

The challenge of embedding an ecosystem services approach: patterns of knowledge utilisation in public policy appraisal

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Abstract

The rise of an 'ecosystem services approach' (ESA) to policy-making has refocused attention on the utilisation of environmental knowledge in policy making. Policy level appraisal has long been identified as a critically important venue in which knowledge should be utilised. Important lessons can therefore be drawn from these experiences to inform the future potential of an ESA. This paper addresses this politically important challenge by reporting on the content of 75 policy appraisals undertaken in the United Kingdom between 2008 and 2012. The UK is a 'most likely' case for knowledge utilisation given its long-standing commitment to both policy appraisal and ESA. However, analysis reveals that only some elements of an ESA appear in the sampled appraisals, and those mostly among appraisals produced by the environment ministry. Drawing on theories of policy appraisal and knowledge utilisation, this paper concludes that a better understanding of the barriers to embedding an ESA in policy appraisal is urgently needed in order to inform wider debates about how to institutionalise ecosystem values in policy making.

1. Introduction

The global Millennium Ecosystem Assessment (MA, 2003), which raised the international profile of the ecosystem services approach (ESA) (see *** editorial introduction***), is based on the premise that managing ecosystems sustainably requires sufficient good knowledge about how they function to be embedded in decision-making processes. The United Kingdom was one of the first countries to formally respond to this challenge with the

publication of its National Ecosystem Assessment in 2011 (UK NEA, 2011a; ***Waylen and Young in this issue***). The NEA built upon the work undertaken in the Millennium Ecosystem Assessment, and arguably represents the most comprehensive overview to date of the state of the natural environment in a nation state. The NEA was also firmly underpinned by the argument that an audit of the services provided by ecosystems would provide the basis for embedding environmental knowledge in decision making. Crucially, the NEA argued that the capacity of UK natural resources to deliver ecosystem services had declined dramatically over the last 60 years. This decline was, in large part, attributed to the fact that the natural world, and its constituent ecosystems, “are consistently undervalued in conventional economic analyses and decision making” (UK NEA, 2011b, 5).

However, the ‘problem’ of under-valuation was not presented as arising from too little knowledge per se. Far from it: “we already have sufficient understanding to manage our ecosystems more sustainably and good evidence of the social benefits that would arise from doing so” (UK NEA, 2011b: 14). Rather the problem was presented as being one of knowledge production and *utilisation*. Understanding *how, by whom and in which contexts* this knowledge about ecosystems - and the services they provide - is embedded in decision-making was thus identified as a vital challenge for scientists and policy makers concerned about the diminution of global ecosystems.

The MA clearly shows how ecosystems knowledge assessment fits within iterative decision-making analytical processes (e.g. MA 2003, Chapter 8). But there are many different contexts or *venues* in which the embedding of knowledge about ecosystems into policy could in principle occur (for a review of these so-called ‘response options, see Chapter 27 of the NEA (2011)). These include expert advisory bodies, legislative inquiries, and planning

systems (see, for example, Barker 1993; Howlett & Craft 2012). *Policy appraisal* is one of the principal venues promoted both by environmental economists (e.g. see Hanley, 2001; Pearce 1998, 2004; Turner 2007) and political systems such as the European Union (CEC 2009; CEC 2012) and the UK (HMT 2012). Appraisal is, of course, not the only venue (Jordan and Schout 2006), but it is widely identified as being a particularly promising one in which to embed an ESA in policy making.

However, appraisal is rather “different” (Radaelli (2007: 3) from other venues. In many venues, knowledge is assumed to flow from knowledge generators into the decision making processes. Getting knowledge utilised is thus heavily determined by the ability of ‘generators’ to find the right moment to ‘deploy’ their knowledge. With appraisal, on the other hand, it is the policy maker that is supposed to search for and weigh the knowledge for themselves. Indeed in many jurisdictions appraisal is mandatory; there is an obligation on policy makers - many of whom are generalists rather than specialists with analytical skills - to collect and show, via published reports, that they have collated and utilised knowledge in their policy making activities. Of course the act of performing appraisal does not mean that a particular type of knowledge will be used (Nilsson et al 2008; Turnpenny et al 2008; Hertin et al 2009). Nonetheless, given the widespread diffusion of policy appraisal techniques across the world in the last 10-20 years (Radaelli 2005), this is a particularly important venue in which to observe how far an ESA might be employed (see ** editorial in this issue **).

Since the late 1980s, policy appraisal has played a particularly important role in UK environmental policy-making; in fact the UK is often said to be a ‘front runner’ in the development and application of appraisal (Russel and Jordan 2007; Russel and Turnpenny 2009). The 1990 Environment White Paper (DoE, 1990) rolled out a system of ex-ante

appraisal to assess the environmental impacts of major policy developments regardless of sector, acknowledging the fact that many of the activities causing environmental degradation reside in non-environmental policy sectors (e.g. transport, energy). That system was originally dominated by economic thinking, with guidance (DoE, 1991) strongly advocating a cost-benefit approach with monetary quantification of impacts. In 2004, it was replaced by a more integrated form of 'regulatory impact assessment' (RIA), in which potential environmental impacts of policy options were assessed alongside other impacts such as the regulatory burdens on business, race, health and gender.

