Epistemic communities in political ecology: critical deconstruction or radical advocacy?

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Abstract
Recent political ecology scholarship appears to be turning towards de-growth agendas and radical activism, notably in Europe. These postures diverge somewhat from the 'classical' political ecological tradition rooted in a critical deconstruction of dominant ideas and actors and field-based analyses. We posit a heuristic distinction between these two impulses. While both are based in critiques (Robbins' 'hatchet'), as far as the 'seed' one impulse leans more towards critical 'deconstruction', the other towards radical 'advocacy.' Through a systemic review of the political ecology literature, we seek to identify and characterize these impulses, link them to epistemic communities of knowledge production, and explain these trends. Our review incorporates qualitative analysis of key texts, as well as quantitative bibliometric and content analysis of Scopus-indexed publications referring to political ecology (1951-2019) and abstracts from all the articles published in *Journal of Political Ecology*, from POLLEN conferences in Europe (2016, 2018) and from DOPE conferences in the US (2013-2019). Among other things, we find that even if political ecology has long been divided between deconstructivist and advocacy approaches, the second is becoming preeminent since many political ecologists are taking a radical turn, with strong theoretically rooted attacks on the capitalist system taking place. Some political ecological research increasingly positions itself in socio-political debates related to the greening of unjust societies in the First World. This is most prominent in continental European academia (and some English universities), where political ecology is institutionally more marginal; in the remaining British and North American universities, the more deconstructivist impulse is more dominant but also more pluralistic in its orientations.

Keywords: epistemic communities, political ecology, bibliometric analysis, content analysis, critical theory, activism

Résumé
La recherche récente en *political ecology*, notamment en Europe, semble se tourner vers des approches prônant la décroissance et un activisme radical. Ces postures divergent quelque peu de la tradition de *political ecology* « classique », ancrée dans une déconstruction critique des idées et des acteurs dominants et dans des analyses de terrain. Dans cet article, nous posons une distinction heuristique entre ces deux approches, héritée quelque part de la différence entre « hachette » et « graine » proposée par Paul Robbins. Si toutes deux sont fondées sur des critiques (la « hachette »), en ce qui concerne la « graine », une approche penche davantage vers la « déconstruction » critique, l'autre vers le « plaidoyer » radical. Par le biais d'une revue systémique de la littérature de *political ecology*, nous cherchons à identifier et à caractériser ces approches, à les relier aux

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communautés épistémiques de production de connaissances et à expliquer ces tendances. Notre revue de littérature intègre une analyse qualitative de textes clés, ainsi qu'une analyse quantitative bibliométrique et de contenu des publications indexées par Scopus faisant référence à la *political ecology* (1951-2019) et des résumés de tous les articles publiés dans *Journal of Political Ecology*, lors des conférences POLLEN en Europe (2016, 2018) et des conférences DOPE aux États-Unis (2013-2019). Entre autres choses, nous constatons que même si la *political ecology* est depuis longtemps divisée entre les approches déconstructiviste et revendicative, la seconde est en train de devenir prééminente puisque de nombreux *political ecologists* prennent un virage radical, avec de fortes saillies théoriquement enracinées contre le système capitaliste, alors que certaines recherches en *political ecology* se positionnent de plus en plus dans les débats sociopolitiques liés à l'écologisation des sociétés des pays développés. Ce phénomène est plus marqué dans les universités d'Europe continentale (et dans certaines universités anglaises), où la *political ecology* est institutionnellement plus marginale; dans les autres universités britanniques et nord-américaines, l'approche plus déconstructiviste est plus dominante mais aussi plus plurielle dans ses orientations.

Mots clés: Communautés épistémiques, political ecology, analyse bibliométrique, analyse de contenu, théorie critique, activisme

Resumen

Los estudios recientes de *political ecology* parecen estar girando hacia reivindicaciones de decrecimiento y de activismo radical, sobre todo en Europa. Estas posturas difieren en cierta medida de la tradición de *political ecology* « clásica », basada en una deconstrucción crítica de las ideas y los actores dominantes y en análisis de terreno. Planteamos una distinción heurística entre estas dos posturas. Aunque ambos se basan en la crítica (el « hacha » de Robbins), en cuanto a la « semilla » un impulso se inclina más hacia la « deconstrucción » crítica, el otro hacia la « defensa » radical. Mediante una revisión sistémica de la literatura sobre *political ecology*, tratamos de identificar y caracterizar estas posturas, vincularlas a las comunidades epistémicas de producción de conocimiento y explicar estas tendencias. Nuestra revisión de literatura incorpora un análisis cualitativo de textos clave, así como un análisis cuantitativo bibliométrico y de contenido de las publicaciones indexadas en Scopus que hacen referencia a la *political ecology* (1951-2019) y de los resúmenes de todos los artículos publicados en *Journal of Political Ecology*, de las conferencias POLLEN en Europa (2016, 2018) y de las conferencias DOPE en Estados Unidos (2013-2019). Entre otras cosas, encontramos que incluso si la ecología política se ha dividido desde hace tiempo entre los enfoques deconstructivista y reivindicativo, el segundo se está convirtiendo en preeminente ya que muchos *political ecologists* están dando un giro radical, con fuertes ataques teóricamente basadas al sistema capitalista, ya que algunas investigaciones de *political ecology* se posicionan cada vez más en los debates sociopolíticos relacionados con la ecologización de las sociedades en el Primer Mundo. Esto es más prominente en el mundo académico de Europa continental (y en algunas universidades inglesas), donde la *political ecology* es institucionalmente más marginal; en las restantes universidades británicas y norteamericanas, la postura más deconstructivista es más dominante pero también más plural en sus orientaciones.

Palabras claves: Comunidades epistémicas, political ecology, análisis bibliométrico, análisis de contenido, teoría critica, activismo

1. Introduction

In March 2016 and June 2018, we attended two international political ecology conferences. Both events appeared to be registering a turn towards advocacy and activism in political ecology. The first was organized by the EU-funded research and training network ENTITLE[2], involving an alliance of researchers from eight universities, coordinated at the Autonomous University of Barcelona. Under the banner of 'Undisciplined Environments', conference promotional material emphasized a transdisciplinary vision honoring a 'decolonial' and 'post-capitalist' political ecology.[3] The second conference was coordinated by POLLEN[4], a newly-formed network of initially Europe-based political ecology scholars. The conference announcement explicitly called

[2] https://cordis.europa.eu/project/id/289374 ; https://www.politicalecology.eu

[3] "Undisciplined Environments" has spun off a website with short articles, initially from ENTITLE: https://undisciplinedenvironments.org

[4] https://politicalecologynetwork.org

for degrowth, eco-marxist, feminist and anarchist approaches. Both conferences featured spokespeople from social and indigenous movements who relayed diverse claims in the panels and presentations. This was complemented by a strong criticism of 'green economy' tools and frameworks, and interest in degrowth futures.

This posture diverges from what some have seen as political ecology's traditional critical wariness towards dominant scientific and policy approaches. Indeed, Paul Robbins noted this in his keynote speech at POLLEN, which was later published (Robbins, 2020). For him, political ecology must be critical of any approach, including any consistent with its values – taking a more deconstructivist line. In other writing, he called political ecology a trickster science, "a kind of troublemaker, effectively adopting the role of a trickster" making a critical reading of any subject (Robbins, 2015). The apparent opposition between deconstructive critical political ecology and more politically oriented, radical approaches manifests in the two competing political ecology Handbooks published in 2015. They give radical approaches a high profile, one in an explicit, even militant way (Perreault *et al*., 2015), the other allowing them to emerge through the chapters of the book (Bryant, 2015).

The present article explores this discernible turn towards degrowth agendas and surging activism through a systematic and quantitative-based review of the political ecology literature. To this aim, we posit a heuristic distinction between two impulses running through political ecology: one leaning more towards critical 'deconstruction', the other towards radical 'advocacy.' Both impulses stem from the field's initial radical approach rooted in a Marxist framework (Peet, 2000) as well as the turn towards post-structuralist approaches including questions of culture and representation. But from this common ground, on the one hand, the 'deconstructing' impulse sees emancipatory forms of politics as stemming from the deconstruction of scientific knowledge and the critical examination of all accounts of human/nature interactions (Forsyth, 2003; Gregory *et al*., 2009), with the underlying assumption that critique allows for transformation. On the other hand, what we have labeled as the 'advocacy' impulse aims to relay claims and visions stemming from civil society in order to overturn relations of power and oppression, and construct more socially just, egalitarian and liberating geographies and ways of living. Here, the liberating potential stems from existing social organizations building visions of renewed human/nature interactions against the powers in place.

Our distinction is somewhat simplistic – as Loftus (2019) notes, such categories obscure as much as they reveal. The two poles sit imperfectly but not irrelevantly with a number of other binaries, such as Marxist versus post-structural approaches (Zimmer, 2015), Eurocentric urban versus Third World rural approaches (Chari, 2016), social science versus integrated social-natural science approaches (Lave *et al*., 2018), critical versus radical approaches (Castree, 2000), and finally applied versus academic approaches (Batterbury, 2018). Yet, it is our contention that this distinction between advocacy and deconstructing impulses can be used as a heuristic framing – in their ideal types, not necessarily in messy reality – to explore the current form of political ecology, its epistemic foundations, as well as the way it positions itself in relation to the social issues of its time. The distinction also reveals the context in which it has evolved, and the strategies that its entrepreneurs have followed (Berdoulay, 1981).

