

1 **A new normative economics for the formation of shared social values**

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7 **Introduction**

8

9 It is widely accepted that transition towards a more sustainable society is in part dependent
10 upon an ability to link scientific knowledges - generated in fields such as sustainability
11 science - with socio-political actions that foster sustainable outcomes. For Miller, et al (2014:
12 p.239), this is about strengthening ‘... the role of values in science and decision-making for
13 sustainability,’ while for Rodriguez-Morales and Rawluk (this issue), it is primarily about the
14 deployment of political power in sustainability decision-making processes. In their work,
15 Westberg and Polk (2016) argue that this is about catalysing knowledge exchange between
16 sustainability science and society in such a way that new composite, socially constructed,
17 knowledges are generated that can inform the development of sustainability policy. As
18 Rawluk, et al (this issue) argue, this revolves around complex social-ecological
19 conceptualisations of values that inform the resource trade-offs that society is prepared to
20 accept in pursuit of sustainability, with the fundamental question being one of how choices
21 are made about these trade-offs (see also Anderson, et al, 2015, 2016).

22

23 Conventionally, in neoclassical economics, the social welfare questions raised by the pursuit
24 of sustainability have been addressed by reference to the aggregation of individual
25 preferences – often expressed and captured through market mechanisms (Bartkowski and
26 Lienhoop, 2018). While it has long been understood that this approach is inadequate (see
27 Massenber, this issue), as well as often inappropriate (Lienhoop, et al, 2015), the

28 development of more appropriate approaches has only emerged in the last 20 years. In
29 particular, those working in the field of ecological economics have developed new ways of
30 thinking that move away from the descriptive and positivist assumptions underpinning
31 neoclassical economics towards a more normative interest in questions about what ought to
32 be (Sagoff, 1998; Wilson and Howarth, 2002; Wilson and Hoehn, 2006; Pelletier, 2010;
33 Kenter, et al, 2014, 2015; Richardson, et al, 2015; Dryzek and Pickering, 2017; Strunz, et al,
34 2017). In particular, new ways have been sought for overcoming the limitations of
35 neoclassical economics, particularly with respect to recognising that social values are both
36 plural and shared (see, for example, Bartkowski and Lienhoop, 2018; Lien, et al, 2018).

37

38 As such, ecological economics has offered new insights into the types of evidence required
39 for decision making, particularly when sustainability is understood as a ‘post-normal science’
40 that is characterised by partial evidence that would in other – positivist - contexts be viewed
41 as insufficiently reliable for decision making (Ainscough, et al, 2018). However, as Kenter,
42 Bryce, et al (2016: p368) have observed, this means that we now need a ‘new valuation
43 language’ that is capable of expressing, rather than simply capturing, plural shared social
44 values that are formed in response to specific post-normal situations. While the need for a
45 new language might be recognised, there is as yet little work on what form it might take
46 (Sagoff, 1998; Wilson and Howarth, 2002; Wilson and Hoehn, 2006; Kenter, et al, 2011;
47 Dryzek and Pickering, 2017), nor how values should be articulated if not through a market-
48 based institution. This is because, as Irvine, et al (2016) and Kenter (2016) have argued,
49 some policy questions are so complex or socially sensitive that individuals are unlikely to
50 hold fully pre-formed values with respect to them, meaning that a deliberative intervention is
51 necessary to enable these individuals collectively to form and express their shared social
52 values – reflecting in a normative sense what they determine to be the values that ought to be

53 held by the group. In this sense, shared social values are those values that we form and
54 express in common as a result of formal deliberative processes (Kenter, et al, 2015). They
55 thus reflect a specific construction of social value that is distinct from other value types –
56 such as individually-held other-regarding values - and other value discourses (see Horcea-
57 Milcu, et al, this issue).

58

59 This recognition of a normative economic proposition is entirely appropriate to the study of
60 shared social values for sustainability, since ‘... the idea of sustainability is intrinsically
61 normative’ (Schmieg, et al, 2018: p.785; see also Horcea-Milcu, et al, this issue). Indeed, the
62 normative link between economics and sustainability lies at the core of both fields, in their
63 concern with conceptualising the basis upon which resource allocation decisions are made
64 (Pelletier, 2010). What differs is the purpose ascribed to such decisions, with the
65 conventional normative proposition in economics being related to maximising surplus
66 (Schmidt, 2017) through the maximisation of individual utilities (Bartkowski and Lienhoop,
67 2018), while in sustainability it has a broader understanding related to inter- and intra-
68 generational distributive justice (Miller, et al, 2014; Warlenius et al, 2015; Heindl and
69 Kanschik, 2016). This asymmetry represents a schism between the theoretical traditions that
70 inform sustainability science and those that inform economics (see Rawluk, et al, this issue).
71 This offers a space in which to investigate how far a renewed recognition of the normative
72 purposes that economics can have might provide new ways of not only identifying shared
73 social values for sustainability, but also ways of operationalising a new approach to
74 articulating these values in forms that are suitable for policy development. Indeed, it is
75 apparent that a new normative approach to economics could have the capacity to encourage
76 the formation of shared social values that harmonise with sustainability goals to the extent

77 that the market is no longer constructed as the primary value articulating institution for
78 sustainability.

79

80 The paper will commence with a review of normative economics and the formation of shared
81 social values that attempts to bridge the spectrum between broad transcendental values and
82 more place and time specific contextual values (see Kenter, et al, 2015; Raymond and Kenter,
83 2016). In so doing, the paper recognises the conventional distinction made between
84 normative and positive (or descriptive) economics: that the former deals with distributive
85 questions about what ought to be while the latter limits itself to largely value-free
86 descriptions of contemporary economic phenomena. However, the paper argues that the
87 distinction is less significant than the need to articulate the purpose for which economic
88 analysis is undertaken. And this, of course, also means clarifying the value articulating
89 institutions that are required to operationalise shared social values. The final substantive
90 section of the paper identifies five new principles that are necessary for the development of a
91 new normative value articulating institution that can form and express shared social values in
92 ways that are appropriate to sustainability science, policy and practice.

