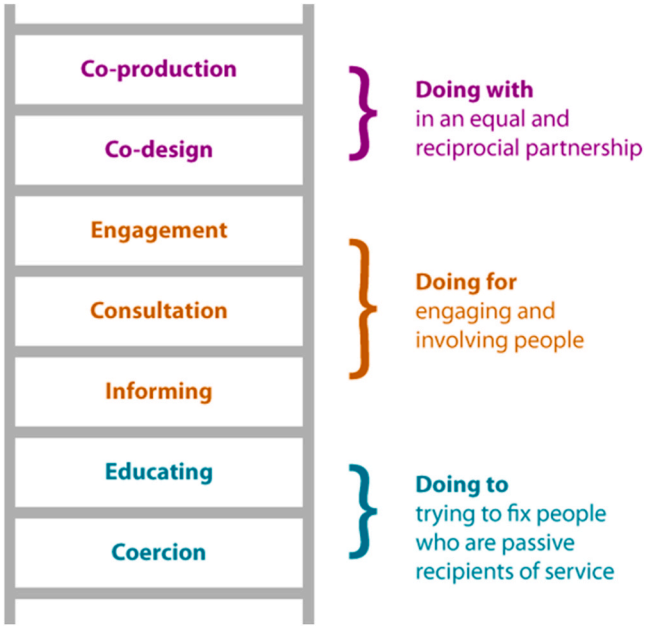

Fig. 2.1. The ladder of co-production (adapted from Arnstein, 1969 in NEF, 2014).

3. Method and case studies

This paper draws on an evaluation of the authors' recent experiences of undertaking co-design for the UK government across three projects focused on tree/woodland management and fisheries. Despite the different contexts, all three projects sought to apply the principles of co-design by engaging with stakeholders during the early stages of policy development and each plays a different role in a larger co-design approach to policy more broadly. This section describes how co-design was applied in each project and sets out the approach taken to evaluate the co-design processes employed across the projects.

3.1. Case study 1: Co-designing criteria for low impact fishing

The UK Government's 25 Year Environment Plan and the Fisheries White Paper (both published in 2018) set out the ambition for an efficient but sustainable fishing industry. The latter states that Defra will "consider new criteria to define low impact inshore fishing vessels to replace the current 'under 10 m category,'" (p. 13) recognising that the allocation of resource access through fleet division determined by vessel length is outdated, reducing the efficacy of management measures and obstructing efforts to ensure sustainable, economic and productive fisheries. However, despite the policy focus on low impact fisheries, there is a lack of evidence and consensus on what 'low impact fishing' means, and furthermore whether 'low impact fishing' is the correct term for describing fishing that is sustainable. Defra also recognised that current definitions for 'low impact' fishing are crude and inflexible, and can lead to a sense of inequity across different parts of the sector.

The project described here was commissioned by Defra to take a co-design approach to identify and agree principles and processes with stakeholders that can be used to co-define low-impact fishing. The rationale was that a definition co-designed with fisheries stakeholders was more likely to be fit for purpose and accepted by commercial fishers and recreational anglers and would be more resilient to changes over time as a result (Table 3.1).

The project was commissioned for six months in 2019 and, alongside a literature review (not detailed here), involved the research team working closely with Defra social scientists and policy makers to scope out, design and conduct workshops in different fishing ports in diverse fishing regions of England (Eastbourne, Brixham, North Shields) covering a broad spectrum of fleets, gears and target species. The aim was to engage with fishers and anglers at the early stages of policy design in early 2020 by holding two workshops in each location with the same stakeholders, 2–3 weeks apart. Unfortunately, the Covid-19 pandemic meant that the second workshop in Brixham and North Shields was cancelled, replaced by emailing participants a series of

Table 3.1
Summary of the co-design approach in the case studies and the role of researchers, policy makers and stakeholders.

	Project 0bjectives	Methods	Role of researchers	Role of policy makers	Role of stakeholders
Case study 1 Developing criteria for low impact fishing	To design principles & criteria for low impact fishing with fisheries stakeholders	Literature review; mixed stakeholder/policy maker workshops	• design and facilitate engagement with stakeholders; • feedback, reflect & guide policy makers in terms of recommendations for further co-design needed	• engage in open dialogue with stakeholders; • better understand their values, behaviours, challenges; • build trust	• deliberate the opportunities & challenges for a low impact fishing definition • improve understanding of policy maker intentions
Case study 2 New policy options for supporting action for tree health	To design new policy options (grants, advice) to support land owners and manage to better deal with tree pests and diseases	Literature review; stakeholder/ policy maker workshops & focus groups; stakeholder interviews; Q methodology; stakeholder surveys	• design and facilitate engagement activities with stakeholders; • feedback, reflect, guide & deliberate with policy makers how data from co-design could inform new grant scheme	• engage in open dialogue with stakeholders to better understand their values, behaviours & challenges; • incorporate input from co-design process into the design of new grant scheme	• identify their needs & challenges in terms of managing tree health; • identify what would incentivise them to take up grant schemes to manage for pest and diseases
Case study 3 Feasibility study for social survey of fishers	To scope the feasibility for a new co-designed social survey of fishers	Literature review; stakeholder/policy makers workshops; focus groups with policy makers	• design and facilitate engagement with stakeholders; • scope out potential for a new survey; • design a co-production framework for a social survey of fishers	• identify and prioritise social evidence needs for informing policy & management of fisheries	• identify and prioritise social evidence needs for fisheries stakeholders; • assess feasibility for fisher engagement in development of a social survey

questions to encourage further engagement. In Eastbourne, the first workshop aimed to build trust between stakeholders and policy makers, and identified the types of environmental impacts that fishing could have, while the second sought to identify ways that environmental impacts of fishing might be lowered across different fishery types and the opportunities and constraints associated with this necessary transition. A total of 116 fishers participated in one or more of the workshops. The research team synthesised the data collected through the workshops and the follow-up emails, with draft findings sent to participants for further input and to confirm agreement with the findings. A key conclusion of the final report was that the project represented a first step in a larger co-design process, and would require a longer period of co-design with stakeholders to fully develop and agree the principles and criteria needed to define low impact fishing and how any definition might be applied in policy and management (Williams et al., 2020). Alongside this, there is a need to build rapidly on initial actions and engagements to ensure industry buy-in is not lost due to receding trust in the process.