Our distinction helps address questions that emerge over political ecology's utility as a 'seed' versus as a 'hatchet' (Robbins, 2004). This debate periodically surfaces at conferences and in publications (Baird, 2014). It enriches a debate classically framed as an opposition between critical approaches on the one side, and calls for greater engagement with policymaking on the other (Blaikie, 2012; Braun, 2015; Muldavin, 2008; Rocheleau, 2008; Walker, 2006).

We propose three hypotheses on the internal diversity of political ecology. The first one is that the two trends in PE constitute real epistemic communities, with their specific background, reviews, debates and networks of researchers. The second hypothesis is that the rise in the visibility of advocacy approaches is the result of the field increasingly positioning itself in socio-political debates related to the greening of our societies, rubbing into discourses like the green economy and degrowth. The third one, recognizing a spatial dimension to epistemic communities, is that the turn towards advocacy is the result of the meeting of traditional, radical US-UK political ecology with scholars from other national academic contexts.

We investigate these hypotheses in three ways. First, we analyze reviews of the field in the journal *Progress in Human Geography*, in the main textbooks, and in the Handbooks above. Using the concept of epistemic communities, we look at how these publications situate political ecology with respect to critical

deconstruction and radical advocacy approaches and the question of social utility. Second, we present the outcome of independent bibliometric and content analysis to describe the network structure of the field of political ecology. We examined all Scopus-indexed articles using political ecology, abstracts of articles published in the *Journal of Political Ecology*, and articles presented at POLLEN conferences (held in Europe) and the DOPE conferences hosted by the University of Kentucky. These computer-assisted methods – which did not specifically look for deconstructive or advocacy poles – nonetheless allow us to demonstrate their pertinence, and to characterize them. We then re-evaluate our hypotheses in the light of these findings in order to characterize the diversity of political ecology and its main current trends.

2. Political ecology as an epistemic community? An agreement on critique, a disagreement about the meaning of critique

The identity and sense of purpose of a scientific community can be understood through the notion of an epistemic community. Preceded by the concepts of 'thought collectives', from the German *Denkkollektiv* (Fleck, 1935) and by Thomas Kuhn's use of 'paradigm' (Kuhn, 1962), the notion of epistemic communities emerged in the 1960s and 1970s with authors who conceptualized them as groups which share the same methods for producing science (Holzner & Salmon-Cox, 1977). This definition would not be useful for our purposes if other authors had not, in the 1990s, proposed a version that went beyond the simple sharing of scientific principles, defining epistemic community a "network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area" (Adler and Haase, 1992, p. 3). An epistemic community, then, refers either to the sharing of a strong scientific culture or to a sharing of a culture for political action.

Reading the main overview texts of political ecology in the light of this definition of epistemic communities requires us to pay attention to questions of both scientific and political culture. To see how political ecology positions itself as a scientific community can be done by analyzing what it is said in texts that review, collect, organize, and promote the field. We focus here on the reviews published in the form of a trilogy every three years or so in *Progress in Human Geography* (Walker, 2005, 2006, 2007; Neumann, 2008, 2009, 2011; Heynen, 2013, 2015, 2017; Turner, 2013, 2015, 2016; Loftus, 2019, 2020; Sultana, 2021), two handbooks of political ecology (Bryant, 2015, Perreault *et al*., 2015), and a selection of key textbooks (Forsyth, 2003; Zimmerer & Bassett, 2003; Benjaminsen & Svarstad, 2008; Peet *et al*., 2011; Gautier & Benjaminsen, 2012; Robbins, 2019).

The *PiHG* reviews raise three main types of questions: the relationship between political ecology and neighboring fields like ecology, resilience, geography, feminism and queer studies (Walker, 2005a; Neumann, 2009, 2009, 2011; Turner, 2013, 2015; Loftus, 2017; Sultana, 2021), its relationship to major debates of the time like scale, the commons, regions, and post-colonialism (Neumann, 2008; Heynen, 2013, 2015, 2017; Turner, 2016; Loftus, 2020; Sultana, 2021) and finally its relationship to critique. The latter topic is central to several of the reviews (Walker, 2006, 2007) and cuts across others (Turner, 2013, Loftus, 2020). For instance, according to Turner, a political economy approach to natural resources is what fundamentally distinguishes political ecology from resilience approaches (echoing Robbins' [2004] who distinguished political ecology from apolitical approaches to the environment), placing conflicts and power relations at the canter of socio-environmental change (Turner, 2013b).

Beyond this consensus on critique, the role given to political ecology beyond academia and its engagement with policy is contested. On the one side, Walker sees an emphasis on critique as a risk for political ecology, constraining its outreach to academia (Walker, 2006), and noting that original field-defining contributions by Piers Blaikie were very squarely oriented towards policy. On the other side, in their introduction to their 2015 *Handbook*, Perreault *et al*. (2015) called on political ecology to draw from critical stances before seeking policy relevance, a path laid out previously by Peet and Watts (1996, Peet *et al*. 2011). Despite a more balanced introduction and selection of chapters, the *International Handbook* (Bryant, 2015) also emphasizes critical approaches in a number of contributions.

Even though intermediate approaches exist[5], this opposition helps frame a field structured by different models and ideologies regarding the immediacy of its policy relevance. These differences are underlain by contrasting visions of the role of critique in society. On the one side, critique works to improve the social and political system, and to inspire new policies and projects. On the other, it is targeted at the system itself and can be used to create new ways of thinking and analyzing the world. Also underlying these differences are diverse implied audiences – for the former they are project designers, NGOs, policymakers and governments, while the latter more obviously target activists and social movements as well as influencing public debate, creating different paths for policy relevance and critique.

We combine this opposition with Paul Robbins' distinction between 'hatchet' and 'seed' approaches to create a framework distinguishing three main poles in political ecology represented in Figure 1. On the left is the common ground of 'hatchet' approaches, based in critical analysis and deconstruction, which serve as a basis for political ecological research. The opposing epistemic communities we have posited emerge on the right side of the figure, rooted in part in different assumptions about the use of political ecology as a 'seed.' One pole holds to the critical deconstruction approach and sees state and institutional actors as their audience for change. The other pole targets social movements and public debate.

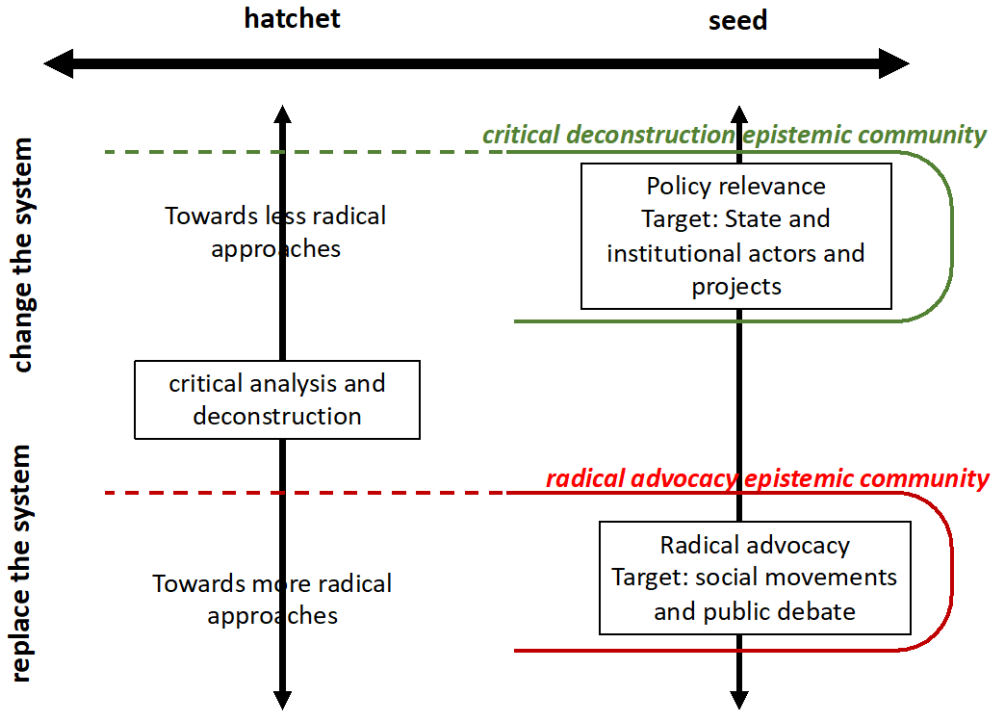

Figure 1: Three poles in political ecology.

While the texts above give a sense of the contours of the debate within political ecology, they do not give a good sense of the respective importance of each approach, or their evolution over time. Furthermore, they do not provide an idea of the material basis of each approach: publication outlets, webs of researchers – elements that participate in an epistemic community. Therefore, we use a number of bibliometric and content

[5] By Zimmerer and Bassett (2003), Forsyth (2003), Neumann (2005) and Gautier and Benjaminsen (2012), and in an article published in 2008 that summarizes three sessions of the annual meeting of the Association of American Geographers (Muldavin, 2008).

analysis tools to investigate the broad corpus of scientific publications referring to political ecology, and the contents of four political ecology conferences (POLLEN and DOPE). This allows us to characterize clusters within political ecology and to analyze their geographical and temporal dimensions, framing them as being part of two distinct epistemic communities, and shedding a new light on the presentations made in the recent main political ecology conferences.