93

94 **Reworking normative economics to form shared social values for sustainability**

95

96 Shared social values are fundamentally normative - because the purpose that we ascribe to
97 them is to guide collective decision-making (Sagoff, 1988; Pelletier, 2010; Irvine, et al,
98 2016). They are typically deployed in complex policy areas such as sustainability (Schmieg,
99 et al, 2018), where multiple constructions of value shape the ways in which we individually
100 and collectively understand the world (Horcea-Milcu, et al, this issue). This can lead to us
101 taking up deontological positions in which the shared social values that we form or identify
102 collectively are not necessarily consistent with what we perceive to be our own self-interests

103 (O'Neill and Spash, 2000). These 'extra-personal' values are nevertheless likely to be
104 informed by our individual perspective – as far as we can determine it - and are thus likely to
105 include both transcendental (general) and contextual (specific to a given situation) values (see
106 Kenter, et al, 2015; Raymond and Kenter, 2016). But we are highly unlikely to perceive these
107 social values as simply an extension of our own values, nor as an aggregation of the
108 individual values of all those affected. Rather, in making normative judgements we are likely
109 to identify for ourselves a 'hybrid' position in which we believe that certain values 'ought' to
110 be common, public, or shared, even if they are inconsistent with our own interests. Evidence
111 from Raymond and Kenter (2016) indicates that this hybrid position is likely to be further
112 modified by discussion with others, with Bartkowski and Lienhoop (2018) noting a number
113 of studies in which individuals have modified their views as they have learnt more about the
114 subject in question. Consequently, as Sagoff (1988) and Pelletier (2010) have argued, such
115 shared social values cannot fully emerge from standard neoclassical environmental economic
116 valuation methods that seek to elicit and aggregate individual values, but instead require an
117 alternative – deliberative - approach and new 'rules of the game' (Kenter, et al, 2016;
118 Landsburg, 2007) that are (per)formed through new value articulating institutions.

119

120 As Landsburg (2007) has observed, the idea of developing new value articulating institutions
121 is uncomfortable territory because such institutions will identify social values that are formed
122 – and reformed - outside the economic models to which they will be applied. This is
123 particularly the case for the normative criterion of distributional justice that is core to issues
124 of sustainability (Pelletier, 2010). This means that the new rules of the game will need to
125 encompass plurality (O'Neill and Spash, 2000; Kenter, et al, 2015) by recognising that people
126 may simultaneously care about the environment normatively (ie independent of its effect on
127 them personally), subjectively (ie in full recognition of their own material well-being) and

128 contextually (ie with respect to a specific situation). This corresponds with the value
129 spectrum proposed by Kenter, et al (2015: p89) in which transcendental values influence
130 contextual values which, in turn, influence how shared values are expressed. This suggests
131 that the assessment of transcendental values may be key to developing new value articulating
132 institutions although, as Raymond and Kenter (2016) have observed, there have been few
133 studies of this type. As Raymond and Kenter (2016: p.241) argue, transcendental values –
134 which are associated with ‘... ethical principles and desirable end states ... that transcend
135 specific situations’ – are important in terms of the social values of sustainability because they
136 affect behaviours and influence how we view and use knowledge and evidence. Yet, as they
137 go on to show, this does not mean that such transcendental values are necessarily a well-
138 formed and stable platform from which to deliberate subjective and contextual values. There
139 is, thus, a need to reconsider how we understand and work with normative economics and
140 values.

141

142 Academic interest in normative economics has increased as it has become clear that markets
143 do not always provide suitable institutions for making resource allocation decisions, and that
144 maximising surplus is not always a suitable singular goal. While there is relative consensus
145 that normative economics focusses on questions of ‘what ought to be or ought to happen’
146 (McQuillin and Sugden, 2012), there is much debate about what this means, particularly in
147 terms of the relationship that economics has with concepts such as welfare, choice, norms,
148 value judgments and policy decisions (see also Massenber, this issue). This has led Mongin
149 (2006) to propose the following understanding:

150

151 ... the task of normative economics is to investigate methods and criteria for
152 evaluating the relative desirability of economic states of affairs. This is a
153 noncommittal statement because it does not say whether normative economics
154 itself endorses the evaluations (and thus *makes* value judgments) or just explores

155 the way of making them (and thus only *relates to* value judgments). Furthermore,
156 it does not decide either whether a more desirable state is one involving more
157 welfare, or more preference satisfaction. (Mongin, 2006: p. 20)
158

159 As this approach suggests, the factor that separates normative from positive economics is
160 fundamentally an epistemic question about the extent to which any given analysis is bounded
161 by an articulation of the purpose of that analysis. For Mongin – although not all economists
162 (see Kolm, 2000) - it is not necessarily the purpose of normative economics to make
163 judgments about relative outcomes, but it is its purpose to ensure that there is clarity about
164 the desired economic state of affairs and certainty about how relative changes in this state of
165 affairs are to be measured and reported. Thus, it is not that markets are necessarily
166 inappropriate institutions for articulating normative values but, rather, that the
167 appropriateness of the value articulating institution cannot be determined separately from the
168 purpose of the valuation exercise (see, for example, Cory, 2006, who argues that markets
169 operate on the basis of dual physiological motives rather than the singularity of self-interest
170 that is conventionally attributed to them). Thus, conventional markets are suitable for some
171 purposes, while in others we are likely to require a more sophisticated approach that
172 acknowledges both distributive justice and biophysical limits (see Schmidt, 2017).

173

174 This suggests that the significance of turning to normative economics lies less in any claim
175 that it may have to privilege distributive justice or scale concerns, and more in the need to
176 articulate clearly the basis upon which the distribution of resources will be undertaken
177 (Pelletier, 2010; Warlenius, et al, 2015; Heindl and Kanschik, 2016). Conventionally, of
178 course, we have tended to deal with questions about distributive priorities and scale by
179 intervening in market allocation mechanisms in order to reallocate surplus in particular ways.
180 However, as Schmidt (2017) observes, this assumes that the cost of redistribution is
181 negligible and that particular distributive outcomes are more important than the processes

182 used to achieve them. As Schmidt (2017) demonstrates, neither of these conditions holds in
183 many situations, because it is highly unlikely that an unfair or inequitable process can be
184 rendered fair simply by changing who gets what, and at a cost that is less than changing the
185 process in the first place. This is particularly the case where allocation is founded on
186 transcendental values that are unlikely to be coherently expressed in conventional markets –
187 if only because wealthier people will have more consumption possibilities and thus more
188 behavioural choice than poor people (McQuillin and Sugden, 2012).

189

190 Thus, as Kolm (2000) and Bartkowski and Lienhoop (2018) have argued, distribution
191 questions cannot be separated from their procedural and ethical dimensions – because it is
192 these very dimensions that identify the values required for decision making. Indeed, if we
193 accept that the shortcoming of conventional economics lies in its failure to articulate an
194 ideology that is appropriate for addressing issues of sustainability, we must surely accept that
195 a new normative economics must achieve the opposite and embrace the ethical dimensions of
196 distribution. This, however, presents us with a number of problems related to our (lack of)
197 ability to elicit values from individual people:

198

199 For at least the last three quarters of a century, both descriptive and normative
200 economics have been based on assumptions about individual rationality. In
201 descriptive economics, economic agents have been assumed to act as if seeking to
202 satisfy preferences that are *coherent*—that is, stable, consistent and context-
203 independent. In normative analysis, economic institutions, projects or policies
204 have been treated as justified to the extent that their outcomes are ranked highly
205 in the preference orderings that agents have been assumed to possess. (McQuillin
206 and Sugden, 2012: p.553-4).