The 2011 Natural Environment White Paper (HMG 2011), which in part sought to implement the findings of the UK NEA, strongly emphasised the importance of appraisal for embedding ecosystems knowledge into policy (ibid, Chapter 3). It was backed up by supplementary guidance to the Treasury's Green Book (HM Treasury 2012), the 'bible' on appraisal. But while the NEA (e.g. UK NEA 2011: Chapter 27) asserts that appraisal is a venue in which knowledge about ecosystems *could* in principle be used it did not systematically examine how far this had actually been achieved in the past. There is in fact a sizeable literature (see Adelle et al 2012 for a comprehensive review) that questions the validity of this assertion, but it was not cited in the NEA. According to this literature, appraisal is not nearly as unproblematic a venue for knowledge utilisation as the authors of the NEA (and the MA before it) seemed to assume. In practice, there are many obstacles to getting knowledge about ecosystems embedded in policy making via routinised, policy level appraisal (e.g. Adelle et al 2012; Turnpenny et al 2009; Nilsson et al 2008).

The UK is an excellent case in which to examine the embedding of knowledge about ecosystems in policy making. It was an early pioneer of appraising policy for environmental

impacts and was, as noted above, one of the first countries to respond to the Millennium Ecosystem Assessment. And although the monetary valuation of ecosystems and the environment is not uncontroversial (see e.g. Foster 1997; Haines-Young and Potschin 2009; Norgaard 2010), the strong economic framing of an ESA in the UK has arguably made it especially amenable to utilisation within rational appraisal techniques such as monetary valuation. In the UK, such techniques have been promoted for at least the last thirty years (see e.g. review by Turner et al 2003). Thus there are good reasons for treating the UK as a ‘most likely’ case in which to find ecosystem knowledge being not only heavily but also routinely utilised in policy level appraisal.

The remainder of this paper subjects this assumption to critical analysis. First of all, it devises a framework through which to study how far knowledge about ecosystems – particularly framed in terms of ESA - is embedded in the particular venue of policy appraisal. Then it outlines a methodology for studying this empirically. Second, using this framework and methodology it summarises the findings of an empirical assessment of the degree of embedding in a representative sample of UK policy level appraisals conducted between 2008 and 2012, i.e. before and after the publication of the NEA. Third, it explores the findings of this analysis from the perspective of the existing theoretical and empirical literatures on appraisal, knowledge utilisation and policy making. Finally, it concludes by outlining the policy implications of the findings and pinpointing some important areas for future research.

2. Exploring the use of knowledge about ecosystems in appraisals

In this paper we examine the extent to which knowledge about ecosystems knowledge is embedded within the practices of appraisal. Measuring influence is difficult when going beyond a simple input-output model (Rich 1997: 16), and a variety of methods are required

for full analysis. For example, in Rich's typology of ways that knowledge may be used, detecting 'use' and 'utility' are likely to require in-depth surveys and case studies over extended periods of time. Similarly, understanding some of the more subtle modes of use (symbolic, strategic, co-production) and the role of boundary work, arguably demand detailed process-tracing. As a first step analysis, the paper does not therefore examine the influences of an ESA on policy outputs and longer term outcomes. Rather, it relies on document analysis to assess how ecosystems and ecosystem services appear in a sample of UK RIAs. This approach is extremely useful because policy-makers are required to use appraisal documents to record in a transparent manner the different sources drawn upon in assessing the potential impacts of different policy options. Documentary analysis allows us to map patterns of knowledge use in a longitudinal manner with the degree of consistency a written record offers. Indeed an appraisal report represents a discrete event, a snapshot of evidence around a policy area at a particular time, as well as a summary of a knowledge-gathering and marshalling process, and hence contains clues to the different influences on the final results.

In this paper, we look for evidence of an ESA in the spirit of that promoted by the MA, the NEA, the UK's Natural Environment White Paper and supplementary guidance in the Treasury's Green Book. Specifically, an ESA is taken to cover: *supporting* services, such as soil formation, nutrient and water cycling; *regulating* services, such as pollination and regulation of pests and diseases, and the way the climate and water systems work; *provisioning* services, such as provision of food, fibre, fuel, water; and *cultural* services, such as gardens, parks, lakes, wilderness, leisure, education, and aesthetic aspects (UK NEA, 2011b: 18). We also look for evidence of other aspects central to an ESA such as: consideration of indirect and long-term impacts, integration between environmental, social and economic aspects of ecosystems, and use of analytical tools around capturing values of

different ecosystems, often in monetary terms. We hence look beyond the more narrow focus of the ESA for broader references to ecosystems and other environmental concerns more generally. We might expect more general environmental impacts of policy to be more likely to appear in our sample than specific references to the (relatively new) conceptual terminology associated with an ESA (e.g. see Russel and Jordan 2007; Russel and Turnpenny 2009).

We examined the content of 75 RIAs conducted in the UK between 2008 and 2012 (See Annex). Crucially, this period covers the time before and after the UK NEA and Natural Environment White Paper. The sample contained 15 RIAs from each year. The aim was to achieve roughly equal proportions of RIAs covering i) environmental policies, ii) policies related to environment - principally those with potentially significant environmental impacts (agriculture; housing and land; energy and natural resources; transport) - and iii) non-environmental policies (e.g. social security, sport, criminal law). Some RIAs were deemed to cover two or more policy fields; in these cases if one or more of the policy fields was deemed environment or environment-related, the whole RIA was classed as environment-related. The sample was coded by two of the authors. To ensure reliability, a sub-sample was assessed by both coders to ensure consistency; frequent consultation between coders sought to minimise inter-coder variability. The final totals were: 17 environment cases, 36 environment-related cases, and 22 non-environment cases. The departments which initiated the RIA were also recorded to see how far an ESA had, as the NEA envisages, spread beyond its 'home domain', that is the environment ministry - the Department for Environment, Food and Rural Affairs (Defra) – its strongest advocate in the UK government.

