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1 **Forests in a bioeconomy: bridge, boundary or divide?**

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7 **Forests in a bioeconomy: bridge, boundary or divide?**

8 Bioeconomy is an emerging concept that is gaining momentum both in science and
9 policy. Within the forest sector, the bioeconomy discourse is already shaping the
10 international forest policy debate. Given the sector's importance for the national
11 economy, this study investigates the perceptions of bioeconomy by forest owners,
12 forest industry and ENGOs in Sweden. Drawing on cognitive and ideological
13 dimensions of political bargaining, we analyse to which extent the bioeconomy
14 serves as a bridging concept, a dividing concept or a boundary object.

15 The results show that the bioeconomy is a broadly accepted concept, perceived as
16 a natural extension of the Swedish forestry model. Results indicate that
17 bioeconomy is well aligned with the key characteristics of a boundary object, i.e.
18 serving specific interests of different forest stakeholders under the generally
19 accepted conceptual umbrella. We did not identify dividing effects of any
20 substance. On the contrary, the interviews provide a strong indication that
21 bioeconomy serves the Swedish forest sector as a bridging concept that brings
22 closer rather than antagonises the different actors.

23 Keywords: Bioeconomy, forest sector, Sweden, bridging concept, boundary
24 object, frame analysis

25 **Introduction**

26 Defined as an “*economy based on biomass for food, feed, energy and other purposes,*
27 *rather than fossil-based resources*”, bioeconomy is an emerging concept both in science
28 and policy (Staffas et al. 2013). Although its meaning is still in flux, increasing popularity
29 of bioeconomy suggests that it has the potential to become a “*new influential global meta-*
30 *discourse*” and consequently influence forests and forestry (Pülzl et al. 2014).

31 Forests are expected to provide a significant contribution to a bioeconomy (Scarlat et al.
32 2015; Ollikainen 2014), not least in a country like Sweden that is rich on forest and is the
33 world's second largest exporter of pulp, paper and wood products (Swedish Forest
34 Industries Federation 2012). Sweden is thus well positioned for the transition to a

35 bioeconomy (Formas 2012), and is expected to undergo significant structural changes
36 (Hetemäki 2014; Socaciu 2014).

37 There is a growing body of research exploring the concept of bioeconomy (Goven and
38 Pavone 2015; Schmidt et al. 2012; Staffas et al. 2013), including its role in reframing
39 forest discourses and shaping forest policy (Kleinschmit et al. 2014; Pülzl et al. 2014).
40 However, the existing literature still lacks empirical insights into the role of bioeconomy
41 in forest policy-making.

42 This paper draws on the importance of cognitive and ideological dimensions (Roe 1991;
43 Shore and Wright 1997) in the formation of policy discourses. Discourses, resulting ideas
44 and arguments are considered to have performative power, i.e. they shape actors' views,
45 influence their behaviour, beliefs and interests, and ultimately lead to institutional change
46 (Arts et al. 2010; Pülzl et al. 2014). Bioeconomy is seen here in the context of the
47 motivations of the actors choosing certain conceptual interpretations that then reside in
48 the interfaces between organizations or groups of people (Huvila 2011). Here, we
49 hypothesise that the Swedish forest stakeholders may choose between three possible ways
50 through which bioeconomy could be used as a discursive vehicle:

51 (1) *Boundary object*. Star and Griesemer (1989) introduced the notion of “boundary
52 objects” as an entity shared by several different communities but used differently
53 by each of them. A number of studies (e.g. Giorgi and Redclift 2000; Huvila 2011;
54 Oppermann 2011) applied the concept in the analysis of bounding discourses. As a
55 boundary object, the bioeconomy would be widely embraced by different actors as
56 a progressive concept, at the same time being assigned very different meanings in
57 accordance to actors' own values and interests. Boundary objects normally have a
58 purposeful nature and, as such, they cannot be viewed as politically neutral or

59 necessarily consensual (Huvila 2011).

60 (2) *Bridging concept*. Alternatively, bioeconomy could serve as a progressive
61 concept bridging the different interests between actors. Defined by Baggio et al.
62 (2015), a bridging concept differs from a boundary object in that it “actively links
63 fields and stimulates dialog”. The notion of bridging concepts has been discussed
64 in different contexts as well, e.g. Davoudi et al. (2012) discuss resilience as a
65 bridging concept that is translated from the natural to the social world and then
66 applied to planning. In the case of the forest sector, bioeconomy could bridge the
67 difference between actors whose interests have traditionally conflicted.