207

208

209 This issue is at the core of the separation between normative and positive economics: how
210 can we justify placing the individual at the centre of resource allocation decisions when the

211 questions being asked are normative ones about ecological sustainability and distributive
212 justice (see Costanza and Folke, 1997)? The answer, for Pelletier (2010), Wilson and
213 Howarth (2002), and for Massenberg (this issue) with respect to the interdependency of
214 individual preferences, is that we cannot make such a justification and, instead, must view
215 each individual as a member of a social unit whose well-being is inseparable from the well-
216 being of every other member of that unit. In this construction of economics, values must
217 inherently be social, to the extent that there is no separate or over-riding self-interest to be
218 elicited. And social, in this context, must mean debated and deliberated by individuals in a
219 democratic forum to which all community members have access, for how else are social
220 values to be formed and prioritised (see Lo and Spash, 2013)?

221

222 **Operationalising new valuation principles for (per)forming social values for**
223 **sustainability**

224

225 The consequence of this line of argument is that there are three primary conditions for
226 normative economics to generate shared social values for sustainability: that there is an
227 agreed definition of distributive justice that will ensure social and ecological equity; that
228 economic activity is understood in terms of social units comprising individual actors; and that
229 the process for determining shared social values and, thus, the distribution of resources, is
230 democratic community-based deliberation. Following work by Spash (2007) and Lo and
231 Spash (2013), these conditions have been incorporated into a new approach to valuation,
232 referred to as Deliberative Monetary Value (DMV) (Kenter, Reed, et al, 2016), and have
233 informed a growing number of valuation studies (see, for example, Jobstvogt, et al, 2014;
234 Orchard-Webb, et al, 2016). All DMV exercises consist of facilitated small groups of
235 participants reflecting, discussing, learning and making judgements about the monetary
236 valuation of environmental and other public goods or policies (Kenter, 2017) in order to ‘ ...

237 establish contextual values around different options, and [to determine] a preferred option,
238 which is well informed and reasoned' (Kenter, Reed, et al, 2016: p.195-6).

239

240 While offering an apparently coherent approach that addresses many of the limitations of
241 conventional economic valuation, Bartkowski and Lienhoop (2018: p.97) urge caution
242 because it is really little more than the addition of deliberation to neoclassical welfare
243 economic theory, and thus '... lacks a convincing, consistent theoretical foundation.' The
244 limitations that this imposes are exposed if we question the extent to which distributive
245 justice should take into account more-than-human interests. While it might be axiomatic that
246 sustainability should be understood from a whole ecosystem perspective, there is little
247 evidence available about what this means in terms of procedural justice, with work on
248 ecosystem service assessments remaining decidedly anthropocentric (see, for example, Diaz,
249 et al, 2018). Similarly, while it is possible to think of more-than-human entities being
250 included within a broad definition of a social unit, it is hard to conceive of how such entities
251 would participate in the deliberative processes anticipated in the third condition. Of course,
252 this latter analysis can be extended to anyone who is not present at the deliberative event, or
253 who is otherwise inhibited from participating.

254

255 In addition to the issue of who or what is, or is not, part of the deliberation, the actual process
256 of shared social value formation is clearly dependent on a complex set of conditions that
257 foster social interaction and learning for sustainability, which are linked to questions about
258 how social groups undertake envisioning exercises that allow them to relate co-formed social
259 values to their own sustainability practices (Miller, et al, 2014; Kenter, 2017). A range of
260 conditions has been identified in the literature, including important work by Bartkowski and
261 Lienhoop (2018), but what is now required is an improved '... understanding of how values

262 are formed and enacted' (Kenter, Reed, et al, 2016: p.194). The contribution that a normative
263 economic perspective can make to this is the identification of a new set of valuation
264 principles that can elaborate the institutional framework that is required in order to form and
265 express shared social values for sustainability. Building on the work of Bartkowski and
266 Lienhoop (2018), it is proposed that there are five key principles of normative value
267 formation:

268

- 269 1. That social units are the appropriate scale of analysis for forming shared values that
270 are 'extra-personal' and reflect current understandings of distributive justice;
- 271 2. That there is procedural justice in the deliberation of shared social values, relating to
272 both human and more-than-human interests;
- 273 3. That decision-making is a constitutive process with instrumental outcomes that is
274 informed by deliberative valuation processes;
- 275 4. That a new dialectical approach to political decision making is required; and
- 276 5. That a 'value bank' is required, based on a new concept of Social Value Transfer
277 (SVT).

278

279 ***1. That social units are the appropriate scale of analysis for forming shared values***
280 ***that are 'extra-personal' and reflect current understandings of distributive justice***
281

282 The condition that social values are formed by social units - such as groups or communities -
283 requires us to stop thinking only about individuals having the capacity to hold values on
284 behalf of others as well as themselves (what Kenter, et al, 2015, have referred to as 'other
285 regarding values'). What is required instead is a more plural position in which individuals
286 are part of social units which foster a capacity within these individuals to form normative
287 values that comprise both transcendental and contextual elements. As Barbopoulos and
288 Johansson (2016) argue, the normative goal of acting appropriately is based on the relative
289 weight that people put on their moral obligation to do the right thing and broader social
290 pressures to fit in and belong – which is enhanced by group deliberation. For many, this
291 coalesces around ideas of environmental justice, understood broadly as the right of all people
292 to enjoy a clean and healthy environment and to be protected from harm caused by

293 environmental pollution (Martin, et al, 2013). Schlosberg and Collins (2014: p.359) add that
294 there should be a focus on ‘... local impacts and experience, inequitable vulnerabilities, the
295 importance of community voice, and demands for community sovereignty and functioning.’

296

297 Shifting focus from the atomised individual to the individual as part of a group also requires a
298 new approach to determining the appropriate size for the group for a deliberative exercise.