To classify the degree of embedding of environmental considerations or ESA in appraisals, we build on Helming et al (2012) in distinguishing between the extent to which policy is *framed* around an ESA (for environment and environment-related policies) and the extent to which potential *impacts* of the policies are assessed from an ESA perspective (all policies). For both ‘framing’ and ‘impacts’, we classified the 75 RIAs on the following criteria:

- Type 0: No ecological or environmental knowledge referred to;
- Type 1: environment mentioned but not evaluated at all;
- Type 2: the environment mentioned but some elements are missing, and those that are there are only weakly evaluated;
- Type 3: strong environment framing and evaluation, but ecosystems not explicitly mentioned;
- Type 4: contains framing around an ESA but does not carry out much analysis; in this sense it identifies the ecological impact of the proposed policy but does not go in analysis beyond vague descriptions. In-depth analysis of the different services affected is lacking.
- Type 5: An ESA fully embedded throughout, i.e. as well as explicitly referring to one or more of the ecosystem services - the RIA examines long-term impacts; considers indirect impacts; takes an integrative approach (both between policy fields and environment, social and economic aspects); and uses different valuation tools, or other types of analytical tools to understand ecosystem complexity.

The RIAs were also assessed for the *degree* of consideration of cultural, provisioning, regulating and supporting services, to gain a more nuanced insight into how ecological knowledge is understood and covered in appraisals. Note that higher type numbers are not

necessarily ‘better’ than lower numbers. For example, an appraisal classed as Type 4 may have a large number of ESA-type elements in it, but just not explicitly framed in those terms. Conversely, an RIA may readily employ the terminology of ESA but only analyse the constituent elements (i.e. services) to a more limited extent. Finally, the typology is not normative – we do not judge whether embedding an ESA is a ‘good’ thing; rather we simply assess the degree to which the concept appears in the way that policy options are described and compared in the appraisal documents.

3. Patterns of knowledge utilisation in the venue of policy appraisal

Figure 1 shows the percentage of appraisals in the sample that conformed to each of the six different types set out above.

*Figure 1: Percentage of sampled RIAs with different types of ecosystems services **framing**: environment vs. environment-related policies*

Crucially, we only find an explicit ecosystems framing (i.e. Types 4 or 5) to be present in about 12% of environment and environment-related policy cases. The most common areas are climate change, energy and nature conservation. Figure 2 presents the same data from a departmental rather than policy-type perspective. It distinguishes between RIAs from the environment ministry (23 cases) and those from other departments (52 cases). This illustrates the spread of the ESA beyond its origins. We find an explicit ESA framing to be present in around 20% of environment ministry-led RIAs. This may be surprisingly low at first sight, given Defra is the lead department. Potential reasons for this finding (based on past studies of appraisal performance and the knowledge utilisation literature) are explored in Section 5.

*Figure 2: Percentage of sampled RIAs with different types of ecosystems services **framing**: Defra vs non-Defra RIAs*

While an RIA may be *framed* around an ESA or the environment, this does not necessarily mean that the analysis of policy options therein will pick up on these issues in a meaningful way. In Figures 3 and 4 we show the degree of an ESA evident in the RIAs' assessment of the *impacts* of policies.

*Figure 3: Percentage of sampled RIAs with **impact** analysis framed to different degrees around an ESA: environment vs. environment-related policies*

*Figure 4: Percentage of sampled RIAs with **impact** analysis framed to different degrees around ESA: Defra vs non-Defra RIAs*

About 10% of environment-related RIAs and about 18% of environment RIAs showed evidence of an ESA in the assessment of impacts. These were often the same policy cases as showed a strong ESA framing. These rather low figures are perhaps not surprising, as an ESA has only been formally adopted in the UK since the NEA and the publication of the Natural Environment White Paper in June 2011. Within our sample of 75 RIAs, only 25 date from after this, and the most recent RIA analysed was dated only 11 months after the White Paper. Of the six RIAs that were classified as Types 4 or 5 on framing and/or impacts, five were published around the time of, or after, the White Paper.

In some 'Type 4' cases (for example the 'National Planning Policy Framework', and 'Planning for a Natural & Healthy Environment' cases – see Annex), an RIA may

acknowledge that the policy issue at hand has strong implications for ecosystems, but does not actually analyse the impacts of the proposed policy options. It may be that the ecological relevance of the policy is so obvious that it was felt unnecessary to conduct a fuller analysis. The difficulties and ethical dilemmas behind measuring ecological impacts and assessing their costs and benefits, including scientific uncertainty and controversies over monetising environmental costs and benefits are covered extensively in the existing literature; past research has suggested these factors might contribute to weak analysis of environmental and by extension ecological impacts in policy appraisal (e.g. Pearce 1998, Russel and Jordan 2007).

In other cases (for example in the case of transferring British Waterways' functions to the charitable sector), there is a strong ESA framing, but this is somewhat disconnected from the policy outputs, which do not necessarily follow from an ESA. In some respects, this refers to what Rich (1997) would call 'utility', where the appraiser sees that the ESA could have value but without identifying how in relation to the policy problem. On the other hand, we may be seeing a strong disconnect between understanding the implications of a policy impact and a policy going ahead regardless. As with all areas of policy making, trade-offs have to be made (Russel and Turnpenny, 2009), meaning that while a policy maker may understand the ecological implications of policy, other priorities may be driving the policy. Existing literature on policy appraisal suggests that these priorities are shaped politically outside of the appraisal process, through actions such as lobbying, ministerial discretion and inter-department negotiations (Russel and Jordan 2007; Turnpenny et al 2008).