68 (3) *Dividing concept*. A third way in which bioeconomy could eventuate is as a
69 *dividing* concept. Different understandings of the same concepts, facts, problems
70 and opportunities often create political struggles (Fischer 2003). Subsequently,
71 divergent frames may give rise to intensified competition (Schön and Rein 2004).
72 As indicated by other studies on forest actors’ perceptions (Lindahl 2015), the
73 bioeconomy concept may be as well divisive, as it could be embraced by
74 production-oriented actors but rejected by environmental actors as a justification
75 for intensified forestry practices.

76 Therefore, this study aims to: (i) examine how bioeconomy is perceived by three main
77 groups of Swedish forest stakeholders; and (ii) investigate whether bioeconomy is
78 evolving as bridging concept, a dividing concept or a boundary object within the forest
79 discourse in Sweden.

80

81 **[Insert Figure 1 near here]**

82

83 **Materials and Methods**

84 *Data collection*

85 Initially, purposive sampling was used to identify the most pertinent actors in the Swedish
86 forest sector. Accordingly, the organisations approached and the individuals interviewed
87 in this study were chosen according to a preconceived, but reasonable initial set of criteria
88 (Sandelowski et al. 1992). We targeted larger organisations within the sector with the
89 assumption that, as larger lobby groups and forest producers, they are both more aware
90 of international trends influencing forest policy and have a greater influence on the
91 development of national forest policy. For example, the Federation of Swedish Farmers
92 (LRF) and Swedish Forest Industries Federation were included as organisations
93 representing large cohorts of forest owners and industries, and consequently exerting
94 weighty influence on the Swedish forest policy arena. For similar reasons, we targeted
95 representatives of the respective organisations, and/or engaged in communication or
96 lobbying for their cause.

97 In total, we sampled 12 experts, divided equally between three groups of
98 organisations, forest industry, forest owner associations and environmental non-
99 governmental organisations (ENGO) (Table 1). Although some organisations could have
100 been classified as either a forest owner or forest industry (e.g. Södra), classification was
101 based on how the organisations identified themselves. The chosen format of semi-
102 structured interviews enabled to retrieve relevant and comparable information at the same
103 time allowing unconstrained conversation offering further insights into issues of interest
104 (Turner 2010). Each interview opened with some personal background and also project

105 background questions, with the intent of making the interviewee more at ease and more
106 likely to speak openly. All interviewees were asked the same set of open-ended questions
107 which focused on the interviewees' interpretation of the bioeconomy (i.e., defining the
108 concept), and on their perception of bioeconomy as a bridge, divide or boundary concept;
109 here the open questions focused on actors' beliefs as well as perceived risks and
110 opportunities associated with bioeconomy. The final questions focused on the expected
111 impacts of bioeconomy on forests and forest management. All interviews were conducted
112 between 28 October 2015 and the 5 January 2016 by the first author of this study.
113 Interviews were taken in person at the premises of interviewees' organisations or per
114 telephone. Each interview lasted between 20 and 45 minutes and was recorded and later
115 transcribed verbatim.

116 [Insert Table 1 near here]

117 ***Data analysis***

118 Two approaches were used to analyse the produced interview data: content analysis and
119 frame analysis. Firstly, key themes were identified and then categorised as being new
120 opportunities for the forest sector provided by a bioeconomy or forces that were either
121 drivers or obstacles for the progression of a bioeconomy (Spencer et al. 2003). Secondly,
122 frame analysis was used to better understand the perceptions of bioeconomy. Frame
123 analysis delves deeper than identifying common themes as it encompasses the entire tone,
124 context and impression portrayed by the interview, as well as the transcribed text, to
125 provide a description. Typically it provides a way to investigate an actor's organisation
126 of experience and the action biases they promote (Entman 1993). Identifying frames from
127 the transcribed interviews allows an understanding of how the concept of a bioeconomy
128 is perceived and used by the various actors interviewed.

129 Analysis of transcribed interviews yielded two types of data, general themes and
130 frames. The themes, summarised in Table 2, were elicited as responses defining
131 bioeconomy and the drivers, obstacles and opportunities related to a bioeconomy. Frames
132 were identified from the transcribed interviews based on both the responses to a specific
133 set of questions that aimed to elucidate how bioeconomy was perceived and the overall
134 impression given by the interview. The results of the frame analysis, summarised in
135 Figure 2, were then used to answer the question of whether the bioeconomy concept was
136 being used as a boundary object, or a bridging, or a dividing concept.