299 This depends upon whether the requirement is for stakeholder-based political representation,
300 or a broader statistical approach to representation. In environmental management the

301 emphasis is typically on stakeholder groups, whereas in deliberative democracy the emphasis
302 tends to be on mini-publics or mini-demos which are quasi randomly sampled to represent the
303 population (see Ranger, et al, 2016). In terms of the basis of deliberation, the normative

304 principle means that valuation exercises start from ethical questions about what is best for

305 society (Sagoff, 1998). This means that the new principles must understand sustainability as a
306 capital good, where trade-offs have to be made on the basis of social investment. Consistent

307 with Irvine, et al (2016), this means shifting valuation exercises from a focus on the

308 satisfaction of individual wants to one in which the gesture is associated with a shared sense

309 of what society ought to do, in terms of distributive justice. This means that normative social

310 values are essentially ‘extra-personal’, or plural, and beyond those of the individual.

311

312 ***2. That there is procedural justice in the deliberation of shared social values, relating***
313 ***to both human and more-than-human interests***

314

315 For many of those working in the field of sustainability, the concept of procedural justice
316 carries equal, if not more, weight than distributive justice, on the basis that we can design

317 procedures that are just, even if we cannot be sure that any given outcome will achieve

318 distributive justice (Eggleston, 2004). Rawls’ (1971) theory of justice provides a foundation

319 from which to develop an understanding of how procedural justice can be brought into the
320 formation of shared social values related to sustainability. Central to Rawls' thesis was the
321 idea of the 'original position' as a state in which fair social decisions can be made that would
322 have unanimous public support (what he termed perfect justice). In order to achieve this
323 position, Rawls (1971: p.141) suggested that everyone involved in a distribution exercise has
324 to be denied certain '... morally irrelevant information ...' such as their relative wealth, social
325 status and position with regard to the resources to be distributed. In this way, everyone is in
326 the same 'original position' and can thus make judgments free of their own individual self-
327 interests. In accepting that the original position cannot be achieved, Sen (2002, 2010) has
328 proposed the idea of using an 'impartial spectator' in deliberative processes whose purpose is
329 to ensure that the perspectives of those who are not present are taken into account. Of course,
330 these perspectives could include those of more-than-human entities.

331

332 What is clear is that procedural justice in deliberative valuation exercises requires a shift
333 towards ideas of a knowledge polity in which narrow constructs of (economic) expertise can
334 be broadened towards a new emphasis on addressing issues of public concern through a broad
335 range of expertises – of which economics will be one (Hansjürgens et al., 2017, and
336 Massenbergh, this issue, discuss a similar approach in relation to Buchanan's Constitutional
337 Economics). This reflects the emergence of a new epistemology of knowledge – and value -
338 formation that moves beyond exchange to posit that knowledges – and values – are co-
339 produced by social groups (Callon, 1999) – and that the procedural element of value
340 formation is fundamental. It also requires an understanding that choices are rational if those
341 making the choices can sustain them when subjected to scrutiny (Sen, 2010). As Bartkowski
342 and Lienhoop (2018) observe, this is very much part of Habermas' (1983) communicative
343 rationality in that individual participants develop, through deliberation with others, positions

344 which, to them, are rational and defensible. This is what Callon (1999) has termed a new
345 'technical democracy' in which the formation of composite knowledges and their associated
346 normative values should emerge from dialogue in which all forms of expertise are
347 recognised.

348

349 This approach to doing sustainability science has been used in England to address knowledge
350 controversies associated with flooding, through the formation of 'competency groups' that
351 have brought together a range of specialists and local people to take an holistic approach to
352 water management and flood prevention (Whatmore, 2009; Donaldson, et al, 2010). One of
353 the key purposes of the groups is to develop new collective competences in handling what
354 Whatmore (2009: p. 595) terms the 'double uncertainty' of flood-risk knowledge that has the
355 capacity to redistribute expertise across the expert/lay divide. Deliberated shared social
356 values lie at the core of these competencies. These values are both transcendental and
357 contextual and, while they may have elements of aggregated individual utility, they go
358 beyond this by making the dialogic element both instrumental – in identifying acceptable
359 norms – and constitutive of group agreement – and the need for the outcomes to be
360 acceptable to all (Hansjürgens, et al, 2017: p.14).

361

362 ***3. Decision-making is a constitutive process with instrumental outcomes that is***
363 ***informed by deliberative valuation processes***

364

365 Rather than the causal rationality of neoclassical economics, in which a specific process will
366 elicit a specific answer, ecological rationality is based very much in the realms of social
367 practices that do not necessarily conclude with consensus (Elster, 1982; Sen, 2002). Indeed,
368 as Costanza, et al (2017: p.7) have observed, the apparently simple process of listing values,
369 or ecosystem services, can make them sufficiently visible to be recognised in public policy.

370 This gives such activities both constitutive and instrumental purposes such that both the
371 process and the outcome are significant. This is similarly the case with deliberative
372 approaches to value formation, which are concerned with pooling knowledges and
373 broadening group understanding of complex problems through a constitutive decision-
374 making process:

375

376 Because the process of deliberation requires citizens to go beyond private self-
377 interest, it is ... believed that the outcome will increase the social equity and
378 political legitimacy of outcomes ... In this manner, the process of discourse itself
379 is taken to provide a '*corrective function*' for situations where individual citizens
380 alone possess incomplete information. Acting together, groups can piece together
381 a more complete, and socially just, assessment of ecosystem goods and services.
382 (Wilson and Howarth, 2002: p. 432)

383

384 For others, the corrective function lies in the co-production, or co-formation, of outcomes that
385 are, at once, constitutive of those involved and also reflective of broader normative values
386 related to everyone affected. As Hansjurgens, et al (2017) have argued, an outcome (or
387 Habermasian 'workable agreement') is in this sense normatively 'right' if it has come about
388 by participants agreeing on a course of action – even if this does not reflect a convergence in
389 their preferences (Bartkowski and Lienhoop, 2018: p.99). The course of action is also rational
390 if those involved can stand by it when questioned (Sen, 2010). This addresses Pelletier's
391 (2010) concern that we know little about how to operationalise outcome measures such as
392 distributional justice, other than that they are founded on widely accepted ideas relating to
393 freedom and equality, across time, for both humans and more-than-humans (see O'Connor
394 and Kenter, this issue).

395

396 ***4. A new dialectical approach to political decision making is required to ensure that***
397 ***decisions remain reversible until they have been extensively deliberated***

398

399 All approaches to deliberative value formation are based, ultimately, on some form of group
400 decision making process that, following Whatmore's (2009) concept of the knowledge polity,
401 is understood as inclusive and transparent, if not necessarily consensual (Bartkowski and
402 Lienhoop, 2018). This is, of course, problematic because while deliberation can potentially
403 promote understanding and generate new composite knowledges and values that reflect those
404 involved, it must be accepted that it does not always result in consensus, at least initially. For
405 Dryzek and Pickering (2017: p.353), deliberation involves developing a highly reflexive
406 approach to decision-making in which institutions have the capacity to reconfigure
407 themselves and the decisions that they make in direct response to self-reflection on their
408 performance. There are countless examples of situations in which such an approach would
409 have yielded more acceptable and convincing results without the need for reversing decisions
410 that had seemingly been made. For example, Irvine, et al (2016) describe how the initial
411 decisions made regarding the future of England's public forest estate were subsequently
412 found to be at odds with both public and expert opinions, and in need of substantial revision.