We did find a larger number of RIAs that had a strong environmental framing and/or impacts analysis without explicitly mentioning an ESA (i.e. Type 3): about 25-30% of environment

policy RIAs and 8% of environment-related ones. As suggested above, because the UK has been appraising policy for environmental impacts since the 1990s (Russel and Jordan 2007), it is perhaps not surprising that this has been more readily picked up than the more recent and narrow concept of an ESA. Indeed, the concept of sustainable development and environmental protection has become common language amongst UK policy makers, albeit not leading to what many critics would call sustainable outcomes (Russel 2007). Within this environmental framing, we also see elements not too dissimilar to an ESA, including an integrated approach, and assessment of the impact on a number of different ecological services such as regulating, provisioning and cultural services with some attempt at monetisation. However, they are not necessarily termed this way in the impact assessments; for example, impacts on climate change may be considered but not framed in terms of a regulating service impact. Thus, while RIAs may not be framed using the language of an ESA, they nonetheless consider many elements of it.

With this in mind, we examined in more detail the approach taken in those RIAs which had a greater degree of environmental and/or ESA framing, or analysis of impacts – i.e. explicitly mentioning an ESA, or employing a strongly integrated environmental analysis. These are the cases that were classified as Types 3, 4 and 5. 14 RIAs out of the total 75 came under this category. Figure 5 illustrates the different elements of an ESA that were most prominent *among the RIAs in this sub-sample*. It classifies each RIA's consideration of the separate elements into one of the above types. Of the results from this analysis, only Types 3, 4 and 5 are presented here.

Figure 5: Number of the sub-sample of RIAs displaying different elements of an ESA

Regulating services appears to garner the most attention, with all the sub-sample of RIAs assessing this element to some extent. This compares with the lower profile of cultural services, even among those RIAs that are framed around an ESA. It appears that the ‘least environmental’ aspects of an ESA still appear less frequently than the more explicit natural processes, nature conservation, and food and fuel provision.

Appraisal processes are typically characterised by the use of analytical tools to order, process and generate (new) knowledge (Nilsson et al 2008). Indeed the Green Book (2012) advocates the use of complex analytical tools and approaches (e.g. cost-benefit analysis). The 75 sampled RIAs were examined for the types of tools used to process and generate knowledge. Fully 95% of the cases showed some form of monetary assessment, including monetary costs and benefits of the policy impacts. 17% of the cases showed use of more sophisticated tools like life-cycle analysis, or computer modelling. This represents a significant increase in the use of such tools, compared to that found by previous studies (see Turnpenny et al 2008 and especially Russel and Turnpenny, 2009).

A requirement to consider integration across environmental, economic and social effects is exemplified by the fact that official guidance says that all RIAs must at least consider these impacts. While the response is often to simply say there are ‘no impacts’, this does at least make policy makers think more widely than the often narrow remit of the policy appraisal. However, in our current sample, there was almost no evidence of attempts at valuing of ecosystems services, even among the small subset of RIAs that explicitly examined ESA impacts.

There was also ample evidence that, despite some signs of at least a strong environmental framing and attempts at more sophisticated tool use to analyse impacts, many assessments appeared to only use tools to examine pre-selected policy proposals. For example, cases where only two options were considered (do nothing vs. do something), or only one option was analysed, or policy set by EU was simply framed as ‘to implement or not’ rather than exploring implementation options. Related to these are cases whose premise is environment or sustainable development, but where the RIAs focus on one very specific aspect like data availability, infrastructure siting or legal procedures¹. Indeed, it has been argued that in the UK, policy appraisals tend to focus on a fairly narrow set of options within a general policy direction that has in effect already been decided (Russel and Jordan 2007, Russel and Turnpenny 2009).

While we found many examples where an ESA has not been taken to analyse impacts, this does not necessarily mean that the assessment is ‘bad’. For example, in the 22 RIAs sampled that were classified as from ‘non-environment’ policy fields, all were classed as Type 0 for an ESA framing, and 86% were Type 0 for an ESA approach to impact analysis, with just a few cases which mention environment in passing. But as Rich (1997: 12) observes it “may be fully rational to ignore information or to actively reject it.” For example, in the case of an RIA on product placement in visual media (‘Legislation to implement the European Audio-visual media Services Directive (product placement on Television’), the ecological impact of the policy is so negligible that not taking an ESA appears logical. Moreover, a similar case

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see for example the following cases in the Annex: ‘Proposal to Consolidate & Amend the Town and Country (Environmental Impact Assessment) (England and Wales) Regulations 1999’; ‘Fairer and Better Environmental Enforcement proposals’; ‘Amendments to Planning Policy Statement 25: Development and Flood Risk’; ‘Making better use of Energy Performance Data’; Sea Fishing (Illegal, Unreported and Unregulated Fishing) Order 2009’; and ‘Plant Protection Products: Enforcement Regulations and Fees Regulations’

can be made for simple policy amendments where impacts are minimal. These are clear examples of 'non-related non-use' where the appraiser has not sought out ecological knowledge as it is clearly not relevant to the issue at hand. However, the not insignificant number of environment and environment-related RIAs that did not analyse environmental impacts at all (18% and 33% respectively – see Figure 3) are more interesting. Embedding of an ESA to even a minimal extent might be expected in these cases, but it appears to be missing. Understanding the reasons behind this, and the associated capacities and constraints, is therefore crucial.

4. Understanding and explaining knowledge utilisation in appraisal

Lessons from attempts to integrate environment into appraisal

Crucially, some of the issues we observe in relation to the use of appraisal to embed an ESA are not unique. In this section we put the above findings in context by turning to the wider literature on how policy appraisal has fared in integrating environmental, or more specifically ecological, knowledge into decision making processes. To start with, the NEA's statement that the UK's natural environment has been undervalued in UK policy making suggests policy appraisal has been less than successful as an integration mechanism. Indeed, there is a growing body of literature that suggests the implementation of policy appraisal has been somewhat at odds with the economically framed 'textbook' model of how it should work (see Russel and Jordan 2007, 2009; Nilsson et al 2008; Russel and Turnpenny 2009; Hertin et al 2009a; Turnpenny et al 2009; among many others).