137 **Results**

138 *Understanding bioeconomy: perceived opportunities, drivers and obstacles*

139 *What is a bioeconomy?*

140 In general, all three actor groups perceived bioeconomy positively. Described by the
141 industry group as “*a vision...for Sweden and for the world*”, bioeconomy was also
142 identified by the ENGO group as “*something that is a very vital and necessary part of a*
143 *sustainable society*” and the owners as “*a positive thing [...] will help us move forward*”.
144 Similarly, all three groups agreed that bioeconomy was defined as “*the part of [an]*
145 *economy built on the sustainable production of renewable materials from nature*”.
146 Owners also recognised that bioeconomy represents “*a shift from the industrial fossil*
147 *based economy*” as did ENGOs stating that “*[it] implies [...] a transition of the economy*
148 *from the present one*”.

149 Bioeconomy was also viewed as a response to the global issues of resource
150 depletion and increasing carbon emissions. As a consequence, bioeconomy promoted
151 forests as a global resource, as identified by an ENGO, “*if we really are going to build*

152 *this renewable society where forest biomass plays a big role [...] there are potentials to*
153 *increase biomass production globally as we have deforested areas, degraded forests”.*

154 *What opportunities does a bioeconomy present?*

155 Bioeconomy was perceived as an opportunity to communicate, both to inform society but
156 also to promote the forest sector. ENGOs recognised that as a term, bioeconomy could be
157 used to inform people “*who don't have a lot of knowledge about environmental issues or*
158 *sustainability issues*” and that it can be used to get people “*interested in something they*
159 *weren't before*”. The industry and owner groups also saw the term as an opportunity to
160 both “*to tell our story and show how good our products are*” and that it “*makes the whole*
161 *sector more accepted*” by showing the forest sector as part of a greener future.

162 *What are the drivers for a bioeconomy?*

163 Climate change was a major driver identified by all groups. Bioeconomy was identified
164 as “*an important part of the solution*” for climate change, with all groups recognising that
165 “*we must substitute fossil fuel based raw materials and energy*” in response to increasing
166 carbon emissions. Also based on the premise of substituting non-renewable products, the
167 need for sustainability was also perceived as a significant driver for a bioeconomy.
168 Identified by all three groups, sustainability was seen as a necessary response to
169 increasing population demand and limited resources and consequently, bioeconomy was
170 seen as “*a very vital and necessary part of a sustainable society*”.

171 All three groups of informants perceived the economic development as a primary
172 motivation for developing bioeconomy. The industry group in particular recognised
173 bioeconomy as “*a way to find new markets and new products and new ways of using this*
174 *raw material*” and emphasised its importance by stating that “*being able to make this*
175 *transition to a new economy, a bioeconomy, [is] vital for survival*”.

176 Regulation was perceived as another potential driver with the ENGO group saying
177 that although “*people want to be eco-friendly*” there was a perceived need for regulation
178 because “*we don't have time for everything to be so eco-friendly as possible in the world,*
179 *have to move it on a bit*”, which indicated that regulation was needed to drive behavioural
180 change. For this reason, “*regulations [...] that are in favour of sustainably produced*
181 *products*” could promote a transition to a bioeconomy “*by stopping the bad things*”. The
182 industry group likewise recognised that national and international policy were a necessary
183 driver to “*to promote new ideas and transform society*”.

184 *What are the obstacles for a bioeconomy?*

185 Societal disconnect from nature was cited as one of the major obstacles that could prevent
186 progress of a bioeconomy. Both the ENGO group and the owner group mentioned
187 society’s alienation from nature, which they attributed to urbanisation. This meant that
188 “*fewer and fewer people have actual knowledge and experience [...] about what nature*
189 *is and how it should be managed*”. This was seen as an obstacle because, as stated by an
190 ENGO representative, “*understanding of the forests and their environmental values and*
191 *ecosystem services is deteriorating [...] and that would then potentially undermine the*
192 *forest push that we manage them sustainably*”.

193 As well as a driver, regulation was also seen as potential obstacle for the
194 development of a bioeconomy. Bureaucracy in general was identified as an issue because
195 it could make forest utilisation so complex and difficult that “*forest owners will not*
196 *harvest*”. Regulation was also identified by the industry group as an obstacle when
197 policies failed to distinguish bio-based energy from fossil based energy and as a result
198 meant it was “*cheaper to import fossil fuels than to use renewable ones*”.