3.2. Case study 2: Co-designing new policy options for supporting action for tree health

The second project adopted a co-design approach with tree/woodland stakeholders to develop new policy options to replace existing tree health grants, as part of Defra's broader new post-Brexit ELM scheme. The project was funded over a three-year period involving three phases of participatory activity with stakeholders, interspersed with periods of interaction between policymakers, the scheme delivery team and researchers to synthesise the co-design activities and develop a prototype grant scheme for piloting. The first co-design phase with stakeholders scoped the need for support for management of tree pests and diseases (in the form of grants and/or advice) and the barriers to uptake of grants, with the research team and policy makers engaging with a range of stakeholders including woodland/tree owners or managers (including farmers), forestry contractors and local authorities. This phase involved an evidence review, a scoping of the stakeholder landscape, 11 deliberative workshops and 44 semi-structured interviews (Ambrose-Oji et al., 2019), involving over 120 stakeholders. The second phase further identified the key criteria that would incentivise grant uptake and led to the development of specific policy options. This phase involved six deliberative workshops (with 15–20 participants at each workshop) involving ranking options using Q methodology (McKeown and Thomas, 1988; Stephenson, 1953), 28 semi-structured interviews and a survey of 138 stakeholders (Ambrose-Oji et al., 2020). Phase three tested the policy options with stakeholders through four deliberative workshops (involving 75 participants) and a further survey with 365 respondents (Ambrose-Oji et al., 2021). Phase three also focused on further engagement with harder to reach groups (in terms of tree health management), such as farmers. Policy makers were involved in all the deliberative workshops, identifying the boundaries for what was possible in terms of the policy options (e.g. high-level policy objectives and likely resources available) and actively listening and engaging in discussion with the stakeholders (Table 3.1). The researchers designed and facilitated the co-design approach and critically engaged with the policy makers to reflect on the data collected and how this might be used to develop the new policy options (Table 3.1). For further details on the methodology and outcomes from this project see Ambrose-Oji et al., (under review) in this special issue.

3.3. Case study 3: Co-design a social survey of fishers to inform future policy

The third project (run over 6 months) was commissioned by Defra to consider, with fisheries stakeholders, the feasibility for a new co-designed social survey of fishers that would have benefits for both policy makers and fishing stakeholders. While not intended to develop specific policies, the new social survey would provide important evidence to better understand the social dimensions of fisheries, which would indirectly inform policy development. A review of existing surveys was undertaken, together with key informant interviews and two workshops with 24 fishing stakeholders and two focus groups with 12 Defra policy makers. A key outcome of the project was the development of a new framework for co-producing a social survey of fishers involving four stages: laying the foundation – gaining agreement on programme design; collecting and analysing the evidence; using the evidence; and evaluating the co-production structure (Urquhart et al., 2019).

3.4. Evaluating co-design in the case study projects

In order to better understand the benefits and challenges of co-design, we evaluated the three case studies to draw out insights that might improve approaches to co-design in the future. We recognise that each of the projects was not a full co-design approach in itself, but was a

starting point that used co-design principles as part of a wider and larger approach to co-design. Our evaluation questions focused on the normative, instrumental and substantive outcomes that co-design processes aim to achieve, drawing on Tsouvalis and Little's (2019) framing of co-design. We, therefore, reflected on the following questions (1) substantive outcomes: how does the policy context and institutional setting influence the potential for successful co-design?; (2) instrumental outcomes: to what extent was trust between policy makers and stakeholders established through the co-design process?; and (3) normative outcomes: was the co-design process equitable, involving appropriate stakeholders and who was excluded? Did the co-design process empower stakeholders or end users and shift power relations?

The purpose of the evaluation was not to undertake a formal extensive evaluation of all case study projects, but provided a reflective space for the project teams to reflect on their experiences of a range of co-design processes. Analysis was undertaken by each project team in a post-project reflections session where benefits and challenges of co-design were identified in the context of the case study. These were collated and analysed to identify recurrent or unique context-dependent themes, presented in the following section, that were subsequently used to develop the co-design framework presented in Section 5.

4. Lessons learnt from co-design case studies

4.1. The policy context

Table 3.2 summarises the outcomes from each of the co-design approaches in the context of their differing focal policy 'types', level of engagement of both stakeholders and policy makers and the extent to which the focus of the activity was contentious. The description of outcomes (Table 3.2) suggests that the tree health co-design case study was the most successful while the development of criteria for low impact fishing was least successful. Looking across at potential causal mechanisms for the difference the most immediate is the duration of the project varying from six months (little time for engagement and building trust) to three years (multiple engagement methods; high level of engagement). But possibly more important in determination of outcomes is the type of policy and the level of contention generated.

Case study 1 on developing criteria for future use in developing regulatory fisheries policy was highly contentious, not just between stakeholders and policy makers but also between different types of stakeholders, who are in competition with each other. As a result, there were limitations around the topics that fishers were prepared to discuss. Participants did not feel they could discuss contentious topics because of the diversity of fishers in the room. For instance, they were reluctant to be seen as labelling fishers who used specific types of fishing gear as being the cause of problems ('high impact'), because they did not know how Defra would use this information and therefore what consequences it would have for their colleagues. Fishers stated that a definition of 'low impact' may provide an opportunity for some parts of the fleet deemed to be 'low impact', resulting in improved access to fishing grounds, more quota or less regulation. On the other hand, by default this would mean others are 'high' or 'higher' impact and there were concerns and uncertainties about the consequences of that distinction. This could potentially result in division, separation and distinct rules for different parts of the fleet, rather than common rules for everyone – potentially replicating the inequity documented as created by the UK fixed-quota allocation (FQA) system (Anbleyth-Evans and Williams, 2018; Appleby et al., 2016; Cardwell, 2015). In addition, power structures across different sectors of the fleet (e.g. quota leasing via Producer Organisations) means that fishers do not always feel they can be open in meetings as they fear reprisals (e.g. unfavourable leasing terms for quota they need) if they disagree publicly with those who lease them quota (or from those who buy their landed catch where there are limited other buyers and wholesalers). These power relationships are fundamental in fisheries and need to be understood and addressed if collective co-design is to be successful across a heterogenous sector such as fisheries, where organised, capitalised businesses dominate disparate coastal fleets. The second fisheries study (Case Study 3) was much less contentious because it was not focused on immediate threats of coercion from possible new regulation (although concerns were expressed about how the data might be utilised). The focus was more about how new information might be collected to benefit both policy personnel and stakeholders, as such it was less contentious and senior policy personnel attended workshops to explain the approach.