In this regard, much of the existing research on appraisal examines its operation 'in practice', in individual jurisdictions and internationally (e.g. Lee and Kirkpatrick 2004; Renda 2006;

Jacob et al. 2008; Hertin et al. 2009b; EEAC 2006). This research has generated a fairly consistent picture of the empirical 'reality' of appraisal, namely that there is a gap between the aims of appraisal and its implementation: the economic aspects of policy all too easily crowd out other issues (e.g. social and environmental) in appraisal processes (e.g. Wilkinson et al 2004; Russel and Turnpenny 2009; Hertin et al 2009a); appraisals tend to be performed at a relatively late stage in the policy process and consequently have little or no influence over the final decisions made (Russel and Jordan 2009; Russel and Turnpenny 2009; Hertin et al 2009a); consultation is often limited to the 'usual suspects' who have participated before or who have large resources (Russel and Turnpenny 2009; Turnpenny et al 2009); more advanced appraisal tools such as computer modeling are rarely used despite the strong political invocation to use them (Nilsson et al 2008).

Many different reasons for these observations are identified. These include the educational background of government staff or their professional identity (e.g. Dunlop and Russel (2012); lack of resources (time, money and human) (see for example Russel and Jordan 2007; Turnpenny et al 2009), resulting in preferential use of the most readily available (rather than necessarily the most useful) data. Such accounts generally focus on the micro-level of individual actions and decisions regarding appraisal (Turnpenny et al 2008). They are based on the premise that producing and embedding a strong knowledge base for appraisal is a resource intensive activity, while policy makers are often faced with resource constraints (Russel and Jordan, 2007; Turnpenny, *et al* 2008). This can be compounded by the fact that policy makers often do not have the required analytical skills or knowledge to conduct a comprehensive appraisal. Implementing an ESA within appraisal systems is not exempt from such difficulties, particularly the importance of improving data sets, communication and system knowledge (e.g. Coleby et al 2012). It is under these constraints that officials must

decide how much information to seek, the level of analysis, and what type of analysis to conduct.

The policy appraisal literature – and the associated policy recommendations - has often tended to focus on these micro-level factors enabling or constraining knowledge use.

However, it is also important to look beyond these micro-scale enablers and constraints (Billé et al 2012) to those at a more meso and macro-scale. Craik et al (2012: 20) note that the operation of assessment ‘depends on the political and institutional characteristics within which it is embedded’, and argue for the relevance of informal ‘norms’ about how policy gets made. The role of appraisal as a tool of political power distribution – and also as a tool influenced by political power – is critical (Craik et al 2012: 33).

At the meso-level (Turnpenny et al 2008), several factors influence the way in which knowledge is collected and deployed in appraisal. These include the political, organizational and institutional traditions of ministries, particularly the function of analysis within the institutions, informal ‘norms’ about how policy gets made and core strategic beliefs and priorities impacting upon what the remit of the appraisal is, and hence what gets assessed (Hertin et al 2009a; Craik et al 2012); departmental competition among ministries leading to some issues being prioritized in departments over others to promote a department's cause within government (Russel and Jordan 2007; 2009); the strength or otherwise of appraisal quality control mechanisms (Dunlop et al 2012); the degree of path dependence on earlier policy decisions (Turnpenny et al 2008).

There are also macro-level enablers and constraints. These include the political desire to maintain flexibility and control over policy decisions and to especially avoid to politically

inconvenient results in the appraisal analysis (Turnpenny et al 2008; Russel and Turnpenny, 2009). Moreover, critics argue that appraisal is far from value neutral; it has embedded discourses which can empower some actors and agendas over others (Owens *et al* 2004; Craik et al 2012: 33) and is conversely malleable enough to be hijacked by specific political agendas (Dunlop et al 2012). The strong economic framing for embedding an ESA into appraisal could be seen as one such discourse that empowers ecosystem valuation over other framings. Finally, decisions made elsewhere, such as EU law and international agreements, mean that, frequently, policy appraisal processes become rather peripheral exercises because the agenda has already been largely set (e.g. Russel and Jordan 2007).

The utilisation of appraisal knowledge

We now turn to literature on knowledge utilisation as a means to interpret these patterns of knowledge creation and use in appraisal. In this paper, there were relatively few cases where the analysis in the RIA helped to choose a policy option from ‘cold’. Expectation that such cases should be the norm builds upon an expectation of knowledge use as fact-gathering, which is then communicated to powerful actors who then make decisions based upon the data. Such a linear-rational process (Owens et al 2004; Owens 2012), where knowledge use is *instrumental*, derives from a rational choice model of policy-making underpinning appraisal and official appraisal guidelines (Jenkins-Smith 1990). Thus knowledge use is about “furnishing authoritative, dispassionate advice for the benefit of those in power” (Owens 2012, p. 6). But in spite of decades of social science research (Heclo 1974; Lindblom 1979; Sabatier 1988; Majone 1989; Jenkins-Smith 1990; Radaelli 1995; Haas 2004; Owens et al 2004; Kingdon 2010) which challenges this simplistic model, this linear-rational model suffuses public expectations of the role of knowledge. Consequently apparent

‘under-utilisation’ of knowledge is often common, and not unique to appraisal or ecosystem impacts of decisions.