3. Material and methods for bibliometric and content analysis

We used four main databases, two from publication databases (Scopus and publications in the *Journal of Political Ecology*) and two from network conference material (the European Political Ecology network conferences in 2016 and 2018[6], and the US DOPE conferences from 2013 to 2019[7]). Scopus includes all publications referenced by the database that include the expression 'Political ecology' in their keywords, abstracts or titles. This resulted in 3,079 references dating from 1951 to November 2019, including articles, books, book chapters, conference papers and reviews – with much metadata (university affiliation, co-authors, references cited and citations, etc.). this offers an overview of the field of political ecology.

Nevertheless, using the Scopus database introduces two major biases. It offers the widest possible coverage in the social sciences and humanities, but is not exhaustive.

First, the majority of the harvested journals are published in English, and with few important exceptions, by major commercial publishers. This harvesting method poorly registers other research traditions, written in other languages and in non-indexed journals, and many titles are still missing from the database.[8] This results in a portrait of political ecology overemphasizing the English-written production of the Global North, with one or two notable exceptions (*Conservation and Society* based in India, and *Journal of Political Ecology* published independently), and downplaying other outputs.

A second bias arises from our query choices: choosing the keyword 'political ecology' led to the articles using this keyword, but not to those who 'do' political ecology without using it systematically, but arguably fitting into the epistemic community of political ecology. This is the case of many articles in *JPE*[9], or some major political ecology publications that do not use the term either in the title or the abstract – for instance Blaikie (1985) or Blaikie and Brookfield (1987). This is clearly a limitation. However, we decided not to enrich the database with other publications that we think represent political ecology since we would have to define an inclusion/exclusion rule that is potentially inconsistent and impractical to apply across a huge volume of literature. We prefer thus to identify and accept these limits, and any resulting bias.

Nevertheless, we view missing up to a third of the publications in *JPE* as a major problem, since it is the most preeminent journal specifically focused on political ecology, established in 1994, and entering Scopus in 2012. So we built a second database constituted by all the articles since the beginning of *JPE*. It consists of 412 references with titles, abstracts, keywords and author affiliations.

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[6] The first Biennial Conference of the Political Ecology Network (POLLEN) was held in Wageningen, the Netherlands, in 2016 on the theme of 'Conflict, Capitalism and Contestation'. The second one took place in Oslo, Norway, on the theme of 'Political Ecology, the Green Economy, and Alternative Sustainabilities', in 2018. They were organized by the by European "nodes" in Lancaster and Wageningen. A third was held remotely from Sussex during the global pandemic in 2020, when the secretariat was at the University of Copenhagen, but is not analyzed here. It was also not possible to apply this analysis to the presentations at the 2016 ENTITLE conference mentioned earlier, as the abstracts are not available online.

[7] The DOPE conference is organized by the University of Kentucky and takes place in Lexington. The conference started in 2011, but the abstracts of this year (as well as the 2012, 2016 and 2020 conferences) are not available. The abstracts correspond therefore to the 2013, 2014, 2015, 2017, 2018, and 2019 conferences.

[8] French, Spanish, and other language traditions are taken into account poorly, including the numerous articles published in non-indexed journals in these languages, which can be very active. Furthermore, because of the language barrier, empirical contributions in international English-written journals can be more accessible to non-English native authors than the more theoretical contributions. Nevertheless, Latin American Political Ecology (PELA) is a very active community and is strongly engaged in radical and Marxist based approaches (Alimonda *et al*., 2017 is an Open Access synthesis volume).

[9] In Table 1 and in the Scopus database, *JPE* appears as the third most prolific journal publishing political ecology articles, despite enforcing a 'political ecology only' rule for submissions. This is due to the limitations of our database. Indeed, many articles published in *JPE* do not mention the expression "political ecology" in the title, keywords or abstract. Furthermore, *JPE* entered Scopus only in 2012; all the articles published before 2012 were not included in Table 1. Except in this table, we consider *JPE* is the journal that publishes the most articles in the field of political ecology.

The Conferences databases consist of around 355 presentations for POLLEN and 1,475 presentations for DOPE, with titles, abstracts and affiliation. These databases allow us to shed light on the forums of political ecology that are distinct from Scopus peer-reviewed publications, and notably gives attention to the work of a large number of early career researchers not yet very visible in the Scopus database but representative (perhaps) of the field's future.

The *JPE*, POLLEN, and DOPE databases complement the analysis of Scopus, which is our main focus, even with its limitations. Scopus has the highest number of articles and covers an important range of publications. For the Scopus database, we combined three approaches: bibliometric, lexicometric content analysis and reading of the articles. First, we used the RStudio Bibliometrics package on the publication metadata in order to identify the structure of the corpus, by highlighting the most salient elements (texts and authors most cited inside and outside the corpus), the places where publications are produced (countries and universities) and to trace networks (between publications, authors, countries, universities, etc.). The bibliometric approach also permitted us to identify communities that use the same keywords or cite the same references (Aria & Cuccurullo, 2017). Second, we conducted a lexicometric content analysis approach using the software Iramuteq to study the statistical distribution of significant words in the corpus abstracts and titles (Ratinaud, 2009). Iramuteq does not count words, but instead reveals their distribution in extracts of equivalent size (formatted by Scopus). We used a hierarchical classification analysis that aims to differentiate between different levels of partition of the abstracts in the corpus, in order to identify clusters of extracts with contrasting profiles. Based on this SCOPUS corpus, we analyzed the academic networks and temporal context linked to the production of each cluster of texts.

We replicated the Iramuteq analysis on the abstracts of *JPE* and the presentations at the political POLLEN and DOPE conferences, to explore the lexicon employed in these forums. We analyzed the titles and abstracts of the *JPE* articles, and the same plus the author networks for the two conferences. For the three databases, we used an Iramuteq analysis similar to the one applied to Scopus abstracts, identifying clusters of words that significantly appear together in the same abstract, to obtain four lexical clusters for each dataset, based on the titles and abstracts. It was not possible to perform the bibliometric and network analysis of these databases since only few authors co-authored their presentations and few metadata are available for these conferences. For the conferences, it was also impossible to read the texts themselves as they are unpublished. They mainly confirmed the main conclusions of the Scopus analysis.

4. Four main clusters within political ecology

The three analyses of the Scopus database were conducted in parallel and then in sequence. We first conducted bibliometric analyses on the corpus to see how it is structured. Then we identified, thanks to Iramuteq, four clusters of words that are related to each other because they appear together in the abstracts. We were able to interpret these clusters as distinguishing different fields within political ecology. We then conducted a new series of bibliometric analyses on these four classifications, in order to identify possible sub-networks and thus, by reading the main articles that these corpuses highlight, to validate the relevance of the lexicometric division into clusters.

Where is political ecology written?

To set the stage for this analysis of epistemic communities within political ecology, we began with an analysis of where political ecology is, in this database, published and made. Table 1 highlights the key results that we use to describe the structure of the corpus of 3,079 publications – by extension the field of political ecology: the journals in which the articles are published, the countries and universities involved, the most cited articles, etc.

The major journals are *Geoforum* (*1st*), *Capitalism Nature Socialism* (2nd), *Journal of Political Ecology* (3rd, but see footnote 9), and *Antipode* (7th), all sharing critical postures to a certain extent. Mainstream disciplinary journals are also very present: *Annals of the AAG* (4th), *Progress in Human Geography* (6th), and *Political Geography* (8th). Journals focused specifically on the relationships between people and environments

are in a second tier. Interestingly, these journals are more commonly those with (loose) affiliations to specific fields, such as environmental anthropology, rural sociology, and biological conservation (respectively *Human Ecology,* 10th; *Society and Natural Resources,* 9th; and *Conservation and Society,* 11th). More generalist people-environment journals, like *Global Environmental Change* (20th), *Ecology and Society* (39th), *Environmental Conservation* (85th), and *Ambio* (102th) are less favored. This is probably due to their less political approaches to the environment, frequently favoring natural science epistemologies and rendering more difficult the inclusion of more critical work (Lave *et al*. 2018, p. 7).

The list of the countries where the main producing universities are based shows a very strong dominance of the United States and, more broadly, the English-speaking world – where political ecology is prominent in the field of human geography and represented in anthropology. Among non-Anglophone countries, Germany, Austria, Spain and France top the list, followed by Brazil, the Netherlands and Norway. In these countries, political ecology is more at the margin of disciplines, especially in geography, which remains rooted in national traditions (Bryant, 2015). At the level of universities, a few are very dominant. In the English-speaking world, the Universities of California (including notably Berkeley, UCLA, and Santa Cruz), Arizona, Toronto, British Columbia, and London (notably King's College) published the most. Outside the US-UK axis, only the Autonomous University of Barcelona emerges in the analysis.

To overcome this over-representation of Global North academic centers, we traced the number of authors based in the universities of the Global South (Figures 2 and 3).[10] This highlights their steady growth, reaching 20% of total academic outputs in 2018) and in particular the dynamism of Latin American authors, who represent [nearly] half of the political ecology outputs from the Global South.