413

414 If decisions are only to be confirmed once the decision makers are confident in the outcome
415 of deliberation, there needs to be a process whereby they can understand how to react and
416 proceed when consensus is not achieved. As Sen (2010) observes, a group of reasonable
417 people may not reach consensus, even when experiencing an 'ideal speech situation' in
418 Habermasian terms – perhaps because of deep moral convictions (Dryzek, 2013). Thus,
419 following Bartkowski and Lienhoop (2018), deliberation needs to be seen as a form of
420 negotiation in which participants remain free to express their preferences, without the need to
421 arrive at a consensus.

422

423 Depending upon the circumstances, this outcome may be sufficient to inform policy makers
424 about the range of values that persist after deliberation. If it is not sufficient, because the
425 preferences expressed remain too diverse to support a specific decision, or there is a need to
426 identify a specific outcome or value, Bartkowski and Lienhoop (2018) recommend that a
427 formal process of negotiation is used to achieve the best outcome available. While such an
428 approach may be effective, Sen (2010) cautions that such negotiations could do little more
429 than obscure the underlying conflicts. Thus, where consensus is illusive it may be necessary
430 to restart the deliberative process, perhaps with new participants or different disinterested
431 spectators. In the most complex situations, or where preferences remain diverse, the act of
432 deliberation could be a relatively permanent part of a decision making process, with
433 preferences being synthesised at regular intervals to update decision makers on the ways in
434 which preferences are being formed, reformed and expressed.

435

436 ***5. That a 'value bank' is required, based on a new concept of Social Value Transfer***
437 ***(SVT)***
438

439 The cost of producing value estimates in cases where there is little or no market evidence can
440 be substantial (Wilson and Hoehn, 2006). This has led to the development of techniques for
441 using economic information derived for one situation to infer the economic value of the good
442 or service in question in another location or at another time. This process, known generically
443 as benefit transfer, is used either to estimate new value functions by modifying and applying
444 the original economic data, or to derive new value estimates by recalibrating the value
445 functions generated in the original valuation exercise (Wilson and Hoehn, 2006; Dryzek and
446 Pickering, 2017). Benefit transfer has been used extensively with respect to environmental
447 goods and services (Richardson, et al, 2015), as well as in global initiatives such as The
448 Economics of Ecosystems and Biodiversity (www.teebweb.org) and the The

449 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
450 (www.ipbes.net) (see Christie, et al, this issue). There are now databases of empirical
451 studies on the economic value of environmental assets, including the Environmental
452 Valuation Reference Inventory (www.evri.ca), which includes over 4,000 studies.

453

454 Given the potential need to conduct numerous, and perhaps continuous, deliberative exercises
455 to form shared social values, it is tempting to suggest that a modified form of benefit transfer
456 - which we might term ‘social value transfer’ (SVT) – could be developed. If successful, this
457 could facilitate the transfer of shared social values that have been deliberated for a primary
458 site or policy initiative to an alternative site or policy scenario. Given that, in theory at least,
459 the outcome of each deliberative exercise is unique, this is a highly contentious and perhaps
460 deontological suggestion – one that certainly needs much theorisation and development.
461 Indeed, benefit transfer itself remains highly controversial because of limited environmental
462 data, poorly conducted primary studies and a rudimentary approach to validating the
463 comparability of the primary and policy sites (Spash and Vatn, 2006). However, given the
464 potential advantages of making shared social values accessible to policy makers in a form and
465 at a cost that they cannot ignore, it is worth pursuing as a potential policy option.

466

467 In common with conventional benefits transfer, the quality of SVT would depend on
468 developing a strong functional understanding of how the deliberated values are formed and
469 expressed and, thus, how applicable they are likely to be in an alternative situation. More
470 fundamentally, it may well be that the normative assumptions and relative weight of different
471 moral criteria for deliberative valuations will differ from study to study, rendering the results
472 incomparable even if they are commensurable in the sense of all being in similar – usually
473 monetary - units. Alternatively, it could be that some shared elements do transfer, such as

474 broader transcendental values over a given period of time. This could mean that while it is
475 not possible to undertake a full unit-based transfer from one site or policy to another, it could
476 be possible to transfer a broad set of value indicators or parameters that can inform relatively
477 limited deliberative processes applied to the new site or policy context. Rather than an
478 EVRI-style database, this could lend itself more to a functional approach in which a
479 deliberated ‘library’ of transcendental values can be used for a range of approaches to
480 forming contextual values, for example through forms of behavioural economics and
481 deliberative monetary valuation (see Cory, 2006; Spash, 2007; Lo and Spash, 2013; Kenter,
482 2017).

483

484 **Conclusion: articulating the five principles for forming normative shared social values**
485 **for sustainability**
486

487 In a recent review article, Costanza, et al (2017: p.7) observed that we really do not have a
488 choice about whether or not to engage in the identification and application of social values
489 for sustainability, because we are required to make decisions that ‘... involve trade-offs
490 between ranges of things that affect human wellbeing differently.’ The question, thus, is not
491 whether we need to identify values, but rather, what kind of approach to valuation is most
492 appropriate to determining and articulating social values. Much work has been done in this
493 respect, in terms of new approaches to conceptualising ecosystem services (Acott, 2017;
494 Lien, et al, 2018) and in terms of increasingly sophisticated approaches to deliberation
495 (Spash, 2007; Raymond, et al, 2014; Kenter, Reed, et al, 2016; Kenter, 2017) and social
496 learning (Reed, et al, 2010). Increasingly, valuation exercises are able to express shared
497 values in ways that move well beyond conventional neoclassical economics and offer insights
498 into how people hold and form transcendental and contextual values for sustainability (see
499 Kenter, et al, 2011; Orchard-Webb, et al, 2016).

500

501 Yet, there remain gaps in our application of economic theory to social values for
502 sustainability, particularly with respect to the theoretical foundation of deliberative value
503 formation. Indeed, Kenter, Bryce, et al (2016) have questioned the extent to which
504 deliberation can create new democratic spaces and foster better decision making, while
505 Bartkowski and Lienhoop (2018) maintain that, at the moment, the economic valuation of
506 complex environmental goods and services is little more than an information tool that can be
507 used to stimulate public debate. But, as Bartkowski and Lienhoop (2018) proceed to argue,
508 recognising that deliberated value formation does not necessarily demand consensus, but
509 instead allows for complexity and deeply held views, is a step forward.