However, the knowledge utilisation literature tells us that richer understandings can be gained through a more nuanced understanding of the term 'use'. As Caplan et al (1975; quoted in Rich 1997) note, assessing the extent of knowledge utilisation largely depends on how use is conceptualised. This entails recognising the many different definitions (Rich 1997) and models of knowledge use, and that what evidence gets used, when and why, are empirical questions. Indeed, in the area of ecosystem services, Billé et al (2012), identified several different ‘modes’ of use of ecosystem valuation being applied in different decision making venues: instrumental both ex ante and ex post, conceptual/enlightenment, and justificatory.

On the surface, many of the observations we see in our sampled appraisals appear to conform to the notion of the *symbolic use* of knowledge. Here, knowledge use is perfunctory as policy makers seek to justify a pre-determined policy or demonstrate that they have gone through a bureaucratic procedure. Thus the appraisal becomes a venue in which symbolic claims are made to show that the pre-determined policy has been subjected to policy making stipulations (Russel and Jordan 2007). Here the analysis within the policy appraisal is merely a device to tidy up rather than drive policy development. As explained above, many of the RIAs sampled appeared to only use tools to examine the impacts of pre-selected policy through for example only examining two options, and even then only really analysing one of them. Others, rather than focusing on ecological impacts tended to focus on technical details like data availability, infrastructure siting or legal procedures, which can explain some of why only around 20% of environment ministry RIAs explicitly show an ESA. This situation is not unique to an ESA, however. Other empirical studies have observed that some appraisals tend

to focus on fairly narrow implementation options once the policy direction has already been formulated, and hence have limited impact on strategic policy direction (Russel and Jordan 2007; Russel and Turnpenny 2009; Dunlop et al, 2012).

Knowledge can also be used *strategically*, such as between government ministries where appraisal data can be used as ammunition in political conflicts. According to Owens (2012, p.7) such use is “less to do with dispassionate analysis than with the interplay of interests, institutions and power.” In relation to policy appraisal, such a use of knowledge would involve ‘cherry-picking’ knowledge to be embedded in appraisal to support a strategically important initiative of a department. Thus the venue of appraisal only presents an analytical veneer. While it is difficult to say whether this is happening on the basis of content tests, it is a familiar finding in the appraisal literature. However, as Hertin et al (2009a: 1198) note, the strategic use of knowledge:

“can legitimately broaden the knowledge base of policy making, but it can also involve the conscious manipulation of evidence (e.g. in the form of overstating the costs of regulation). Strategic use tended to occur in relation to issues with high ‘decision stakes’. In some cases, assessment processes even became an additional venue for conflict. This was particularly the case if key actors had the expertise and information to engage in a factual discussion, and if knowledge claims could be used to support their position.”

In such cases, conflict can encourage policy makers to look for more robust evidence in an attempt to win political conflicts. Thus the strategic use of knowledge may ultimately enhance the embedding of an ESA, by bringing value conflicts out into the open.

Finally we turn to the idea of *conceptual* use. Conceptual use occurs where the accumulation of knowledge gradually contributes to long term ‘enlightenment’ (Owens 2012, p. 8). Thus we might expect to see only gradual evidence of diffusion and increased embedding of concepts such as an ESA over longer time periods. While an ESA first captured the attention of policy makers with the publication of the Millennium Ecosystem Assessment in 2003, conceptual modes of knowledge utilisation (Weiss, 1979; Sabatier, 1998) suggest that knowledge impacts are not immediate but occur over longer time periods as a critical weight of evidence builds up. Thus the paucity of an ESA within the appraisals observed may be caused by it being too early to observe its widespread embedding. It may appear first as a simple acknowledgement of its existence, and perhaps a rudimentary framing of the problem using ESA language – before being used subsequently in more detail to generate instrumental results.

5. Conclusions and new directions for analysis and policy

Policy appraisal has been identified as a crucial venue to embed an ESA within policy-making. In many ways it is an old solution to a much older problem: how to ‘green’ policy making). However, there are, to date, very few empirical analyses of how far this hope is actually realised. Without such analyses, policy pronouncements run the risk of running ahead of everyday policy practices and/or being misconceived. This paper has addressed this important policy gap by exploring ecological knowledge utilisation in the venue of policy level appraisal in the UK. As was noted in the opening section, there are very strong grounds for treating the UK as a ‘most likely’ case in which to find ecosystem knowledge being heavily and routinely utilised in policy level appraisal.

Our findings reveal that while UK authorities can draw on extensive experience, there are still significant obstacles standing in the way of the systematic embedding of an ESA in practice. We find that relatively few appraisals (about 10% of environment-related RIAs, and about 18% of environment RIAs) exhibited evidence of an ESA. While an RIA may acknowledge that the policy issue at hand has strong implications for ecosystems, it may not actually analyse the impacts, and/or it may be somewhat disconnected from the policy outputs. Even among those that do consider an ESA, it appears that the ‘least environmental’ aspects of an ESA still appear less frequently than the more explicit natural processes, nature conservation, and food and fuel provision. New ideas are often slow to diffuse and spread, at least at first, due to institutional inertia, pre-existing policy constraints, the time taken for new coalitions of interests to be formed around the new ideas, and the potentially significant shifts in intellectual changes required from different policy actors. The evidence from this paper is that an ESA is indeed taking time to diffuse, even within the UK environment ministry.

Earlier, we suggested that appraisal was ‘different’ to other types of knowledge utilisation venues as it forces decision makers to seek and synthesise knowledge. However, our empirical findings suggest that appraisal exhibits many of the patterns of knowledge use observed in other non-appraisal venues. If the UK - as an appraisal and ESA pioneer – is finding this difficult, it raises questions over how much reliance to place on appraisal to embed an ESA in societal practices. This is not to say that policy appraisal is unsuitable for embedding an ESA – see for instance the discussion on the conceptual use of knowledge. But it does raise important areas for future research that we discuss below.