	Corpus	
Most common journals (number of articles)	Geoforum	208
	Capitalism Nature Socialism	150
	Journal of Political Ecology (but see footnote 9)	115
	Annals of the American Association of Geographers	80
	Environment and Planning A	47
	Progress in Human Geography	47
	Antipode	46
	Political Geography	46
	Society and Natural Resources	43
	Human Ecology	37
	Conservation and Society	37
	Journal of Peasant Studies	36
	Human Organization	30
	Ecological Economics	26
	Geographical Journal	26
Most common authors' university affiliations (number of publications)	Universitat Autónoma de Barcelona	82
	York University (Canada)	62
	University of Arizona	59
	University of Wisconsin-Madison	55
	King's College London	51
Most productive years	2018	377
	2007	339

[10] Note that there is also linguistic under-representation. For instance, Francophone publications in political ecology are poorly captured in our data. For more on this lively community, see Chartier and Rodary (2015).

Most prolific authors (number of publications)	Robbins, P.	33
	Benjaminsen. T. A.	19
	Hurley, P. T.	19
	Ioris, A. A. R.	18
	Loftus, A.	18
Most cited 'internal' works (number of citations) **internal = within the corpus of 3000 articles*	(Blaikie & Brookfield, 1987)	23
	(Walker, 2005)	21
	(Hardin, 1968)	16
	(Heynen *et al*., 2006)	15
	(Vayda & Walters, 1999)	14
Most cited 'external' works (number of citations) **external = outside the corpus of 3000 articles*	(Escobar, 2001)	896
	(Berkes, 2004)	848
	(Scoones, 1999)	336
	(Sneddon *et al*., 2006)	245
	(Brown & Purcell, 2005)	234
Publication types	Articles	2392
	Book chapters	322
	Books	108
	Reviews	176
	Conference papers	38
	Editorials	30
	Others (erratum, letters, notes)	34

Table 1: The structure of the field of political ecology. Top five elements arising from bibliometric analysis of 3,079 publications retrieved from Scopus using the key word 'political ecology' (covering 1950 to 2019).

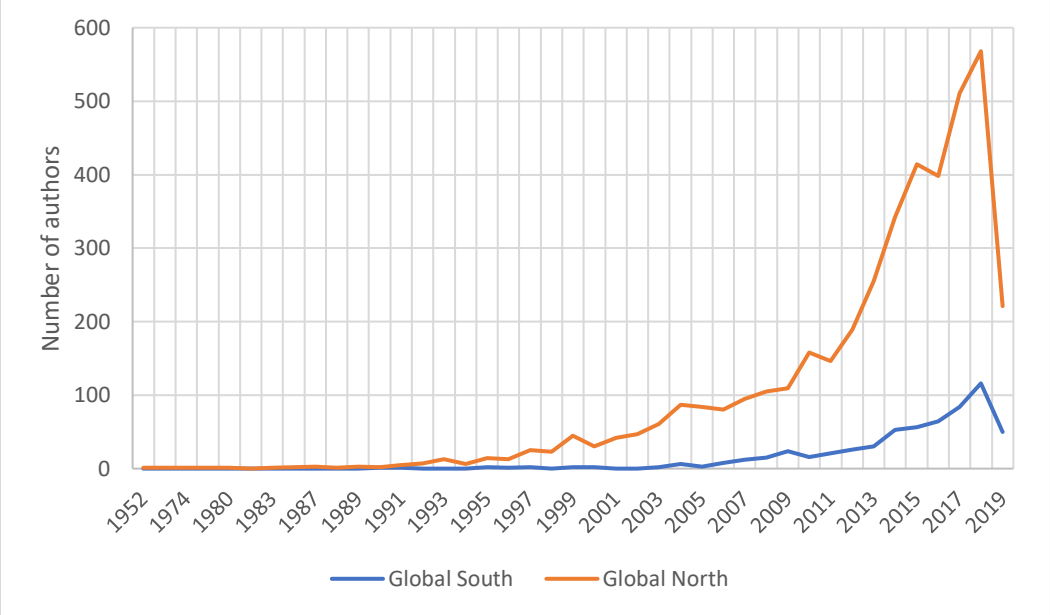

Figure 2: Authors contributions by year, and by the continent of origin of the authors' university affiliations.

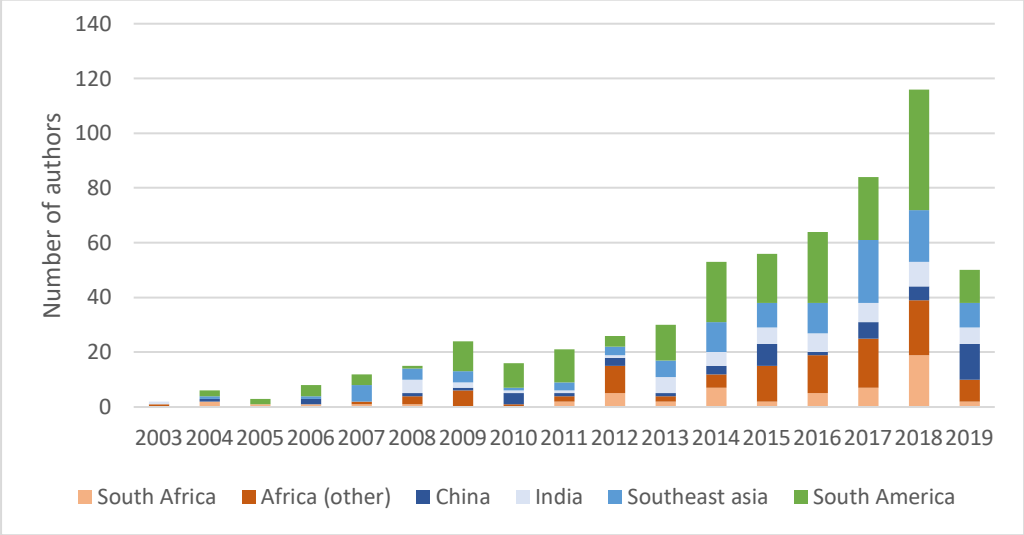

Figure 3: Political ecology from the Global South: numbers of authors of different origins (by authors' university affiliations) and by year. 2019 incomplete.

Characterization of the clusters

As a next step, we used lexicometric analysis to describe the internal diversity of political ecology. This was done in an automated way by analyzing the titles, keywords and (when available) abstracts of the 3,079 publications in the database – articles, books and reviews[11] – and clustering them according to their semantic class, i.e. a list of words that significantly appear together in a same abstract. We treated the abstracts as whole texts – as opposed to selecting text segments – because of their similarity in length and internal structure. From this corpus, Iramuteq allows the user to test several numbers of semantic clusters and we analyzed up to ten different cluster configurations, before settling on four. Higher numbers led to repetitions in the structures of the clusters, and lower numbers hid elements of the internal diversity of the corpus.

In Table 2 we present the resulting four clusters, listing the dominant words according to their Chi^2, which measures the level of co-occurrences between semantic clusters and words, including words referring to countries where studies were conducted. Each cluster covers between 10% and 30% of the corpus. A look at the dominant words in each class/cluster (Table 2) allows us to tentatively characterize each one:

1. The words of the first cluster ('science', 'field', 'think', and so-on) very clearly demarcate it as a set of conceptual or overview texts, in which disciplines (mainly geography and anthropology) feature prominently.
2. The second cluster addresses urban questions. Marxian theoretical approaches and concepts ('capital', 'marx-', 'Gramscian', 'accumulation', etc.) have significant presence in the class/cluster, as well as concepts of 'metabolism', 'infrastructure' and 'flows' that are central to the field of Urban Political Ecology (UPE).
3. The third cluster deals with small-scale farmers, livelihoods, and agricultural production, addressing themes such as health, crops, and gender, and with Africa as a recurrent region of study.
4. The fourth cluster shifts its focus to Latin America, with keywords suggesting an interest in conflicts between conservation and extraction projects on the one hand, and local communities, sometimes indigenous, on the other.

[11] More than two thirds of the publications are research articles (2,400), 500 are books and book chapters, and 150 are reviews.

Description of each cluster based on five representative articles

In order to better understand the characteristics of each cluster in the above typology, we analyzed the five publications that the analysis considers as the most representative. For each of the clusters, Iramuteq can identify the article abstracts that best reflect the associations of text segments, i.e., the texts with the most words that are strongly related to the class. In other terms, these are the texts that have best internalized the discourses and ideas of a certain strand of political ecology. This approach brings to the fore texts that are *representative* but not necessarily from the most well-known authors nor well cited. This analysis highlights the different forms in which epistemic communities appear in the representative texts.

Three of the five most representative publications in cluster 1 are epistemological works providing an overview of the field: the introduction to one of the handbooks (Perreault *et al*., 2015); another chapter in a book dealing with approaches to the social sciences of the environment, including political ecology, and showing that these approaches converge towards a certain transdisciplinarity (Vaccaro *et al*., 2010); and finally a book in the postcolonial tradition, arguing that political ecology texts which have focused on the power of narrative ignore African voices – thus calling for multivocality in texts (Caminero-Santangelo & Myers, 2011). More vocal in a 'seed' approach aiming at changing the system though policy relevance is an article reviewing three sessions held at the AAGs from 2005 to 2008 (Muldavin, 2008). It argues that critical approaches to political ecology should not impair its ability to participate in development debates. The fifth representative text in the cluster directly applies these principles to urban energy transitions, calling for a renewed understanding of transitions as not only infrastructural challenges, but first and foremost as challenges in re-thinking our collective futures (Luque-Ayala *et al*., 2018). This cluster 1 appears not only as a set of theoretical texts, but also a place for debate around the search of policy relevance for political ecology.