The duration of the tree health case study enabled a very different co-

Table 3.2
Reflection on outcomes from the case study co-design approaches.

	Policy 'type' and focus of co-design activity	Duration	Level of stakeholder /policy personnel engagement	Level of contention	Outcome
Case study 1 Developing criteria for low impact fishing	Type: Regulatory Agree principles and processes that can be used to define 'low-impact fishing' for future regulation	Short (6 months)	• Medium – stakeholders not willing to discuss all issues in open workshops	• High - between stakeholders and policymakers stemming from past experience • High - between stakeholders due to power imbalances & rivalry	• More time needed to build trust • Requires multiple forms of engagement due to power imbalance among stakeholders • Highly contentious issue • Lack of structured participant follow-up
Case study 2 New policy options for supporting action for tree health	Type: Distributive Development of new grant schemes for improving tree health, continuation of current policy approach	Long (3 years)	• High – but uneven engagement by stakeholders	• Low – general agreement on grant scheme approach • Low - Defra personnel attended workshops & clarified aims of new scheme	• Policy makers initially reluctant to share ideas & information • Researchers developed 'critical friend' and reflexive approach to enhance engagement • Pilot grant scheme approach agreed
Case study 3 Social survey of fishers to inform future policy	Type: Constituent/Regulatory Design of monitoring system (survey) to provide evidence on social dimensions of fishing	Short (6 months)	• Low – uneven engagement, smaller scale fishers not able to attend workshops	• Medium - Stakeholder concerns over how information would be utilised • Medium - Defra personnel attended workshops – responded to concerns	• More time required to explore stakeholder concerns over utilisation of evidence • More time required to access the 'hard-to-reach' • Agreed framework for co-production of evidence needed

design approach with multiple methods and time for reflection following engagement between stakeholders and policy personnel. In addition, the focus was on a very different type of policy, one of providing incentives and much less contentious as it was continuing an already established and agreed policy approach (i.e. a grant scheme). Sufficient time and resources, a high level of engagement, and a low conflict environment enabled development of a pilot grant scheme to be achieved through the co-design process.

The three case studies suggest that the co-design approach requires careful consideration of the policy context arena (Ostrom, 2005) prior to developing techniques, or agreeing on the level of resources and time needed. Examination of prior action and the type of political activity generated through policy feedbacks within a specific policy arena would also provide a more secure foundation for developing co-design approaches. This requires sustainable institutional arrangements through which stakeholders can engage on an ongoing basis, rather than in stand-alone projects. For instance, in the context of UK fisheries, the establishment of Regional Fisheries Groups and the collaborative process of Fisheries Management Plan development is aimed at providing sustainable institutions within which co-design can be sustained on an ongoing basis.

A further, and significant, challenge for policy co-design is power structures within policy development. For co-design to be effective, this requires policymakers to relinquish some control over the policy-making process. This was evidenced in our case study projects with the co-design process largely being confined to seeking input on policy design, but the decision-making responsibility remained with the policy makers. For instance, while participants in the tree health project commented on potential policy options, they were not able to make decisions on the final structure and format of the resulting pilot tree health grant scheme. Transferring some decision-making power to stakeholders does not always align well with how bureaucratic government systems are structured and traditionally operate (Blomkamp, 2018; Steen et al., 2011). Thus, as Trimble and Lazaro (2014) suggest, attempts at sharing control are often difficult to achieve. But, in order for it be successful, policy co-design must have strong support, engagement and commitment to the long-term from policymakers, representing a marked change in long-established processes (Evans and Terrey, 2016) and requires a careful balance between validating and enabling stakeholder input to policy design and fulfilling bureaucratic imperatives.

4.2. Institutional barriers within governmental departments

One of the key challenges to undertaking meaningful and effective co-design identified in our case studies was the time constraints for undertaking the projects. Governmental research funding budgets often have to be spent within the financial year they are allocated to. Projects are frequently short in duration – the low impact fishing project was six months, as was the feasibility study for a survey of fishers. Added to this is the lack of structured follow up to participants by policy makers about how the research has been used, with researchers often having to do this after funding for the project has ended, thus reducing the capacity they have for this activity. Conversely, the longer duration of the tree health project allowed for an initial scoping and trust building stage before moving onto more specific policy option designs and testing of scheme prototypes with stakeholders. This resulted in the design of a pilot tree health grant scheme that built on the input from the co-design process.

Also, there is often a disconnect between the commissioning of research and a clear process for implementing policy. Clearly this is a conundrum for co-design, as engaging with stakeholders in the early stages of policy development may mean their involvement occurs alongside policy development and there may not be a clearly identified roadmap for implementation. This can be frustrating for stakeholders who may not be clear about how their involvement will be make a difference, coupled with longstanding perceptions that they are not listened to. It can also mean that policy makers are unwilling to share initial ideas early on (as demonstrated in our tree health case study), fearing that they will be held to account if those ideas are not realised in the final policy outcomes.

Furthermore, the frequent turnover and movement of staff between government departments in the civil service can hinder effective partnership working with stakeholders (Sasse and Norris, 2019). For example, a number of fisheries stakeholders indicated that fishers have put a lot of time into raising awareness about the sector's needs and building trust and rapport with Defra Marine and Fisheries policy teams, but have to start again when civil servants move on. There was a widely held perception that institutional knowledge is lost every few years within Defra as the fishers involved remember having similar conversations with previous generations of civil servants.

4.3. Building trust between stakeholders, policy makers and researchers

Trust between stakeholders and policy makers/researchers is an essential component for effective co-design of policy (Clarke et al., 2021; Durose and Richardson, 2016; Arnstein, 1969), allowing open and positive dialogue between participants. Trust can help to strengthen relationships and enhances engagement between policy makers and stakeholders. However, trust within co-design can be difficult to establish when there are already high levels of mistrust in government and public institutions (Blomkamp, 2018).