Crucially, it is also important to bear in mind that a large number of RIAs revealed a strong environmental or sustainable development framing without explicitly mentioning an ESA:

about 25-30% of environment RIAs and 8% of environment-related cases. This was particularly noticeable around the requirement to consider environmental, sustainable development and greenhouse gas impacts of all policy proposals. This requirement may not produce much (or any) analysis or influence on the policy output, but it requires officials to at least *think* about the issues; they are not completely alien concepts. The impacts of such requirements are not trivial. We note a significant increase in the sophistication of analysis present in the RIAs as a whole, compared to that found by past studies. Crucially, monetary assessment is now strongly promoted in RIA guidance, and it actually gets done in almost all cases, and reasonably comprehensively, although there is tendency still to monetise economic impacts rather than environmental or indeed ecological ones. The point is that an official obligation to carry out a certain type of analysis is an important factor in its uptake. On this point, there is now supplementary guidance on *ecosystems* in Green Book, an institution normally very resistant to change. It remains to be seen what impact this will have on the embedding of an ESA in RIAs. There are also questions over whether the strong promotion of *valuation* in the NEA (and Green Book) is likely to enhance or hinder the embedding of ecological knowledge in decision making.

Nevertheless, there remains a relatively large number of RIAs on environmental policy which report very little analysis of any sort; a finding which chimes with countless previous studies. Particularly, the perennially narrow remit of RIA still appears to affect ability to carry out extensive new analysis or policy reframing. To be clear, the absence of an ESA is not necessarily a problem to be rectified – it could simply be that the concept is of minimal relevance to the policy at hand. But it will be interesting to examine cases where integration of an ESA might be more expected but it is not happening, for whatever reason, and also the

cases where there is stronger evidence of an ESA – to see why and how the concept has been taken up, and with what results.

The results presented in this paper do inform this task. First, they help to address the question “how does one define the ‘use’ of an ESA?” by unpacking different definitions, such as conceptual framing rather than an instrumental learning about policy impacts. Other ‘modes’ of knowledge use, such as that associated with the co-production of knowledge and as elements of boundary work (Owens 2012), are potentially important. The argument runs that each representation can be observed to different extents, and in overlapping and complex interactions. Future research examining these interactions in the case of an ESA in policy appraisal may yield further useful insights. However, these are difficult to detect without in-depth interviews to elicit the motivations for appraisers to include the ESA in an appraisal, or for selecting one type of knowledge over another. Moreover, interviews would allow for an examination of how knowledge use within the formal appraisal process interacts with wider, more informal, policy processes.

Second, future research on better understanding the *influence* of an ESA on policy outputs and outcomes will complement this paper’s findings on the *appearance* (or not) of an ESA in policy appraisal activities. While looking for ESA knowledge within appraisal tells us something about how it is prioritised in the policy making process, it tells us little about the factors that shaped the ultimate policy decision. It may be, for example, that an appraisal had a strong ecosystems framing but had little impact on the final policy decision - or vice versa. Future research could help to tease out the influences that did *not* result in action (e.g. information received, read and rejected). A further strand of research could focus on the influences on the ESA framing itself, and the likelihood that such a framing will form the

basis of policy-making activity in the first place. For example, the influence of political party, degree of politicisation of a policy problem, and the problem structure may all be critical factors.

Third, the results in this paper can be tested against the various factors that generally affect the embedding of an ESA. These may include the level of political conflict in a policy field, the tractability of policy problems, the mobilisation of powerful advocates, the availability of resources, and the willingness of actors to accept different ways of approaching problems. The requirement for officials to collect and use knowledge within appraisal systems means that investigating how ESA has emerged/is emerging *in the awareness of policy officials*, may be a critical line of enquiry in understanding the processes shaping how an ESA and ecological knowledge is embedded in policy making more widely.

Annex: List of RIAs analysed

RIA	YEAR	Lead	POLICY AREA (E = environment; ER = Environment- related; N = non- environment)
2012 Diamond Jubilee Extra Bank Holiday	2011	DCMS	N
A Competition Regime for Growth	2011	BIS	N
A sustainable State Pension: when the State Pension age will increase to 66	2011	DWP	N
Amending the Dangerous Wild Animals Act 1976	2009	Defra	ER
Amendments to Planning Policy Statement 25: Development and Flood Risk	2010	DCLG	ER
Amendments to the Biofuel (Labelling) Regulations 2004	2011	DfT	ER
Amendments to the eligibility criteria for the Warm Front Scheme	2011	DECC	ER
Animal Gatherings (England) Order 2006	2010	Defra	ER
Apprenticeships, Skills, Children and	2009	DfE	N

Learning Bill 2009				
Ban on Phosphorous in Domestic Laundry Cleaning products		2009	Defra	E
Cattle Compensation: Bovine TB, Brucellosis, BSE and Enzootic Leukosis		2012	Defra	ER
Children and Young Persons Bill		2009	DCLG	N
Civil Contingencies Act 2004 (Contingency Planning) (Amendment) Regulations 2012		2011	Cabinet Office	N
Commencement of Part 5 of the Legal Services Act 2007		2011	MoJ	N
Common Agricultural policy Single Payment and Support Scheme regulations		2009	Defra	ER
Conservation and Amateur Vegetable Varieties Directive 2009/145/EC		2010	Defra	ER
Definition of zero carbon homes		2008	DCLG	ER
Digital Economy Bill		2010	DCLG	N
Dogger Bank Special Area of Conservation		2011	Defra	E
Draft Categories of Gaming Machine (Amendment) Regulations 2009	2008DCLG	N		
Draft Planning Policy Statement:		2010	DCLG	ER