The most representative texts in cluster 2 have a much more critical tone. Four of them mobilize an Urban Political Ecology approach, moving beyond nature/society dichotomies to approach urban environments as hybrid metabolisms, constituted by material and immaterial flows. These processes, they argue, are infused with power relations and create unjust geographies. While urban environments are central to one of the representative abstracts – a handbook chapter on urban gardens (Miller & Jonas, 2018) – the other texts add discussions on expanding UPE beyond particular cities and approaching lager urbanization processes. As such, data centers (Mahmoudi & Levenda, 2016) and mining sites (Arboleda, 2016) are analyzed as crucial infrastructures linking 'rural' and 'urban' areas in a co-dependency network of flows and infrastructures. The fourth text deals with the overflows of nature, particularly in the case of floods (Ranganathan, 2015). The final is a theoretical piece reflecting upon a Marxist framework to human/environment relations, conceptualizing capitalism as an ecological regime in which biophysical problems take a constitutive part (Moore, 2011). Four of these texts are published in journals known for their Marxist (or marxist) theoretical line (*Antipode*; *Communication, Capitalism, and Critique;* and *Journal of Peasant Studies*). All five texts have a very critical positioning and favor deep theoretical engagements. They are based on very little data, but rather claim to add new dimensions to ongoing theoretical debate without explicitly seeking policy relevance.

The tone changes significantly with the texts of cluster 3. The first work self-identifies as environmental history and investigates the environmental consequences of the colonization of Mexico, inviting the reader to develop a critical approach to modernity (Boyer, 2012). The other four texts deal with data-rich African cases. Two of them deal with the consequences of climate change, one focusing on rural populations in general (Bezner Kerr *et al*., 2018), the other on women (Ajibade *et al*., 2013). The other two articles deal with agro-environmental transitions, one through the example of the change in socio-spatial practices in state-led marketing in Rwanda (Clay, 2017), the other studying the factors that have interacted to change land use patterns between the pre-colonial and post-colonial periods in Ghana (Asibey *et al*., 2019). The journals in which these texts are published are general disciplinary or interdisciplinary journals (*Annals of the AAG*, *Global Environmental Change*), or in agronomic and forestry sciences (*Journal of Sustainable Forestry*, *Renewable Agriculture and Food Systems*) that do not feature a critical positioning. Their main focus is on developing policy responses to improve rural livelihoods, and the authors use political ecology to take a step back and place the cases in a broader light – in line with the founding work of political ecology.

Cluster 1 and Chi^2		Cluster 2 and Chi^2		Cluster 3 and Chi^2		Cluster 4 and Chi^2	
science	154	urban	220	household	229	local	195
field	147	city	203	farmer	161	conservation	167
geography	130	capitalism	178	interview	146	protect	156
think	121	capitalist	129	farm	123	forest	151
anthropology	114	UPE	97	agricultural	120	conflict	151
scholar	97	capital	92	impact	106	national	137
human	92	argue	90	datum	102	community	124
theory	90	metabolism	88	Africa	94	company	105
research	75	nature	85	crop	92	right	104
theoretical	74	material	82	factor	88	resource	104
discipline	74	Marx	77	woman	85	land	97
concept	70	waste	62	vulnerability	85	area	96
student	69	politics	59	agriculture	81	park	94
ecology	67	Gramscian	56	finding	78	mine	91
interdisciplinary	64	accumulation	55	village	78	state	85
sociology	63	everyday	55	change	74	indigenous	82
contribution	56	circulation	54	access	73	management	81
methodology	50	metabolic	54	water	73	industry	81
teach	48	Marxist	50	income	68	legal	79
question	45	degrowth	49	indicate	64	government	77
theme	43	moment	49	flood	63	coastal	68
methodological	42	infrastructure	48	health	63	private	66
epistemology	42	urbanism	48	semi	61	region	66
epistemological	40	uneven	48	improve	61	international	65
contributor	39	critique	47	variability	60	reserve	62
political	39	embody	46	food	60	sector	57
academic	38	form	42	risk	58	deforestation	56
anthropologist	38	rethink	42	qualitative	58	over	55
university	36	argument	42	gender	58	resistance	53
philosophical	35	waterscape	41	survey	57	oil	53
				Saharan	44	Chilean	40

Table 2: Four thematic clusters in political ecology. This Table is the result of a lexicometric analysis of the abstracts of the corpus of 3,079 publications using Iramuteq (the significance Chi^2 level is 5).

Environmental justice is the unifying keyword of the most representative articles of cluster 4. Three of the texts address questions of environmental justice related to biodiversity conservation. They specifically touch

on topics of land rights in protected areas (Mollett & Kepe, 2018), biases in the 'landscape approach' popular with conservation actors (Clay, 2016), and community-based wetland governance (Gallardo *et al*., 2013). The fourth article investigates the rationalities of ecosystem services-based water governance mechanisms and their impacts in terms of justice and equity for indigenous populations (Nahuelhual *et al*., 2018). The final text focuses on socio-environmental conflicts with a view to founding an environmentalism of the poor (Camisani, 2018). The tone of these texts is clearly critical in their analyses of dominant approaches to environmental management. Here, advocacy appears to take another turn, where campaigns led by organized local movements – such as indigenous groups – are chosen as objects of study in publications voicing their concerns over environmental policies.

These results help address our initial hypothesis. The bibliometric analysis, supported by the analysis of words and article contents, confirms the existence of different epistemic communities. In Clusters 2 and 4, questions regarding the greening of our societies give rise to more advocacy-oriented texts, engaging in socio-political debates and manifesting in either radical anti-capitalist advocacy (cluster 2) or strong support for indigenous social movements (cluster 4). In contrast, questions related to livelihoods in cluster 3 revert to more practical, policy-oriented interventions, while inward-focused studies of the field (cluster 1) emphasize its critical tradition, and policy relevance in an abstract or prescriptive sense.

In the following section, we seek to locate these epistemic communities in places and networks, testing our second hypothesis on the divergent strategies developed under different academic contexts.

5. From the four clusters to epistemic communities

Highly structured clusters

By quantitatively analyzing five elements linked to each text (authors and their university affiliations, bibliographic citations, publication venue and years), we can draw a first delineation of the structure of the different epistemic communities represented by each cluster (see Table 3). We begin with the authors. The most productive authors of clusters 1 and 2 are prominent references in the overall field and correspond to the main authors identified in the qualitative analysis of the key texts above. But while authors in cluster 1 include authors who have written on the field generally (Paul Robbins, James McCarthy), and from a rural, mostly third-world political ecology perspective (Matt Turner, Brian King), the authors in cluster 2 are notable theorists of UPE, such as Erik Swyngedouw, Alex Loftus or Maria Kaika. In contrast, clusters 3 and 4 feature authors engaging with case studies and regional accounts of political ecology: ruralists working on Africa for cluster 3, and in cluster 4 a series of authors displaying specializations in regional studies (such as Isaac Luginaah on West Africa), in resource extraction (such as Tan Mullins on fishery management in South Asia), or in indigenous movements (such as Leah Horowitz on Kanak struggles around mining operations in New Caledonia).

As far as the most-cited works in each cluster, there is a first-order homogeneous corpus that serves as a common set of references within the field, with canonical political ecology books such as *Land Degradation and Society* (Blaikie & Brookfield, 1987) and *Third World Political Ecology* (Bryant & Bailey, 1997) receiving the most citations across the clusters. The appearance of 'The tragedy of the commons' (Hardin, 1968) can be interpreted as a canonical text to the extent that political ecology was in part founded as a critique of its propositions. At the next level of detail, one can find distinguishing features of each cluster. Cluster 1 cites Walker's (2007) article about 'Where is the ecology?', confirming the inward-looking disciplinary and conceptual focus of this class. Cluster 2 is strongly marked by UPE texts such as 'Social power and the urbanization of water' (Swyngedouw, 2004). Cluster 3 emphasizes health and rural topics, for instance citing 'Political ecologies of health' (King, 2010), while cluster 4 references 'Neoliberal nature and the nature of neoliberalism' (McCarthy & Prudham, 2004) and 'Advancing a political ecology of global environmental discourses' (Adger *et al.*, 2001), texts expressing critiques of neoliberalization processes and of apolitical framings of global environmental discourses.