Across the projects, stakeholders in both fisheries and tree health expressed distrust of policy makers, often linked to historic issues, however this was particularly an issue in both fisheries projects. This was also identified in Reed et al. (2020), who characterised fisheries as a low trust environment, where fishers are mistrustful of policy makers but can also lack trust in one another. In both our fisheries case studies, distrust related to dissatisfaction with the government's historic approach to quota allocation between the under and over 10 m sectors and its (perceived lack of) management of the activities of foreign vessels in UK waters. Furthermore, developments since the UK exit from the EU (e.g. the Trade and Cooperation Agreement (T&CA)) have delivered outcomes that failed to meet the expectations of fisheries stakeholders and the sector overall (Stewart et al., 2022), including continued EU fleet access to the UK's 6–12 nautical mile territorial waters. In addition, there was also distrust between different sectors within the fishing industry, with small-scale fishers suspicious of the agenda and power held by the large-scale fleet, national and foreign quota owners and their influence on the fishing federations (the National Federation of Fishermen's Organisations (NFFO)), Producer Organisations (POs) and across all tiers of government (Defra, Marine Management Organisation (MMO), Inshore Fisheries and Conservation Authorities (IFCAs)).

In our projects, a crucial methodological consideration was the inclusion of Defra staff in all the stakeholder engagements. This was fundamental in overcoming initial mistrust or scepticism about the purpose and value of the projects and also allowed Defra staff to directly hear the views, concerns and preferences of the stakeholders. Having key Defra personnel engaging in the workshops in an open and committed way, supported by the researchers, gave stakeholders the opportunity to directly quiz and challenge the civil servants. For example, in the low impact fishing workshops, the participation of senior Defra staff was crucial in the workshops, including ensuring adequate time was spent answering questions and defending policy positions, while also demonstrating a genuine interest in listening to stakeholders' views. This approach was important for trust building at the time, and feedback from fishers after the workshops indicated this was essential in showing who Defra policy makers actually are, and allaying fears or confusion surrounding new projects that aim to involve stakeholders directly. However, without continued follow-up and feedback on how stakeholders' views have been incorporated into policy development, it will be unlikely to yield the necessary continued engagement and level of trust needed to co-design policy in the future. Ongoing following up will be crucial.

Therefore, stakeholder engagement is rarely a 'blank slate' or a new approach to working collaboratively with industry, but rather a continuation of previous undelivered aspirations. In both the fisheries examples, this lack of trust was particularly prevalent and difficult to overcome, permeating across all levels, from international (European Commission, International Council for the Exploration of the Sea (ICES) science), to national (Defra, MMO) and local (IFCAs). For example, many of the participants in the low impact fishing project expressed scepticism as to the purpose of the project, with concerns that information elicited through the workshops could later be used to restrict fishing activity or penalise the parts of industry perceived to be higher impact.

In the tree health project, there was some evidence of a lack of trust, particularly in the early stages of the co-design process. A few participants were sceptical about the potential efficacy of any new grant scheme, referring to past poor policy decisions, such as tax breaks in the 1980s that led to widespread tree planting on peatlands. For others, distrust coalesced around perceptions related to the degree that some participants felt that their needs could be properly accounted for in policy options that target a diverse set of landowners, each with their own specific needs and objectives. However, most who engaged welcomed the opportunity to directly talk to policy makers in the early stages of development of the new policy options.

The tree health project also identified the need for trust between policy makers and the researchers commissioned to undertake the co-design process. For policy makers engaging in co-design at the early stages of the policy process, it was challenging to discuss undeveloped ideas with the researchers and initially there was a reluctance to share too much information about potential policy options. Policy makers were also unsure exactly what they wanted from the co-design process. For researchers, it was difficult to engage stakeholders with very opaque objectives for the new policy options and to design engagement activities that addressed the changing needs of the policy makers. It required frequent meetings between the research team and the Defra commissioning team to work together to develop the specific engagement methods and to include periods of reflection after each data collection phase. This resulted in the researchers acting as a critical friend to the policy makers, feeding in data from the co-design activities iteratively as Defra developed the draft policy options.

4.4. Involving hard-to-reach groups and representation in the co-design process

Clearly for co-design to be effective all stakeholders who are likely to be impacted (negatively or positively) by the resulting policies should be included in the co-design process. Often, however, inclusion in participatory processes is not equitable, with some stakeholders having better access than others (Chauhan et al., 2021), either through their experience or capacity to take part in policy fora, their willingness to engage or their visibility to those facilitating the co-design process. For example, in UK fisheries, those who are more visible come from established organisations (fishing federations and POs) that are underpinned by their control of UK quota and the resulting financial and contextual power which impacts quota leasing markets (Anbleyth-Evans and Williams, 2018; Appleby et al., 2016). The history of quota allocation has left a legacy of division and significant gaps in representation of interests, e.g. POs for quota owners, which has skewed representation to follow quota interests over other needs (Williams, 2018; Cardwell, 2015). This is a particular problem for the inshore fleet. The dispersed and fragmented nature of the inshore fleet, and the local/regional nature of their engagement means they are often not represented fully in the national context and must often prioritise going to sea to fish over participating in workshops, if the weather and tides are in their favour. While fishers' travel was paid in the low impact fishing project, their time was not. This is a clear obstacle to effective co-design as shared objectives and outcomes will be hard to achieve if not all relevant stakeholders are able to be involved in the co-design process. Furthermore, certain groups, such as private forest owners and forestry agents who have experienced tree pests and diseases, or are aware of their potential impacts, are more likely to engage in participatory processes related to tree health than those who are less aware, and therefore do not feel the topic is relevant to them. For instance, it can be difficult to engage farmers in discussions about tree health, despite farmland usually consisting of trees in hedgerows, woodland or fields. Farmers may focus their attention on the food production elements of their land, with trees and woodland taking a more peripheral role in their attention.

5. A framework for co-designing natural resource policy

Drawing on our experience of undertaking co-design across three applied projects, previous experience of the authors in participatory policy approaches and the literature (academic and practitioner), this section sets out principles for effective co-design of policy (Table 5.1) and an operational framework to apply co-design processes.

The framework seeks to overcome some of the challenges of co-design and enable those engaging in co-design to achieve better and more equitable outcomes. Fig. 5.1 sets out a co-design framework within the standard conceptual diagram of the policy cycle with its iterative process operating over six stages. The dashed lines between the stages indicate recognition that the boundaries between stages are not fixed and can overlap. It also suggests that stages may vary in scale, level of attention, and duration. The central element of the framework focuses on development of understanding and trust, without which co-design is not possible. Understanding and trust works in both directions between stakeholders and policy makers, and is based on continuous iterations of engagement, listening, negotiation and reflection. These iterations are required (at different levels depending on context) between each stage in the policy cycle (Pomeroy and Douvere, 2008). At each stage, the focus of activity may vary, for example between stages 1 and 2 concentrating on developing communications and forms of engagement, while between stages 3 and 4 it might pay more attention to assessing impacts of policy options designed through the process. At each stage, however, building trust through iterations of activities that generate engagement /listening /negotiation /reflection forms the foundation of the co-design process.