Planning for a Natural and Healthy Environment				
Drinking Water Inspectorate Charging Scheme for England	2012Defra	E		
Duty to promote Democracy	2008	DCLG	N	
Education and Skills Act	2008	DfE	N	
Education Standards (Independent Schools) Regulations 2010	2010	DfE	N	
Energy Bill 2010-11: Green Deal Impact Assessment	2010	DECC	ER	
Environment Agency Transport and Works Act Order 2009	2008	Defra	ER	
EU directive on the exercising of voting rights by shareholders	2009	BIS	N	
EuP implementing measures for simple set top boxes	2008	Defra	E	
EuP Implementing measures of domestic lighting	2008	Defra	E	
Fairer and Better Environmental Enforcement proposals	2010	Defra	E	
First stage transposition of EU legislation to include aviation in the European Union Emissions Trading Scheme (EU	2009	DECC	ER	

ETS)				
FLEGT (Forest Law Enforcement Governance and Trade) licensing scheme, implementing FLEGT Regulation 2005		2011	Defra	ER
Flood and Water Management Act 2010 Sustainable Development Duty and Guidance	2011Defra	E		
Fourth Carbon Budget Level		2011	DECC	E
Free Prescriptions for cancer patients		2008	DH	N
Harbour Works (environmental Impact Assessment) (Amendment) (England and Wales) Regulations 2008		2009	DfT	ER
Implementation of 2010/79/EU on the adaptation to technical progress of Annex III to Directive 2004/42/EC of the European Parliament and of the Council on the limitation of emissions of volatile organic compounds		2012	Defra	E
Implementation of the Nitrates Directive in England 2013-2016		2011	Defra	ER
Implementation of the third EU directive on driving licences (driver testing and		2011	DfT	ER

driving examiners)			
Introduction of the New Medicine Service	2011	DH	N
Legislation to implement the European Audio-visual media Services Directive (product placement on Television)	2010	DCMS	N
M1 Junctions 10 to 13 Managed Motorway	2011	DfT	ER
M20 Junctions 4 to 7 Controlled Motorway (SI 2010/775)	2010	DfT	ER
Making better use of Energy Performance Data	2010	DCLG	ER
Merchant Shipping (Accident Investigation and Reporting) Regulations 2012	2012	DfT	E
Merchant Shipping (prevention of pollution by sewage and garbage from ships) Regulations 2008	2008	DfT	E
Merchant shipping (Vessel Traffic Monitoring and Reporting Requirements) (Amendment) Regulations 2008	2008	DfT	ER
Merchant Shipping and Fishing Vessels (Port Waste Reception Facilities) (Amendment) Regulations	2008	DfT	ER
Motor Vehicles (Replacement of	2009	DfT	ER

Catalytic Converters and Pollution Control Devices) Regulations 2009			
Moving the British Waterways network in England and Wales into civil society	2012	Defra	ER
National Planning Policy Framework	2011	DCLG	ER
Planning Act 2008 – Town and Country Planning: Impact Assessment of a statutory ‘design duty’ on those exercising regional/local development plan functions	2009	DCLG	ER
Plant Protection Products: Enforcement Regulations and Fees Regulations (final)	2011	Defra	ER
Plant Protection Products: Enforcement Regulations and Fees Regulations (consultation)	2010	Defra	E
Postal Services Bill	2009	BIS	N
Proposal to Consolidate & Amend the Town and Country (Environmental Impact Assessment) (England and Wales) Regulations 1999 (as amended)	2011	DCLG	E
Proposals for amending the Renewable Transport Fuels Obligation Order	2009	DfT	ER
Proposed Penalty Regime for the Ecodesign of Energy Related Products Regulations 2010 and the Energy	2012	Defra	ER

Information Regulations 2011				
Reduced frequency of inspection for wood of Acer from Canada and the USA		2012	Forestry Commission	E
Reducing and phasing out the horticultural use of peat in England	2011Defra	E		
Removing obligation to consider relevant factors at the point of Removal Decision		2012	Home Office	N
Restricting some types of permitted development on World Heritage Sites		2008	DCLG	ER
Review of Council Housing Finance		2009	DCLG	ER
Review of Export Control Legislation (2007)		2008	BIS	N
Revised Statutory Guidance for Local Authorities on Delivery of Free Early Education Provision for 3 & 4 year olds		2012	DfE	N
Sea Fishing (Illegal, Unreported and Unregulated Fishing) Order 2009	2009Defra	E		
Simplifying & streamlining rights of way procedures		2012	Defra	ER

Sunbed Regulation Bill	2010	DH	N
Town and Country Planning (Tree Preservation) (England) Regulations 2012	2012	DCLG	E
Traffic Signs (Amendment) Regulations and General Directions 2011	2010	DfT	ER
TSE responsibility and cost sharing proposals	2008	Defra	ER
UK renewable energy strategy 2009	2009	DECC	ER
UK Statutory Instrument for Credit Rating Agencies	2010	HM Treasury	N
Zero Carbon Homes	2009	DCLG	ER

Key

BIS = Department for Business, Innovation and Skills

DCLG = Department for Communities and Local Government

DCMS = Department for Culture, Media and Sport

DECC = Department of Energy & Climate Change

Defra = Department for Environment, Food and Rural Affairs

DfE = Department for Education

DfT = Department for Transport

DH = Department of Health

DWP = Department for Work and Pensions

MoJ = Ministry of Justice

IAs can be found in the impact assessment library:

<http://www.ialibrary.bis.gov.uk/search/index.cfm?advanced=1>

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