510

511 This is highly significant because while we have been ready to accept that sustainability is
512 intrinsically normative (Schmiege, et al, 2018), we have been much less ready to ascribe a
513 similar normative proposition to economics. Indeed, we have largely remained wedded to the
514 conventional proposition that economic analysis is related to the maximisation of surplus
515 (Schmidt, 2017), with ex-post interventions in markets to modify how this surplus is
516 distributed. This has, inevitably, meant that many questions remain about how best to co-
517 ordinate and develop work in the field of deliberative value formation, particularly around the
518 ‘rules of the game’ (Kenter, Bryce, et al, 2016: p. 366) that are required concerning the
519 processes of forming and expressing shared social values.

520

521 In addressing the need for a new set of rules, this paper has sought to return economics to its
522 normative foundations, by arguing that surplus maximisation is but one of a number of
523 normative purposes to which economic analysis can be applied. In particular, the paper has
524 proposed five principles for forming and expressing social values. These are based on a

525 normative approach in which the focus of value switches from the individual to social units
526 such as communities and broader society, with an associated epistemology in which such
527 shared social values are formed and articulated through dialectical deliberative social
528 processes. This approach is thus founded on the principles that both procedural and
529 distributive justice must be accounted for in the formation of shared social values for
530 sustainability. The theoretical position therefore reflects the harmonisation of normative
531 sustainability goals with a procedural approach to economic theory that is founded on justice
532 for both human and, potentially, more-than-human entities. The emphasis of this new
533 approach is thus on sustainability itself, with the economic purpose being to form and express
534 shared social values in ways that articulate the choices that we – society - seek to make in
535 determining how we allocate resources, before we undertake an allocation process. This
536 reflects a new world of ‘post-normal’ science (De Marchi and Ravetz, 2001; Ainscough, et al,
537 2018) in which there are few certainties upon which to base complex political decisions.

538

539 What the five principles offer, therefore, is the foundation for creating a new set of normative
540 valuation rules – and an associated value articulating institution - that are applicable to a
541 range of policy decisions related to sustainability science. In recognising the need for an
542 approach to procedural and distributive justice that is consistent with sustainability science,
543 the principles seek to address the concern expressed by Kenter, et al (2016) that
544 developments in the practice of deliberation have put more emphasis on technique than they
545 have on the processes through which shared values are formed and expressed. The principles
546 also recognise that – in theory - each deliberative exercise is unique, because the co-
547 constructed knowledges that are generated are necessarily unique to those involved. This
548 implies forming and expressing shared social values for each circumstance in which a
549 decision is required. Not only is this impractical, but there is little indication yet that it is

550 entirely necessary – because while each deliberation exercise may be unique, it is far from
551 clear whether the outcomes produced are similarly unique, or are informed, for example, by a
552 relatively stable set of transcendental values. Thus, just as approaches have been developed
553 for ‘transferring’ the economic benefits from one cost-benefit study to another, there may
554 also be scope for establishing a new form of Social Value Transfer (SVT) which provides a
555 mechanism whereby deliberated social values from one situation can be applied to other
556 similar situations and contexts. While remaining no more than an idea at this stage, such an
557 approach could provide indications of shared social value in cases where the cost of forming
558 a new set of values is greater than the likely benefit of doing so.

559

560 However, questions must inevitably remain about how far values formed and expressed in
561 one setting can be transferred at all. Work to date indicates that transcendental values are
562 themselves relatively stable because they are very much part of people’s identity (Kenter, et
563 al, 2015). However, as Kenter, Bryce, et al (2016) have argued, the extent to which specific
564 transcendental values are activated tends to be dependent on the context and framing of the
565 deliberation (for example, a flood event that brings out community spirit will probably
566 activate different transcendental values to those that would articulated in a debate over
567 windfarms). Following Kenter, Bryce, et al (2016), it may well be that we hold ‘proto-values’
568 that are partially formed prior to deliberation but which are then more or less fully formed by
569 each specific context. More research is required to establish this, but if it is the case, the SVT
570 approach could be developed by reference to the forming and expression of a broad range of
571 individually-held proto-values.

572

573 In concluding, therefore, the five principles identified in this paper address an established
574 research question by beginning to codify new rules of the game that are necessary in order for

575 deliberative value formation to move centre stage, in terms of value estimation and
576 sustainability science. The next step is to develop research that can apply, test and revise the
577 principles into a form that encourages a more standardised and replicable approach to
578 forming and expressing shared social values for sustainability.

579

580 **References**

581

582 Acott, T. (2017) WetlandLIFE: Nested ecosystem services, wellbeing and valuing nature.
583 Paper presented at the *Valuing Nature Annual Conference*, John McIntyre Centre, Edinburgh,
584 18-19 October 2017.

585 Ainscough, J., Wilson, M., and Kenter, J.O. (2018) Ecosystem services as a post-normal field
586 of science. *Ecosystem Services* 31: 93–101.

587

588 Anderson, M., Teisl, M., Noblet, C. and Klein, S. (2015) The incompatibility of benefit–cost
589 analysis with sustainability science. *Sustainability Science* 10: 33-41.

590

591 Anderson, M., Teisl, M. and Noblet, C. (2016) Whose values count: is a theory of social
592 choice for sustainability science possible? *Sustainability Science* 11: 373-383.

593

594 Barbopoulos, I. and Johansson, L-O. (2016) A multi-dimensional approach to consumer
595 motivation: exploring economic, hedonic, and normative consumption goals. *Journal of*
596 *Consumer Marketing* 33(1): 75-84.

597

598 Bartkowski, B., & Lienhoop, N. (2018). Beyond rationality, towards reasonableness:
599 enriching the theoretical foundation of deliberative monetary valuation. *Ecological*
600 *Economics* 143(Supplement C), 97-104.

601 Callon, M. (1999) The role of lay people in the production and dissemination of scientific
602 knowledge. *Science, Technology and Society* 4(1): 81-94.

603

604 Cory, G.A. (2006) A behavioral model of the dual motive approach to behavioral economics
605 and social exchange. *The Journal of Socio-Economics* 35: 592-612.

606 Costanza, R., de Groot, R., Braat, L., Kubiszewski, I., Fioramonti, L., Sutton, P., Farber, S.
607 and Grasso, M. (2017) Twenty years of ecosystem services: How far have we come and how
608 far do we still need to go? *Ecosystem Services* 28: 1-16.