Fig. 5.1 also illustrates that co-design is not necessarily an activity that must occur across the entire policy cycle but can occur at any specific stage or in the space between the stages identified. In the case studies described earlier, for example, the tree health project (case study 2) focused on stages 3 and 4 (Table 5.2), having already decided that the overall approach would be a continuation of a grant scheme. Case study 1 on the other hand, developing criteria for low impact fishing, focused on the space between stages 2 and 3, while case study 3 developing a social survey of fishers was focused on stage 3. There is also no reason why co-design processes should not begin to operate in the evaluation stage (Stage 5) of the generally accepted policy cycle (this might even be the most beneficial place to initiate a co-design approach). Co-design of evaluation has the potential to lead to deeper understanding of deficiencies/weaknesses in an existing policy arena and from there lead on to re-design through another round of the policy cycle. Even here, however, a co-design approach would require the scoping stage to operate in order to agree rules of engagement, boundaries and objectives.

Fig. 5.1 illustrates that co-design is most effective when it operates as an iterative cycle, with phases of reflection and evaluation to support the building of understanding and trust, and to enable policies to be adjusted or reworked where needed. The co-design framework indicates a flexible process capable of adopting new ideas, as well as being reflexive with clear requirements for evaluation and outcome agreement.

Trimble and Lazaro (2014), drawing on their experiences of participatory research in Uruguay, note that building group cohesion, trust, respect, honesty and tolerance among stakeholders was a main strength

Table 5.1
Principles for policy co-design.

Principles for effective co-design of policy	Process requirements / needs
Incorporate relevant interests	1. A process of scoping to assess who should be involved, in what way, and at what stage in the policy process. 2. Stakeholder analysis to assess range and interests of different participants 3. May require a programme of capacity building prior to, or incorporated within, the co-design process to ensure relevant stakeholders can engage effectively.
Build trust	1. Requires a process for building social capital among the stakeholders 2. Scoping to assess current levels of trust, mechanisms contributing to increased / decreased levels of trust. 3. Co-design of the operation, rules and goals of the process itself, agreement on how decisions will be made within the process. 4. Setting agreed objectives 5. An iterative process to increase trust through demonstrations of support (e.g. senior level policy personnel listening and reflecting on issues with stakeholders; transparency of processes; clarity of motives underpinning action; transparency of action) 6. Clarity of policy options and constraints – needs to be made clear at the start of the process, with regular updates and identification of potential risks and uncertainties. 7. Regularised provision of feedback on input and progress
Manage power relations	1. Understanding of power relations between those involved in the co-design process (including relations between stakeholders and relations between policy personnel and other stakeholders). 2. Requires acceptance / recognition of power relationships between participants/organisations in the process. Setting agreed boundaries and rules for the process is essential. 3. Recognition of the rights, needs and obligations, of all stakeholders. 4. Transparency of action is important for building trust in the process. 5. Meeting on neutral ground 6. Use neutral facilitators (mutually agreed)
Manage competing interests	1. Where different stakeholders are in direct competition for a resource it is some level of conflict is likely. Strategies for managing conflict will need to be agreed as part of the rule-setting. 2. Transparency of action is important for building trust in the process
Utilise inclusive and iterative approaches	1. Multiple iterations of listening and reflecting where all interests are represented on an equal basis. 2. Iterations may be needed for different aspects of a complex or contentious issue to allow for reflection, absorption of information, time for representatives to report back to their members/ organisations and respond.
Validate proposed solutions / policy options	1. Incorporate relevant sources of evidence (e.g. statistical, documentary, lived experience) and expertise to validate proposed solutions and policy options.
Adopt multi-method approaches to engagement	1. Complex situations may require one-to-one meetings/visits with a range of relevant stakeholders 2. Interviews, small working groups, discussion groups, plenary sessions may all be required to support effective engagement. 3. Ensuring participation through enabling different forms of activity (may require some capacity building) 4. Enhanced understanding of stakeholder concerns / views / beliefs / attitudes can be achieved through field visits (provides background context). Multiple visits might be required to understand the range of settings in which policy will be implemented.
Provide adequate resources	1. Allocation of time to undertake capacity building, development of social relations and trust, and engagement with the issue. 2. Funding to provide support for meeting rooms, visits, facilitation, policy personnel attendance, and where necessary to enable stakeholders to engage (e.g. compensation for missed employment; travel and subsistence costs) 3. Resources to provide feedback (might require different formats)

of the co-design process, along with the importance of learning by listening to others who think differently. However, there are also limitations to the approach if not applied in an open and transparent manner, resulting in loss of trust rather than improving relationships. In order for co-design to be successful, there needs to be an iterative and negotiated process, requiring a commitment to shared responsibility and recognition of the importance of collaborative relationships (Needham and Carr, 2009) and legitimacy, both of the process and the outcomes (Jagers et al., 2020).

The following sections describe each stage of the full policy cycle framework, outlining the purpose of the stages and how they might be approached in a co-design approach. Although, as noted above, a co-design approach can be applied at specific points in the cycle as required.

5.1. Stage 1: Scoping

The first stage identified in the policy cycle is perhaps the most important, but often the most overlooked as it takes time, and is required whatever aspect or stage of policy formulation is being addressed. It is important because it builds the foundations on which the co-design process takes place. Thus, even where the focus of a co-design study is focused on activities occurring at later stages in the policy cycle a scoping process will still be required in order to undertake stakeholder identification, set the boundaries of the study, and agree rules of engagement. Ensuring that all relevant stakeholders are involved may require using local gatekeepers or neutral intermediaries to bring stakeholders together.