199 Resistance, both normative and from competing economic interests, was
200 identified as an obstacle for a transition to a bioeconomy. Normative resistance was seen

201 as an impediment for alternative uses of biomass because it was not “*what we are used to*
202 *doing*”. Competition was also perceived as an issue by an owner stating that, “*there are*
203 *institutions and sectors that are against the use of forest*” that have “*very strong economic*
204 *interests, which use lobbies and politics to promote their own products*”.

205 When viewing the forest as a limited resource for a developing bioeconomy, there
206 was a gradient of decreasing concern from the ENGO group to the owner and industry
207 groups. The ENGO group promoted the view that forest use is already at a limit, saying,
208 “*forest [in Sweden] is already being over exploited*” and emphasising a change in biomass
209 consumption patterns. The owner group also recognised that in Sweden “*we are cutting*
210 *as much as we can*” but identified that there was potential to increase growth, for example
211 with “*better seed orchards*” and “*denser stands*”. The industry group viewed forests as a
212 global resource that can be increased, stating, “*we can still do a lot more to have more*
213 *productive forests*”.

214 [Insert Table 2 near here]

215 ***Bioeconomy as a bridge, boundary or divide***

216 In general, there was a common understanding of bioeconomy between the groups, which
217 indicated that bioeconomy had potential as a bridging concept. Delving deeper, the
218 interviews exhibited a range of understandings and as a result, there was no clear
219 distinction between the groups in terms of how the concept was used. Instead perceptions
220 of the bioeconomy were more a function of individual understandings rather than beliefs
221 held in common for an actor group (Figure 2).

222 The notion that bioeconomy could be regarded as a bridging concept was
223 supported by interviews from all three actor groups. The industry group recognised that
224 “*we have to make it a concept that we can work on together as a whole society [...] we*
225 *need a common base in the vision*”. Similarly the ENGO group identified that “*if we use*

226 *[bioeconomy] just to reach our own political goals [...] it's not going to be very*
227 *constructive*". Deeper than commonalities, any indication that the bioeconomy concept
228 included a shift in attitude was a sign that the concept provided a bridge between
229 traditionally disparate groups. For example, an ENGO actor recognised that *"it's good,*
230 *better, to use more fibres to replace other things"* and industry and owners acknowledged
231 that *"it's important for us to redefine ourselves and become a part of the future"* and need
232 to *"shift from a traditional industrialised economy"*.

233 Bioeconomy as a boundary object had less support from interviews than it did as
234 a bridging concept. Owners in particular supported the notion, with three of the four
235 owners interviewed regarding bioeconomy synonymously with forestry stating that, *"we*
236 *are the bioeconomy"* and *"our mission has not changed but the wording has changed"*.
237 This view indicates that, counter to attitudes that supported bioeconomy as bridging
238 object, bioeconomy is a tool for society to accept forestry as it is.

239 Of the three alternatives, bioeconomy a dividing concept had the least support,
240 with only the ENGO group providing a nominal backing. The main reason this interview
241 was categorised as dividing is that bioeconomy was perceived as *"rhetoric"* used by the
242 *"the forest industry and others [...] to increase production, increase fertilisation, and*
243 *more exotic species"*.

244 [Insert Figure 2 near here]

245 **Discussion**

246 In general, bioeconomy was perceived positively by all interviewees. In this sense, it acts
247 as a "nirvana concept" that embodies an ideal image of the world, which societies strive
248 to reach (Molle 2008). The fact that each informant could define bioeconomy indicates
249 that the concept has already pervaded the national forest discourse in Sweden. Although
250 all interviewees perceived the concept positively only a few exhibited an understanding

251 deeper than a vague sense implying a push towards a more sustainable society. The broad
252 understanding could imply that the concept is still in its infancy and needs further
253 refinement before it can influence forest policy. Alternatively, the openness of the
254 definition can be viewed as a strength and consequently a reason why the concept had
255 universal acceptance between the diverse groups interviewed and was supported as a
256 bridging concept. This is in line with Kleinschmit et al. (2014) who found that
257 bioeconomy could diminish the traditionally strong actor-coalitions of the forest sector.

258 Not all informants saw it in this way though. The openness of the concept also
259 provided scope for stakeholders to interpret bioeconomy in their own ways, treating it as
260 a boundary object. Predominantly it was the forest owners, who interpreted bioeconomy
261 as a validation of forestry and as a consequence, perceived themselves as synonymous
262 with bioeconomy. In some regards this view may be accurate as forest owners supply raw
263 forest material. This, however, implies a normative resistance to any change from a
264 traditional forest management model. In fact, this difference in attitude clearly
265 distinguished the forest owners from the other two groups. As it is often the case with
266 boundary objects, they are usually employed by a particular group to differentiate
267 themselves from others (Huvila 2011). An attitude that equates bioeconomy with forests
268 and forestry – not altogether surprising in a country where the forest sector is so dominant
269 – could present a barrier for widespread adoption of the concept in Sweden.