609 Costanza, R. and Folke, C. 1997, *Valuing ecosystem services with efficiency, fairness and*
610 *sustainability as goals*, Island Press, Washington, DC.

611 De Marchi, B. and Ravetz, J.R. (2001) *Participatory approaches to environmental policy*.
612 EVE policy Research Brief Series No. 10. Cambridge: Cambridge Research for the
613 Environment.

614

- 615 Diaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R.T., Molnár, Z., Hill, R.,
 616 Chai, K.M.A., Baste, I.A., Brauman, K.A., Polasky, S., Church, A., Lonsdale, M.,
 617 Larigauderie, A., Leadley, P.W., van Oudenhoven, A.P.E., van der Plaats, F., Schröter, M.,
 618 Lavorel, S., Aumeeruddy-Thomas, Y., Bukvareva, E., Davies, K., Demissew, S., Erpul, G.,
 619 Failler, P., Guerra, C.A., Hewid, C.L., Keune, H., Lindley, S. and Shirayama, Y. (2018)
 620 Assessing nature's contributions to people. *Science* 359(6373): 270-272.
 621
- 622 Donaldson, A., Ward, N. and Bradley, S. (2010) Mess among disciplines: interdisciplinarity
 623 in environment research. *Environment & Planning A* 42: 1521-1536.
 624
- 625 Dryzek, J.S. (2013) The deliberative democrat's idea of justice. *European Journal of Political*
 626 *Theory* 12: 329–346.
 627
- 628 Dryzek, J.S. and Pickering, J. (2017) Deliberation as a catalyst for reflexive environmental
 629 governance. *Ecological Economics* 131: 353-360.
 630
- 631 Eggleston, B. (2004) Procedural justice in Young's inclusive deliberative democracy.
 632 *Journal of Social Philosophy* 35(4): 544-549.
 633
- 634 Elster, J. (1982) Sour grapes - utilitarianism and the genesis of wants. In: Sen, A., Williams,
 635 B. (Eds.) *Utilitarianism and beyond*. Cambridge: Cambridge University Press, pp. 219–238.
 636
- 637 Habermas, J. (1983) *Theory of communicative action, volume one: reason and the*
 638 *rationalization of society*. Translated by McCarthy, T.A. Boston, Mass.: Beacon Press.
- 639 Hansjürgens, B., Schröter-Schlaack, C., Berghöfer, A. and Lienhoop, N. (2017) Justifying
 640 social values of nature: economic reasoning beyond self-interested preferences. *Ecosystem*
 641 *Services* 23: 9-17.
- 642 Heindl, P. and Kanschik, P. (2016) Ecological sufficiency, individual liberties, and
 643 distributive justice: Implications for policy making. *Ecological Economics* 126: 42-50.
- 644 Horcea-Milcu, A.I., Abson, D.J., Apetrei, C., Riechers, M., Dușe, I-A., Dorninger, C., Lam,
 645 D.P.M., Freeth, R. and Lang, D.J. (2019) Values in transformational sustainability science:
 646 four discourses for change. *Sustainability Science*, this issue.
- 647 Irvine, K.A., O'Brien, L., Ravenscroft, N., Cooper, N., Everard, M., Fazey, I., Reed, M.S.
 648 and Kenter, J.O. (2016) Ecosystem services and the idea of shared values. *Ecosystem*
 649 *Services* 21: 184-193.
- 650 Jobstvogt, N., Hanley, N., Hynes, S., Kenter, J.O., Witte, U. (2014) Twenty thousand sterling
 651 under the sea: estimating the value of protecting deep-sea biodiversity. *Ecological Economics*
 652 97: 10-19.
- 653 Kenter, J.O. (2016) Editorial: shared, plural and cultural values. *Ecosystem Services* 21: 175-
 654 183.
- 655 Kenter, J.O. (2017) Deliberative monetary valuation. Ch. 34 in *Routledge handbook of*
 656 *ecological economics* (Ed. C. Spash). Abingdon, Oxon: Taylor & Francis Ltd.

- 657 Kenter, J.O., Hyde, T., Christie, M., Fazey, I. (2011) The importance of deliberation in
658 valuing ecosystem services in developing countries—evidence from the Solomon Islands.
659 *Global Environmental Change* 21: 505–521.
660
- 661 Kenter, J.O., Reed, M.S., Irvine, K.N., O'Brien, E., Brady, E., Bryce, R., Christie, M.,
662 Church, A., Cooper, N., Davies, A., Hockley, N., Fazey, I., Jobstvogt, N., Molloy, C.,
663 Orchard-Webb, J., Ravenscroft, N., Ryan, M., Watson, V. (2014) UK National Ecosystem
664 Assessment Follow-on: Work Package Report 6: *Shared, Plural and Cultural Values of*
665 *Ecosystems*. UNEP-WCMC, Cambridge.
666
- 667 Kenter, J.O., O'Brien, L., Hockley, N., Ravenscroft, N., Fazey, I., Irvine, K.N., Reed, M.S.,
668 Christie, M., Brady, E., Bryce, R., Church, A., Cooper, N., Davies, A., Evely, A., Everard,
669 M., Fish, R., Fisher, J.A., Jobstvogt, N., Molloy, C., Orchard-Webb, J., Ranger, S., Ryan, M.,
670 Watson, V. and Williams, S. (2015) What are shared and social values of ecosystems?
671 *Ecological Economics* 111: 86-99.
672
- 673 Kenter, J.O., Reed, M.S., Fazey, I. (2016). The Deliberative Value Formation Model.
674 *Ecosystem Services* 21, 194–207.
- 675 Kenter, J.O., Bryce, R., Christie, M., Cooper, N., Hockley, N., Irvine, K.N., Fazey, I.,
676 O'Brien, L., Orchard-Webb, J., Ravenscroft, N., Raymond, C., Reed, M.S., Tett, P. and
677 Watson, V. (2016) Shared values and deliberative valuation: future directions. *Ecosystem*
678 *Services* 21: 358-371
679
- 680 Kolm, S-C. (2000) A historical introduction to normative economics. *Social Choice and*
681 *Welfare* 17: 707-738.
- 682 Landsburg, S.E. (2007) The methodology of normative economics. *Journal of Public*
683 *Economic Theory* 9(5): 757-769.
- 684 Lien, A.M., Schlager, E. and Lona, A. (2018) Using institutional grammar to improve
685 understanding of the form and function of payment for ecosystem services programs.
686 *Ecosystem Services* 31, Part A: 21-21.
- 687 Lienhoop, N., Bartkowski, B., Hansjürgens, B., 2015. Informing biodiversity policy: the role
688 of economic valuation, deliberative institutions and deliberative monetary valuation.
689 *Environmental Science and Policy* 54:522–532.
690
- 691 Lo, A.Y. and Spash, C.L. (2013) Deliberative monetary valuation: in search of a democratic
692 and value plural approach to environmental policy. *Journal of Economic Surveys* 27: 768-
693 789.
- 694 McQuillin, B. and Sugden, R. (2012) Reconciling normative and behavioural economics: the
695 problems to be solved. *Social Choice and Welfare* 38: 553–567.
- 696 Martin, A., McGuire, S. and Sullivan, S. (2013) Global environmental justice and
697 biodiversity conservation. *The geographical Journal* 179(2): 122-131.
698
- 699 Massenber, J.R. (2019) Social values and sustainability: a retrospective view on the
700 contribution of economics. *Sustainability Science*, this issue.
701