Participants involved in the co-design process should include those who are likely to be impacted by, or will benefit from the process/outcomes, including minority groups or those who might be hard to reach. This may involve not just relying on representatives or spokespeople, but actually engaging with those who will be directly affected. In the case of our projects, this involved fishers and tree and woodland owners and managers. However, this means more than just inviting a wider set of stakeholders to co-design workshops. Individuals will be unfamiliar with engaging in co-design processes and there are often power inequalities between different stakeholders, hindering the effectiveness and equity in the process. Being clear about what the co-design approach hopes to achieve and the terms of reference for engagement (see 5.1.2), including the validity and importance of all stakeholders' perspectives, can help to overcome this. In addition, in some contexts it can also help to include specific key individuals who know the local sector, are trusted by everyone, have experience of engaging in policy fora and who are able to facilitate discussions and enable stakeholder contributions.

To address some of these issues, Pieraccini and Cardwell (2016), in their assessment of the inshore fisheries authorities in England and Scotland, note that deciding who should be involved in the co-management is crucial for effective co-design. Careful consideration

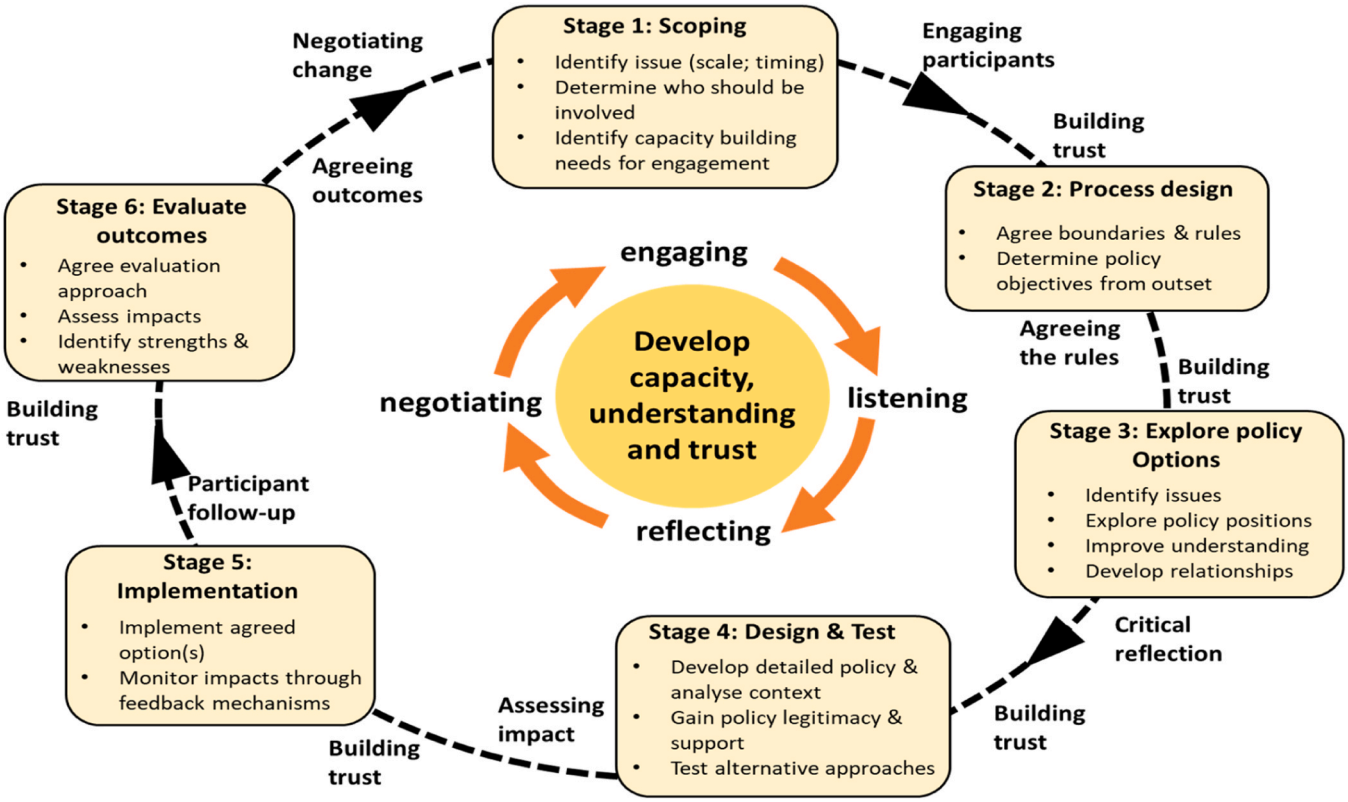

Fig. 5.1. Overview of a co-design policy cycle framework.

needs to be given to how many people are involved; the stage in the policy cycle at which co-design will take place; the nature and degree of change that is being sought; and the type and extent of input from people and communities that is expected (Scottish Government, 2015). In certain instances, it might be necessary to engage in capacity building to develop stakeholder empowerment (Pomeroy and Douvere, 2008).

5.2. Stage 2: Process design

At the start of any co-design process it is crucial to define with participants what 'co-design' means in order to ensure that everyone is clear about the objectives of the engagement and to manage expectations regarding the outcomes. It is, therefore, important to be clear about what is in scope for the co-design in terms of what aspects of policy can be impacted or influenced through the co-design approach and the expected outcomes (Evans and Terrey, 2016). For example, in the tree health project it was made clear by the policy makers that input was needed on what attributes of a grant incentive for managing tree pests and diseases would encourage tree and woodlands owners and managers to apply for a grant. Attributes might include payment rates, access to advisory services and ease of the application procedure. Draft grant schemes were then developed by Defra and discussed again with stakeholders to clarify if they were fit for purpose. However, the final decisions relating to grant criteria and eligibility, and the high-level policy objectives, were beyond the scope of the co-design process, as these were determined by broader governmental objectives, including alignment to other schemes such as the ELM scheme and its Sustainable Farming Incentive and Landscape Recovery Scheme.

Creating the conditions under which co-design can successfully operate and develop is important, particularly when there may be conflicts between different stakeholder groups or where there is a lack of trust. It involves identifying areas of mutual benefit and improvement, and an agreement on the boundaries of activity, ways of working, and the management of outcomes. It also involves being clear about the degree of commitment that is expected from participants. This includes setting out and agreeing the terms of reference or rules of engagement for the co-design (see, for instance, Mackinson and Middleton, 2018) to promote a shared vision and the planning to achieve it. The aim is to manage expectations and enable stakeholders to be clear about their involvement and what is on the table for discussion and what exactly their views will be informing. Stakeholders in a defined natural resource policy arena might be willing to engage in a policy co-design process, but not all have the capacity to engage in terms of time, financial resources, or ability to take on responsibilities for tasks (Puley and Charles, 2022).