270 Another reason that bioeconomy seemed to have widespread acceptance in this
271 study is that actors framed the concept in a way that aligns well with the current Swedish
272 forest model. Although there was a recognition that forests were a limited resource,
273 primarily by the ENGOs, there was simultaneously little sense that there was any need
274 for change in production or consumption behaviour. Rather, there was an expectation that
275 improved efficiencies and other developments will help meet future production demands.

276 Lindahl et al. (2015: 11) describes this attitude as the “*more of everything pathway*”, an
277 “*optimistic view that it is possible to create more of existing resources*” and as such, can
278 be seen as an extension of the Swedish forest model that traditionally has prioritised wood
279 production.

280 This study aimed by no means to be exhaustive nor claimed to be representative
281 for the entire bioeconomy discussion in Sweden. The particular focus on forests in the
282 bioeconomy allowed for some first insights into how the “moving” bioeconomy concept
283 is perceived by some purposefully chosen forest actors, and for discussing the
284 implications of these findings. It was beyond the scope of this study to dwell deeper into
285 actors’ interests and strategies. However, the infancy of the concept and actors’ interests
286 may have sponsored narrower frames in which problem formulations were delimited and
287 thus revealed perceptions that provided a rather optimistic view (Lindahl 2015). As the
288 political bioeconomy discourse becomes more established and materializes into Swedish
289 forest policy, future studies could follow up on this investigation and extend the study to
290 a larger population of actors, perhaps from other bioeconomy-relevant sectors (e.g.,
291 agriculture, energy sector, chemical industry etc.).

292 At this time however, the revealed actors’ perceptions offer the potential to shape
293 policy discourse towards the notion of bioeconomy as a natural extension of the
294 traditional Swedish forestry model. Whether motivated by a need for society to be
295 sustainable or a need for the industry to survive, all of the interviewees see bioeconomy
296 as a desirable future. Industry and ENGOs see it as a vehicle for progress, while for forest
297 owners it rather constitutes an approval of the current practices. Thus, the owners
298 perceive bioeconomy more as a pathway for society to progress towards them. In other
299 words, owners would expect the society to give a “green card” for the current forestry
300 practices, due to a better understanding of the role of forests in bioeconomy. In either

301 interpretation, such consensual “nirvana” (nobody is against bioeconomy) can risk being
302 hijacked by groups seeking to legitimize their own agendas (Molle 2008). This caveat
303 aside, bioeconomy has a clear potential to serve a bridging role, bringing together forest
304 actors with different interests. Let us conclude with the words of one of the interviewees:
305 “[bioeconomy] is a buzzword, but a useful buzzword”.

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388 Table 1. Interviewed organisations.

Group	Organisation	Number of interviews
ENGO	Forest Stewardship Council	1
ENGO	Greenpeace	1
ENGO	Swedish Society for Nature Conservation	1
ENGO	World Wildlife Fund	1
Industry	Forest Industries Federation	1
Industry	Svenska Cellulosa Aktiebolaget	2
Industry	Sveaskog	1
Owner	Federation of Swedish Farmers	2
Owner	Södra	2

389

390 Table 2. Summary of opportunities, obstacles and drivers identified by interviewed
 391 groups. An 'X' denotes that there was evidence from every interview within a group that
 392 supported the identified themes.

	ENGOS	INDUSTRY	OWNERS
OPPORTUNITIES			
COMMUNICATION TOOL	X	X	X
DRIVERS			
CLIMATE CHANGE	X*	X	X
ECONOMIC DEVELOPMENT	X	X	X
REGULATION	X	X	
SUSTAINABILITY	X	X	X
OBSTACLES			
REGULATION		X	X
RESISTANCE		X	X
RESOURCE LIMITATION	X		X
SOCIETAL DISCONNECT	X		X

393 Note: *There was no unanimous agreement within the group for this topic.

394

395 Figure captions:

396 1. Figure 1. Three potential interactions between two groups that the bioeconomy
397 concept can facilitate.

398 2. Figure 2. Summary of bioeconomy perceived as a boundary, bridging or dividing
399 object for each of the three groups interviewed.