- 702 Miller, T.R., Wiek, A., Sarewitz, D., Robinson, J., Olsson, L., Kriebel, D., Loorbach, D.
703 (2014) The future of sustainability science: a solutions-oriented research agenda.
704 *Sustainability Science* 9: 239-246.
705
- 706 Mongin, P. (2006) A concept of progress for normative economics. *Economics and*
707 *Philosophy* 22: 19-54.
- 708 O'Neill, J. and Spash, C. (2000) Conceptions of value in environmental decision-making.
709 *Environmental Values* 9: 21-536.
710
- 711 Orchard-Webb, J., Kenter, J.O., Bryce, R., Church, A. (2016) Deliberative democratic
712 monetary valuation to implement the ecosystem approach. *Ecosystem Services* 21: 308–318.
713
- 714 Pelletier, N. (2010) Environmental sustainability as the first principle of distributive justice:
715 Towards an ecological communitarian normative foundation for ecological economics.
716 *Ecological Economics* 69: 1887-1894.
717
- 718 Ranger, S., Kenter, J.O., Bryce, R., Cumming, G., Dapling, T., Lawes, E., Richardson, P.
719 (2016) Forming shared values in conservation management: an interpretive-deliberative-
720 democratic approach to including community voices. *Ecosystem Services* 21: 344-357.
721
- 722 Rawls, J. (1971) *A theory of justice*. Harvard: Harvard University Press.
- 723 Rawluk, A., Ford, R.M., Anderson, N. and Williams, K.J. (2019) Exploring multiple
724 dimensions of values and valuing: a conceptual framework for mapping and translating
725 values for social-ecological research and practice. *Sustainability Science*, this issue.
- 726 Raymond, C.M., Kenter, J.O., Plieninger, T., Turner, N.J. and Alexander, K.A. (2014)
727 Comparing instrumental and deliberative paradigms underpinning the assessment of social
728 values for cultural ecosystem services. *Ecological Economics* 107: 145-156.
- 729 Raymond, C. and Kenter, J. (2016) Transcendental values and the valuation and management
730 of ecosystem services. *Ecosystem Services* 21, Part B: 241-257.
- 731 Reed, M. S., Evely, A.C., Cundill, G., Fazey, I., Glass, J., Laing, A., Newig, J., Parrish, B.,
732 Prell, C., Raymond, C. and Stringer, L.C. (2010) What is social learning? *Ecology and*
733 *Society* 15(4): r1. [online] URL: <http://www.ecologyandsociety.org/vol15/iss4/resp1/>
- 734 Richardson, L., Loomis, J., Kroeger, T. and Casey, F. (2015) The role of benefit transfer in
735 ecosystem service valuation. *Ecological Economics* 115: 51-58.
736
- 737 Rodriguez-Morales, J.E. and Rawluk, A. (2019) Exploring technologies of power in the
738 expression of social values for sustainability: an example from Latin America. *Sustainability*
739 *Science*, this issue.
740
- 741 Sagoff, M. (1998) Aggregation and deliberation in valuing environmental public goods: A
742 look beyond contingent pricing. *Ecological Economics* 24: 213-230.
743
- 744 Schlosberg, D. and Collins, L.B. (2014) From environmental to climate justice: climate
745 change and the discourse of environmental justice. *WIREs: Climate Change* 5: 359-374.

- 746 Schmidt, S. (2017) A proposal for more sophisticated normative principles in introductory
747 economics. *The Journal of Economic Education* 48(1): 3-14.
- 748 Schmieg, G., Meyer, E., Schrickel, I., Herberg, J., Caniglia, G., Vilsmaier, U., Laubichler,
749 M., Horl, E. and Lang, D. (2018) Modeling normativity in sustainability: a comparison of the
750 sustainable development goals, the Paris agreement, and the papal encyclical. *Sustainability
751 Science* 13: 785-796.
- 752 Sen, A. (2002) The informational basis of social choice. In: Arrow, K.J., Sen, A., Suzumura,
753 K. (Eds.) *Handbook of social choice and welfare*. Amsterdam and Boston: Elsevier, pp. 29–
754 46.
- 755
756 Sen, A (2010) *The idea of justice*. London: Penguin.
- 757
758 Spash, C.L. (2007) Deliberative monetary valuation (DMV): issues in combining economic
759 and political processes to value environmental change. *Ecological Economics* 63(4) 690–699.
760
- 761 Spash, C.L. and Vatn, A. (2006) Transferring environmental value estimates: issues and
762 alternatives. *Ecological Economics* 60: 379-388.
763
- 764 Strunz, S., Klauer, B., Ring, I. and Schiller, J. (2017) Between Scylla and Charybdis? On the
765 place of economic methods in sustainability science. *Sustainability Science* 12: 421-432.
766
- 767 Warlenius, R., Pierce, G. and Ramasar, V. (2015) Reversing the arrow of arrears: The
768 concept of “ecological debt” and its value for environmental justice. *Global Environmental
769 Change* 30: 21-30.
- 770 Westberg, L. and Polk, M. (2016) The role of learning in transdisciplinary research: moving
771 from a normative concept to an analytical tool through a practice-based approach.
772 *Sustainability Science* 11: 385-397.
773
- 774 Whatmore, S.J. (2009) Mapping knowledge controversies: science, democracy and the
775 redistribution of expertise. *Progress in Human Geography* 33(5): 587-598.
776
- 777 Wilson, M.A. and Howarth, R.B. (2002) Discourse-based valuation of ecosystem services:
778 establishing fair outcomes through group deliberation. *Ecological Economics* 41: 431-443.
779
- 780 Wilson, M.A. and Hoehn, J.P. (2006) Valuing environmental goods and services using
781 benefit transfer: The state-of-the art and science. *Ecological Economics* 60: 335-342.
782
783