5.3. Stage 3: Exploring policy options

The exploration and analysis of alternative approaches to a problem, or the range of options available for resolving issues requires a close working relationship between stakeholders and policy makers. This is likely to need multiple interactions over a period of time to build trust, with sessions that move from the general to the specific. The format and content of the sessions also needs to be flexible. For instance, in our low impact fishing project, we had to adjust our first workshop format on the spot as stakeholders just wanted to talk about their immediate concerns before addressing the detail of co-designing new definitions for low-impact fishing. This was an important step in trust building and policy makers had to listen (and respond) to stakeholder concerns; it required flexibility and adaptation to the needs of the stakeholder group.

It is also important to design the participatory method to suit the needs of the stakeholders. There are a wide range of techniques, such as standard workshops or interviews, but also citizens juries, visual methods, mapping, multi-criteria decision analysis (MCDA), and participatory action research. It is important to choose a method, or suite of techniques, tailored to the local context and characteristics of the stakeholder group.

As noted above, it is also important to have policy makers present at

Table 5.2
Summary of factors affecting policy co-design drawn from the case study examples.

	Case Study 1: Principles for low impact fishing	Case Study 2: Tree health pilot	Case Study 3: Fisher survey
	Stage 2: Process design & Stage 3: Exploring policy options	**Stage 3: Exploring policy options & Stage 4: Design and test**	**Stage 3: Exploring policy options**
Engage	(-ve) Inability to engage for some relevant stakeholders (requires capacity building) (-ve) Limited willingness to engage (+ve) Enhanced responsibility *Policy makers:* -(ve) Loss of institutional knowledge	(+ve) Engagement limited to potential target population (+ve) Additional efforts made to include the 'hard to reach' (+ve) Few constraints on stakeholder engagement (+ve) Multiple ways to engage *Policy makers:* (+ve) High level of expertise / experience with proposed approach (-ve) Long duration of the process	(+ve) Few constraints on stakeholder engagement (-ve) Reluctance to engage due to loss of personal relationships as a result of personnel movement within civil service *Policy makers:* (+ve) Limited range of engagement methods
Listen	(-ve) Power relations (-ve) Limited willingness to engage on part of some stakeholders *Policy makers:* (+ve) senior policy personnel present in workshops (-ve) Budget & time constraints (-ve) Premature stakeholder involvement	(+ve) Exploration of beliefs / attitudes / sources of information (+ve) Multiple iterations of listen / reflect (+ve) Focused exploration of barriers to grant uptake (+ve) Concerns expressed over previous policies *Policy makers:* (+ve) Policy personnel involved in all workshops (+ve) Multiple methods of interacting (+ve) Boundaries of possible options clearly laid out along with likely resource levels	(+ve) Exploration of barriers to information provision; not contentious (+ve) Issues raised were followed up *Policy makers:* (-ve) Budget & time constraints; limited range of methods utilised
Reflect	(+ve) Familiarity with policy options (-ve) Concerns over discussing some issues due to potential impact on future regulation of fishing *Policy makers:* -(ve) Loss of institutional knowledge & personal relationships (-ve) Budget & time constraints (-ve) Premature stakeholder involvement	(+ve) Focus on characteristics of support (-ve) Some opposition to grant scheme approach based on prior experience (+ve) Multiple iterations of listen / reflect *Policy makers:* (-ve) Reluctance of policy personnel to discuss ideas for policy options; fear of being held to account (-ve) Lack of clarity over desired outcomes from the co-design process (+ve) Boundaries of possible options clearly laid out along with likely resource levels *Researchers/ facilitators:* (-ve) Difficult to engage participants with 'opaque' ideas/ options; requires clarity of objectives and options (+ve) Data analysis and critical engagement with policy makers	(+ve) Exploration of sources of information / beliefs (-ve) Concerns over control and how the information would be utilised *Policy makers:* (+ve) Synthesis of data fed back to participants (-ve) Budget & time constraints
Negotiate	(-ve) Inability to discuss contentious issues (unequal power relations) (-ve) Potentially massive implications for future policy options (needs smaller steps in Stage 1) *Policy makers:* (-ve) Final policy outcomes decided outside the co-design process (-ve) Loss of institutional knowledge & personal relationships (-ve) Budget & time constraints (-ve) Lack of follow-up with participants on outcomes of the process	(+ve) Time and budget allocated for developing, testing and evaluating design (+ve) Concerns expressed that single policy could not reflect / satisfy diverse needs (+ve) General policy approach pre-determined (grant support scheme); (+ve) Limited range of stakeholders involved; experience of similar previous programmes (-ve) Final policy outcomes decided outside the co-design process *Policy makers:* (+ve) High level of expertise /experience with proposed approach (+ve) Timeframe enabled development of a pilot grant scheme	(+ve) Internal discussions summarised and draft findings circulated (+ve) Arrived at an agreed methodological framework for survey *Policy makers:* (-ve) Budget & time constraints (-ve) Implementing personnel different from those involved in co-design activities – creates a disconnect. (-ve) Final policy outcomes decided outside the co-design process

the co-design events, who are prepared to be open, honest and transparent. It is, therefore, vital to have senior policy makers who are confident, open and willing to take on board stakeholders' views, and who can deal with sometimes difficult confrontations from participants. This can be a real challenge for policy makers, particularly with stakeholders who are frustrated and distrustful of the policy making process as a result of grievances from past policy interventions (Moynihan and Soss, 2014). It requires particular skills and confidence on behalf of the policy maker and, potentially, a willingness to publicly accept failures of previous colleagues. This is likely to require training and capacity building of policy makers to ensure that they have the skills necessary to engage with stakeholders in the co-design process.

It is also important to be clear about who (i.e. which organisation) is facilitating any co-design activity (e.g. workshop, discussion group, forum or other). Stakeholders are unlikely to understand the organisational structures of government agencies, viewing all those involved in delivering or facilitating an activity as 'government' regardless of whether they represent the main department implementing policy, some other government department, a delivery agency or university

researchers.