	Cluster 1 – 872 articles		**Cluster 2 – 577 articles**		**Cluster 3 – 688 articles**		**Cluster 4 – 882 articles**	
	Name	Chi^2	Name	Chi^2	Name	Chi^2	Name	Chi^2
Tests on keywords	Capital Marxist Neoliberal Critique Radical	-44 0,1 -11,6 17,3 1,8	Capital Marxist Neoliberal Critique Radical	97,7 50,6 18,8 55,8 27,2	Capital Marxist Neoliberal Critique Radical	-0,7 -11,1 -12,8 -30,7 -10,5	Capital Marxist Neoliberal Critique Radical	2,7 -11 7,3 -26 -7,5
Journals (number of articles)	Geoforum Journal of Political Ecology Progress in Human Geography Capitalism Nature Socialism	40 38 31 31	Capitalism Nature Socialism Socialism Geoforum Antipode Environment and Planning A	71 51 23 20	Geoforum Journal of Political Ecology Human Ecology Annals of the AAG	39 25 23 22	Geoforum Capitalism Nature Socialism Journal of Political Ecology Society and Natural Resources	65 39 28 25
Universities (number of articles)	King's College London Clark University University of Wisconsin University of Arizona University British Colombia University of Oxford York University (Canada) Univ. of Washington	20 18 22 16 16 13 12	Autonomous Univ. of Barcelona University of Manchester York University (Canada) King's College London Lund University Syracuse University Oxford University	23 21 16 14 13 11	University of British Columbia University of Wisconsin University of Arizona University of Barcelona University of Owfort University od Waterloo University of Sussex	15 13 12 11 10 10 10 10	York University (Canada) University of Arizona Autonomous Univ. of Barcelona Michigan State University University ofOxford University of Georgia Wageningen University	26 20 22 15 11 11 12
Most representative years	2015	15	2018 2015	15 7	1988 1991	10	2006 2007	10 6
Most productive authors in the cluster (number of articles)	Bryant, RL Robbins, P. Turner, M.D. King, B. McCarthy, J	12 9 8 6 6	Swyngedouw, R Loftus, A. Heynen, N. Kallis, G. Moore, J.W	16 12 9 9 7	Robbins, P., Lunigaah, I. Mkandawire, P. Tan Mullins, M. Nyantakyi Frimpong, H.	12 8 7 7 7	Hurley, P.T Benjaminsen, T.A Robbins, P. Campbell, L.M Boelens, R.	13 8 7 6 5
References most cited by the texts composing the cluster	(Blaikie and Brookfield, 1987) (Walker, 2005) (Forsyth, 2003a) (Bryant and Bailey, 1997) (Vayda and Walters, 1999)	40 23 21 1 18	(Blaikie and Brookfield, 1987) (Hardin, 1968) (Bryant and Bailey, 1997) (King, 2010) (Mollett and Faria, 2013)	47 18 17 12 11	(Blaikie and Brookfield, 1987) (Bryant and Bailey, 1997) (Escobar, 2001) (Hardin, 1968) (McCarthy and Prudham, 2004)	47 18 17 12 11	(Blaikie and Brookfield, 1987) (Bryant and Bailey, 1997) (Escobar, 2001) (Hardin, 1968) (McCarthy and Prudham, 2004)	35 20 19 17 16

Table 3 (previous page): Characteristics of the four thematic clusters of Political ecology. Top-five elements that emerge in analysis of the corpus divided into the four thematic clusters.

Concerning publication venues, *Geoforum* – in line with the general political ecology literature – is highly present in all four clusters. Following the policy relevance/advocacy delineation built from the content analysis, generalist disciplinary journals (*Progress in Human Geography* and *Annals of the AAG*) are more present in clusters 1 and 3, while the critical journals mentioned above (*CNS, Antipode, Journal Peasant Studies*) are predominant in clusters 2 and 4. Yet it should be noted that other more disciplinary journals (like *Political Geography; Environment and Planning A*[12]) are also prominent in clusters 2 and 4.

A longitudinal approach to the clusters highlights their evolution through time and the dynamics of community-making. Clusters 2, 3 and 4 are strongly associated with particular decades: a significant part of the texts composing cluster 3 were published in the 1990s, while the 2010s saw the publication of texts belonging to clusters 2 and 4. Cluster 1 is comparatively present throughout the decades and does not show a significant temporal pattern. This suggests a steady production of inward-looking conceptual texts focused on the field and discipline – and addressing policy relevance and advocacy in diverse ways – but a decline in more practical applications of political ecology oriented towards development practitioners. The critique of capitalism – both theoretical and applied – gained academic interest in the 2010s.

The analysis of the affiliations of the authors places the four clusters into the structure of global academia. The more critical and urban texts belonging to cluster 2 prominently feature European universities, such as the Autonomous University of Barcelona (Spain) and a number of British universities (Manchester, Kings's College London, Oxford) along with Lund University (Sweden). This European anchoring is mirrored in cluster 4, which features case studies from AU Barcelona, Oxford, and Wageningen (Netherlands), but also from North American universities such as York, Arizona and Michigan State. The more theoretical and inward-looking cluster 1 features a majority of North American universities (Clark, Wisconsin-Madison, Arizona, British Columbia), with two English exceptions (King's College London and Oxford). Finally, cluster 3 is dominated by American universities (led by British Columbia, Wisconsin-Madison, and Arizona), with Oxford, Sussex, and Barcelona as European exceptions.

Network analysis of the most visible centers in the Scopus database

To investigate whether the four clusters are correlated with interuniversity networks, we conducted a synthetic analysis using the networking tool developed in the 'Bibliometrics' package in RStudio. This tool is based on the Gephi software, and assigns links between universities based on co-authorship in publications (Bastian *et al*., 2009). The Gephi software identifies communities within the network when co-publication links among members of a network are significantly more numerous than the links those with other entities.

We conducted this network analysis on the whole corpus, and on three temporal periods (Table 4). We designated three temporal periods (pre-1998; 1998-2008; 2009-2019) based on inflection points in the curve of annual scientific output with the keyword 'political ecology' in the Scopus database. The production of political ecology texts has visibly increased – our boundary years 1998 and 2008 represent quintupling of annual production, from 21 to 96 publications. We paid particular attention to the latter decade, with 2,452 abstracts, because it allows for a better grasp of political ecology's internationalization. Indeed, the inclusion of articles published in previous decades flattens the network by erasing the temporal trends shown in Table 4, such as the rise of European universities in the 2009-2019 decade (AU Barcelona, King's College London, University of Manchester), along with Canadian universities (British Columbia, York). Their publications exceeded the production of established US universities dominant in the 1998-2007 decade (University of Arizona, Michigan State University).

[12] Most political ecology work in this latter series of journals is now published in *Environment and Planning E: Nature and Space*, a journal founded only in 2018.

Universities	**TOTAL**	Cluster 1 Theory	Cluster 2 Critique	Cluster 3 Rural studies	Cluster 4 - New case studies	**Dominance**
Autonomous University of Barcelona	63	10	23	8	20	Cluster 2; Cluster 4
York University (Canada)	53	11	11	10	21	Cluster 4
University of British Columbia	42	15	4	13	10	Cluster 1; Cluster 3; Cluster 4
King's College London	40	15	12	7	4	Cluster 1; Cluster 2
University of Manchester	38	7	19	6	6	Cluster 2
University of Arizona	34	12	5	10	7	Cluster 1; Cluster 3
University of Wisconsin	34	16	5	7	6	Cluster 1
University of Oxford	32	12	4	8	8	Cluster 1; Cluster 3; Cluster 4
Wageningen University	29	6	7	5	11	Cluster 2; Cluster 4
Clark University	29	17	5	1	6	Cluster 1
University of Georgia	28	5	8	4	11	Cluster 2; Cluster 4
University of California at Berkeley	25	7	3	8	7	Cluster 1; Cluster 3; Cluster 4
Norwegian University of Life Sciences	25	4	3	8	10	Cluster 3; Cluster 4
Durham University	24	8	9	5	2	Cluster 2; Cluster 4
University of Sussex	23	6	2	9	6	Cluster 1; Cluster 3; Cluster 4
University of Kentucky	21	6	4	4	7	No dominance
University of Toronto	21	5	6	6	4	No dominance
Arizona State University	21	12	1	5	3	Cluster 1
University of Leeds	20	8	2	7	3	Cluster 1; Cluster 3
Michigan State University	20	4	1	7	8	Cluster 3; Cluster 4
University of Cambridge	20	3	6	4	7	Cluster 2; Cluster 4
University College London	19	9	4	0	6	Cluster 1; Cluster 2; Cluster 4
University of Edinburgh	19	6	4	3	6	Cluster 1; Cluster 2; Cluster 4
Cornell University	18	4	4	7	3	Cluster 3
Ursinus College	18	3	3	2	10	Cluster 4
Waterloo University	17	4	2	10	2	Cluster 3
Amsterdam University	16	2	4	1	9	Cluster 4
University of Washington	15	8	2	3	2	Cluster 1
University of Cape Town	15	5	4	4	2	No dominance

Table 4: Evolution of the universities publishing the most since 1950.

Figure 4 shows the results corresponding to the 2008-2019 decade. The nodes refer to the universities – with a size corresponding to the number of their publications – and the links represent various intensities of collaborations, with thicker links illustrating larger numbers of co-authorships.[13] The colors of the nodes correspond to their community as identified by the Gephi software within the Bibliometrics package. To make this figure, we added four symbols representing the dominant clusters of the articles published by researchers affiliated to the universities, the dominance parameters being detailed in Table 5.

[13] There is one important limitation: the universities that are represented are not the most important ones, but the ones that share important relations. An important center of PE may not be represented if it does not co-publish with other universities.

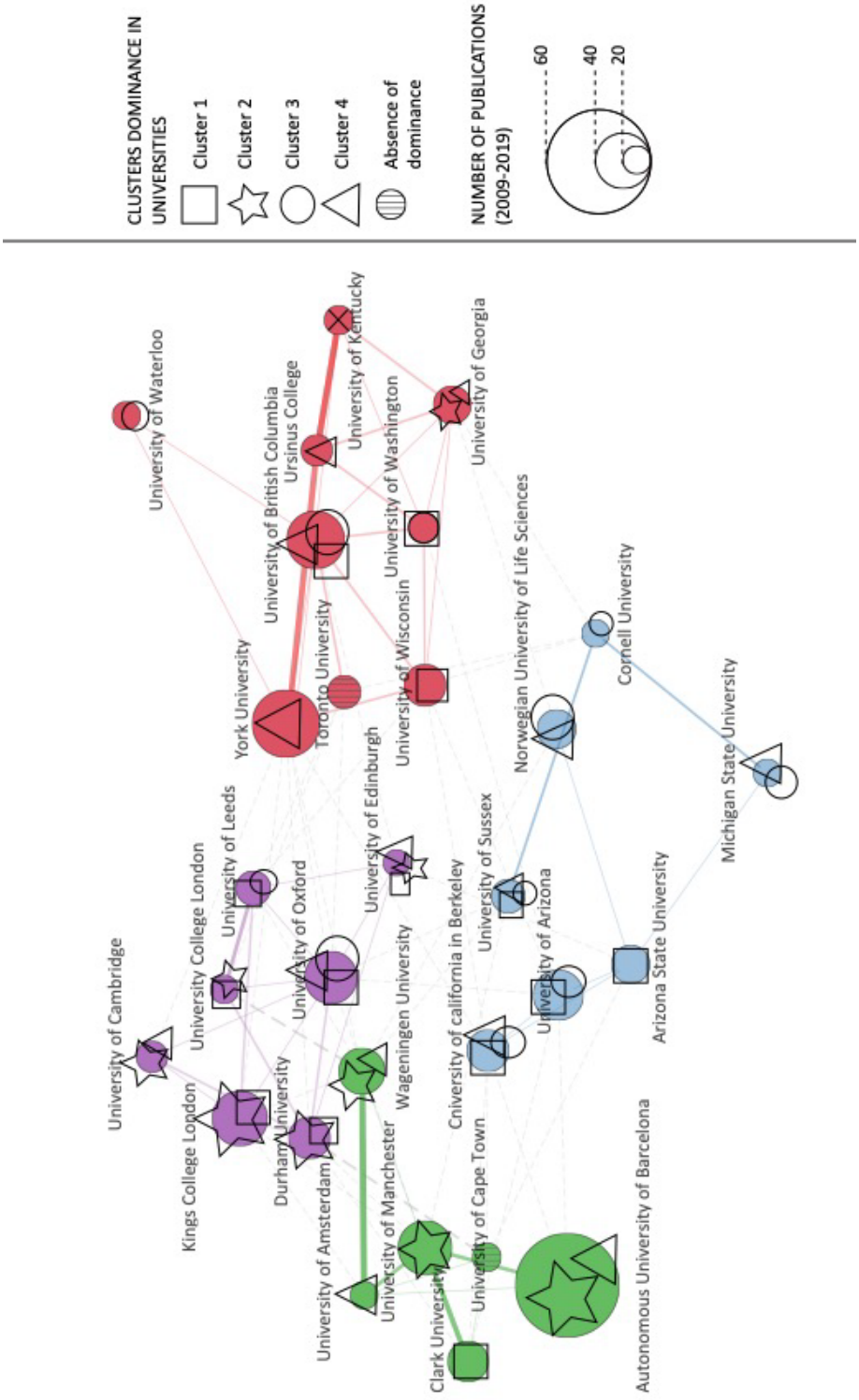

Figure 4: Political ecology co-authorship network (2009-2019), as described in text.

Rank	Decade 2008-2019 and number of publications		Decade 1998-2007 and number of publications		Decades 1950-1997 and number of publications	
1	Autonomous University of Barcelona	63	University of Arizona	17	Clark University	4
2	York University	53	University of Wisconsin	22	King's College London	3
3	University of British Columbia	42	University of Oxford	12	University of California Santa Barbara	3
4	Kings College London	40	Michigan State University	13	University of Wisconsin	2
5	University of Manchester	38	York University	11	University of Arizona	2
6	University of Arizona	34	University of Florida	9	University of California Berkeley	1
7	University of Wisconsin	34	Ohio State University	8	Washington State University	1
8	University of Oxford	32	University of Oregon	7	University of Missouri	1
9	Wageningen university	29	University of Michigan	7	University of Miami	1
10	Clark University	29	Autonomous University of Barcelona	6	University of Oxford	1
	TOTAL	2,452	TOTAL	495	TOTAL	132

Table 5: Identification of dominant clusters in the 2008-2019 university network.

As Figure 4 makes apparent, there is a level of separation between European universities on the left part of the graph (in purple and green), and predominantly North American universities on the right and bottom part (in red and blue). The two European communities share a dominance of Marxist-influenced critical texts represented by the star-shaped symbol. They are prominent in the community colored in green and centered around the universities of Manchester and Barcelona, and in the English sub-network colored in purple and composed by the universities of Oxford, Leeds, Durham, Cambridge, Edinburgh, and two colleges within the University of London (King's College, University College London). This critical perspective is far less present in the two Northern American networks, whether structured by US universities (Berkeley, Arizona, Cornell, Ursinus) or Canadian ones (York, British Columbia). The dominant texts produced in these academic contexts belong to a rural approach represented by the circle-shaped symbol and by general theoretical texts as shown by the square symbols. However, texts belonging to cluster 4 – critical case studies of conservation and resource extraction projects – are present across the network, particularly at York as well as at Amsterdam and UC Berkeley.

In order to overcome the Global North-centered bias introduced by the Scopus database, the following graphs focus on the contribution of universities in the Global South to the four classes, showing that they participate preferentially to the most empirical clusters (clusters 3 and 4, Figure 5), with a distinct contribution from Latin American universities to clusters 1, 3, and 4. However, their academic production remains limited when compared with the Global North, and cannot explain the clusters' temporal dynamics (Figure 6).

These results inform our second hypothesis. We argue that the advocacy impulse follows different trajectories depending on the national academic context. Critical accounts of resource extraction and conservation are shared throughout the network in all the co-publication communities. However, differences emerge when comparing political ecology communities across the Atlantic. On the one side, in the context of North America political ecology is dominant in the sense that it forms a major, accepted sub-field in geography, anthropology, and related fields. Here it is widely represented even in small academic departments, influenced by and reflecting a diverse pool of researchers who publish under the political ecology banner. On the other side, texts belonging to Cluster 2, featuring critical Marxist approaches and UPE references, are dominant in European universities. In continental Europe, this impulse is related to the marginal place held by political ecology, which has been used by more radical researchers as a means to make their mark and stake out territory

in academic institutional space (Chartier & Rodary, 2015).[14] We further explore these transatlantic differences further through our analysis of the *JPE* dataset, the European POLLEN conferences and American DOPE conferences in the next section.

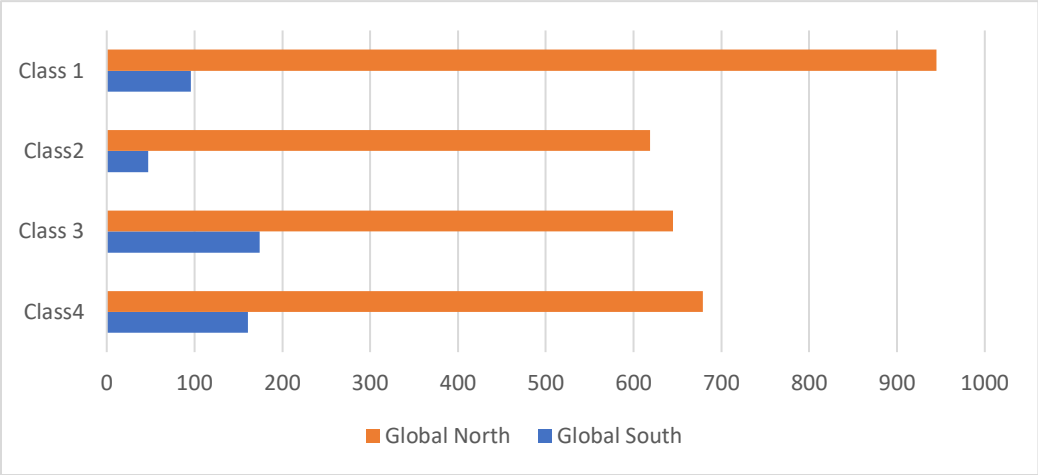

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Figure 5: Proportion of authors of the global South in the four classes of the political ecology corpus.

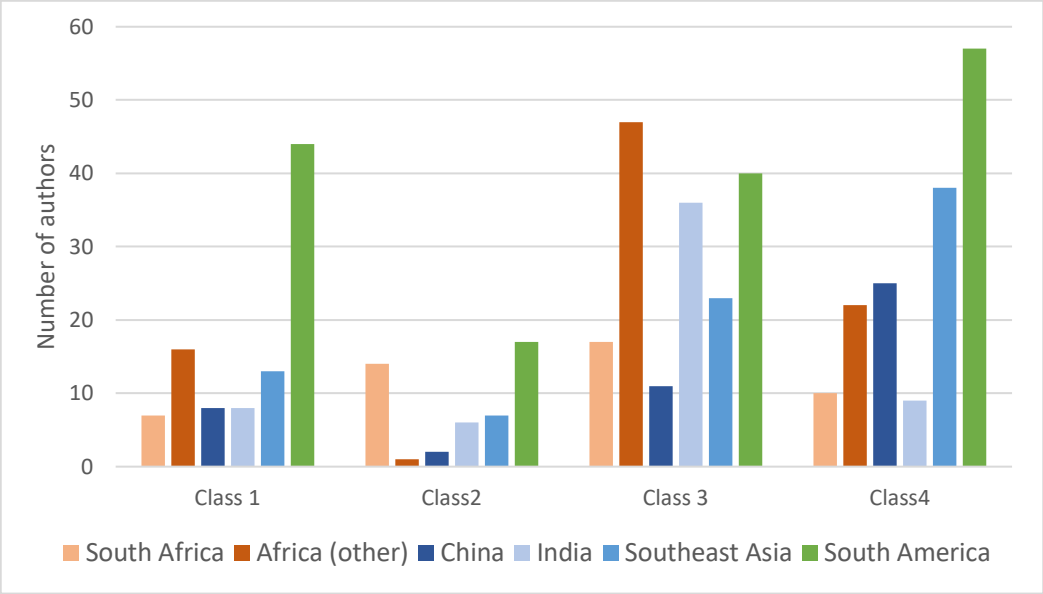

Figure 6: Contribution of authors of the Global South to the four classes.