5.4. Stage 4: Design and test

In the full policy cycle Stage 4 focuses on taking draft policy options (prototypes) from the previous stage and exploring them in more detail with stakeholders to determine flaws and the contexts in which they may and may not work as intended. Validation with end user stakeholders is an important aspect of this stage. This is the point at which detailed policy documents will be drawn up, in conjunction with government lawyers (especially if new or changing legislation is an objective). It is essential at this stage of co-design to gain support and legitimacy for policy proposals, which may require testing out alternative approaches on local stakeholders. This stage can be demanding and time consuming and the boundary between this and the previous stage not always clear cut. Where conflict or disagreement continues it may be necessary to revert to Stage 3 deliberation activities to refine or redesign policy options. Significant time and effort were required at this stage in the tree health case study, despite the fact that the overall policy approach was a continuation of a grant scheme approach and there was little opposition to the proposed approach. This was partly due to difficulties in engaging landowners and managers who had not experienced tree health problems in the past, and partly due to the complexity of the science of pests and disease which had to be communicated before policymakers could start to engage with financial and advisory needs in different contexts.

5.5. Stage 5: Implementation

During the fifth stage, policy implementation, it may be necessary to pilot the proposals in order to identify and address delivery issues in advance of its full deployment. This stage requires planning and development of delivery programmes, which are critical issues for stakeholders on the receiving ends of government action. A co-design framework thus requires continued activity to build and/or maintain trust through stakeholder involvement in activities that assess impact (especially in testing or pilot phases). It also involves participant follow-up from those involved in the co-design activities to ensure their concerns have been heard and addressed. Developing a monitoring and evaluation framework in conjunction with stakeholders capable of assessing formative processes and summative impact through feedback mechanisms is therefore a key requirement for this stage of co-design. A co-designed developmental evaluation is required that provides opportunity for iterative learning and feedback that supports policy development and implementation, and enables transfer of learning between stakeholders, and between policy elements. Implementation of periodic evaluation cycles offer regular check points for collaborative policy learning and evaluation framework adjustment.

5.6. Stage 6: Evaluating process and outcomes

Involvement in the evaluation and monitoring processes is also essential in a co-design framework, especially as evaluation can be viewed as the start of a new policy cycle identifying where and what kind of changes are required to address weaknesses, to meet future needs, or meet new challenges arising from changes in exogenous factors (HM Treasury, 2020).

A final step is evaluation and reflection on the both the co-design process and the strengths and weaknesses of the policy and programme delivery. Feedback to stakeholders clarifying how their involvement has shaped the policy and implementation programme is important to maintain working relationships.

In many cases, stakeholders are unclear about how they contributed and if they cannot see a clear value in their participation, are unlikely to engage in future policy developments. This aligns with the findings of the National Audit Office (NAO) (2021) review of ELM, which concluded that adequate feedback to stakeholders is often lacking, undermining stakeholders' trust in the co-design process and their role in influencing policy design.

6. Conclusions

This paper has set out a framework approach for co-design within the familiar concept of the policy cycle from initiation through to evaluation. As the case studies have illustrated, the co-design approach can be applied at any stage in the policy cycle and adapted to a range of natural resource policy development scenarios. It identifies factors influencing successful co-design, noting the significance of the policy context in which the approach will be applied, which will require a tailored approach and identifying resource requirements for a successful outcome. While it is informed by the experience of policy-making in the UK, the principles and framework presented will have much wider significance and application, with relevance for land use and natural resource policy making in other countries and contexts.

As discussed earlier, there are a series of challenges that need to be addressed in order for co-design to be effective and successfully operationalised in public policy and government-funded research. Firstly, for policy makers, there needs to be a cultural change (Christiansen, 2016) and removal of institutional barriers to recognise that co-design takes time and involves a series of iterative stages to build trust and reflect on outcomes. This may involve a shift in power to more inclusive forms of governance and a recognition that projects need to allow time for multiple interactions and reflexivity if they are to be successful. The co-design process involves a series of iterative stages in order to build trust, collectively define the scope of what is to be co-designed, share knowledge, negotiate and deliberate, reflect, identify areas of consensus and disagreement, establish feedback loops to monitor and evaluate the process and outcomes and a long-term commitment and follow up with stakeholders (Fig. 5.1).

Secondly, stakeholders need to be empowered to engage in co-design. This can be through training, building social capital (Burkett, 2012; Pomeroy and Douvere, 2008) or through the support of stakeholder representatives. In addition, stakeholders need to recognise that inclusive governance brings with it more responsibility, although there will be limits to participation based both on stakeholder willingness to engage and societal limits based on which policy formulation activities are deemed appropriate (Puley and Charles, 2022). Rather than passive recipients of policy, stakeholders become active partners in the process and a solid and inclusive feedback process showing how their knowledge and views have been incorporated into policy design is essential in building their formal role and ensuring involvement in future co-design activities.

Finally, researchers will need to develop the tools and skills to facilitate participatory action. Engaging in co-design is an applied form of research and involves the researcher taking on a boundary spanning role, navigating between the worlds of the policy maker and the stakeholder to enable trust building and reflection, and to translate outcomes from a co-design process into clear messages for policy improvement. Researchers play an important role in the co-design process, designing and implementing activities and techniques to ensure scientific rigour in real-time policy development. Governmental social researchers and co-design experts within government departments also act as a conduit for engaging with policy teams.

Co-design is becoming fashionable in UK policy making, but the institutional set-up within government departments currently lags behind the ambition to involve stakeholders more directly in policy design. However, there have been positive developments in this regard since these projects were undertaken. For instance, Defra now has its own co-design team and, in fisheries, the Bass Fisheries Management Plan is being led by Policy Lab, co-design experts who are embedded within the Department for Education. Unless central government can be more open, accessible, transparent and committed to actually including

stakeholder views in all instances then co-design, at best, will not achieve its full potential or, at worst, it can destroy trust between policy makers and those who will be affected by the policies.

CRediT authorship contribution statement

Powell John: Conceptualization, Investigation, Methodology, Visualization, Writing – original draft. **Reed Matt:** Investigation, Methodology, Writing – original draft. **Ambrose-Oji Bianca:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft. **Chiswell Hannah:** Formal analysis, Investigation, Methodology, Writing – original draft. **Courtney Paul:** Investigation, Methodology, Writing – original draft. **Lewis Nick:** Investigation, Methodology. **Urquhart Julie:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. **Williams Chris:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft.

Declaration of Competing Interest

None.

Data Availability

Data will be made available on request.

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