[14] This marginality is also the case in Australasia, not shown in our analysis, which has comparatively few political ecologists.

6. Replicating the analysis with the JPE database

To address the issue of unreported political ecology articles in the Scopus database, we conducted a specific analysis of the whole *Journal of Political Ecology* corpus, comprising 412 articles since its first issue in 1994. We replicated the lexicometric analysis using Iramuteq, leading to four clusters of articles, listed in Table 6 (*JPE*-A, *JPE*-B, *JPE*-C and *JPE*-D).

		JPE-B		JPE-C		JPE-D	
protect	45	theoretical	35	legitimate	28	export	26
area	44	think	28	quality	27	market	24
management	42	critique	27	ethnographic	26	report	24
conservation	38	field	24	intentional	23	enforcement	19
park	30	justice	24	inspire	23	plantation	17
traditional	24	diverse	23	food	20	price	17
access	19	science	22	contamination	18	solution	16
local	19	research	20	personal	18	international	16
establishment	18	ecology	19	waste	16	behavior	16
ethnic	16	organize	18	performance	15	economics	16
encompass	16	praxis	18	agriculture	15	capital	15
republic	16	emancipatory	18	energy	14	elite	15
conservationist	15	scholarship	18	challenge	14	primary	15
exclude	15	geography	18	interpretation	14	flow	15
fishery	14	human	17	contestation	14	consumer	15
hill	14	critical	17	revolve	14	level	14
national	13	offer	16	iteration	14	displace	14
state	13	Graham	15	shale	14	actual	14
identify	12	Gibson	15	Richards	14	police	14
belief	12	scholar	14	respective	14	increase	14
finding	12	political	13	prevalent	14	source	13
resource	12	decolonial	13	Paul	14	high	13
impose	12	biopolitics	13	audience	14	ensure	13
govern	11	nonhuman	13	production	13	development	13
threaten	11	decolonize	13	industrial	13	raw	13

Table 6: Keywords of clusters identified in the analysis of abstracts and titles of articles of *Journal of Political Ecology*.

Firstly, the most representative articles in the JPE-A cluster address the enfolding power relations in conservation projects. They combine empirical observations with nuanced analyses of the shifting power dynamics: for example, both Beitl (2012) and Love (2021) question the assumption that traditional uses of resources are sufficient safeguards against their depletion. Other texts in this cluster address the impacts of eco-tourism (Hill *et al*., 2016) and tourism in protected areas (Kamau, 2017; Quiroga, 2009) and on local communities and ecosystems.

The keywords defining the *JPE*-B cluster indicate the presence of a theoretical stance in *JPE* publications, with terms such as 'theoretical', 'think' and 'critique.' A further analysis of the most representative texts in this cluster shows that they engage with the search of alternative futures beyond capitalism, offering innovative conceptualizations of justice (Fernando, 2020), and exploring the transformative potential of activism and critique (Burke & Shear, 2014; Dunlap, 2020; Healy, 2014). These texts also embody the increasing attention given to racial issues in political ecology research collectives, such as the Left-Coast Political Ecology Manifesto (LCPE) (Schulz, 2017; Wesner *et al*., 2019; Zanotti *et al*., 2020).

The articles in *JPE*-C share an interest in ethnographical approaches to agroecological challenges faced by producers involved in rural development projects (Flachs, 2018; Flachs & Richards, 2018; Raftery, 2017) and by city dwellers (Frazier, 2018; Lockyer, 2017).

The accounts in the *JPE*-D cluster have a common disciplinary background in [heterodox] economics, with critics of 'green' (Turhana & Gündoğan, 2017) and 'blue' (Bond, 2019) economies. This cluster also highlights the presence of Ecologically Unequal Exchange (EUE) theory, postulating a net flow of natural resources from peripheral developing countries to core industrialized countries through international trade (Dorninger & Eisenmenger, 2016; Kill, 2016; Oulu, 2016).

When compared to the Scopus analysis (Table 7), these clusters highlight common themes and approaches: both databases a set of articles addressing the theoretical underpinnings of political ecology (JPE-B and Sco-1). The ethnographical approaches in JPE-C also mirror the Sco-3 cluster, with a dominance of ethnographical accounts of livelihoods and agricultural production in both cases. The fourth Scopus cluster (Sco-4) echoes both *JPE*-A and *JPE*-D corpuses, with interest in conflicts involving conservation, extraction and local communities. However, UPE approaches, which structure one of the four Scopus clusters, do not constitute a distinct cluster in the *JPE* corpus even some UPE articles are published by *JPE* (see for instance Radonic & Kelly-Richards, 2015).

	Theoretical accounts	**Urban political ecology**	**Small-scale farming ethnographies**	**Conflicts over conservation, extraction, and indigenous issues**
Scopus	Sco-1	Sco-2	Sco-3	Sco-4
Journal of Political Ecology	JPE-B		JPE-C	JPE-A JPE-D

Table 7: Correspondences between Scopus and JPE political ecology databases

To further establish these correspondences, we confronted the 107 JPE articles referenced in the Scopus database with the four Scopus clusters. Figure 7 shows that JPE articles referenced in the Scopus database participate more in the theoretical debate (Scopus 1) and to empirical analyses corresponding to Scopus 3 and Scopus 4 clusters than to the UPE debates structuring the Scopus 2 cluster.

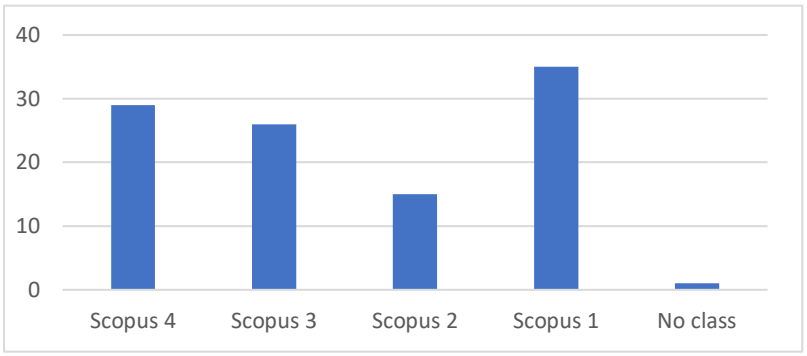

Figure 7: Cluster correspondence of the 107 *JPE* articles referenced in Scopus.

7. Replicating the analysis on the DOPE and POLLEN conferences: radicalized forums for political ecology

To explore the different ways in which the field is structured on either side of the Atlantic, and to identify, confirm, and explore what we identified as a turn towards more radical advocacy approaches (such as those that emerged in cluster 4 of the Scopus analysis), we analyzed the texts associated with two series of international conferences organized by research communities. These were the DOPE and POLLEN conferences held respectively between 2013 and 2019 (DOPE) and in 2016 and 2018 (POLLEN).

We analyzed the titles, abstracts, and author networks of the two conferences, consisting of around 355 presentations for POLLEN and 1,475 presentations for DOPE. We used an Iramuteq analysis similar to the one applied to Scopus and *JPE* abstracts, identifying clusters of words that significantly appear together in a same abstract, to obtain four lexical clusters for each conference, based on the titles and abstracts. The results are presented in Tables 8 and 9. We name the four clusters Po-A, Po-B, Po-C and Po-D for POLLEN and Do-A, Do-B, Do-C and Do-D for DOPE conferences to differentiate them from the previous Scopus classification.

The resultant clusters highlight both common ground and differences in political ecology. First of all, in each of the three databases, there is a cluster that comprises conceptual terms. But while cluster Po-A is dominated by terms such as 'Marxist', 'neoliberal', and 'conceptual', akin to the Europe-centered Cluster 2 of the Scopus corpus, the conceptual terms used in cluster Do-A does not share this Marxist common ground, with a dominance of 'theory', 'science', and 'humanity' mirroring instead cluster 1 of the Scopus corpus.

The three databases also share a common focus on critical accounts of conservation and resource extraction projects. This is found in cluster 4 of the Scopus corpus, and is widely present in POLLEN clusters Po-B, Po-C and Po-D. These three clusters each focus on a specific sub-theme, but also show signs of an advocacy impulse, with words such as 'indigeneity' and 'grassroots' being significant components of the lexicon. Cluster Po-B, with significant terms such as 'oil', 'palm', 'mine' and 'river', and characterized by 'Latin America' and 'South-East Asia' case studies, corresponds to a focus on extractive resource management issues in the Global South. Cluster Po-C with 'parks', 'conservation', 'indigeneity' and 'wildlife', refers to critical accounts of conflicts in and around conservation areas in southern case studies. In the cluster Po-D, critical analyses target the green economy, with significant terms such as 'REDD', 'climate change', and (payments for) 'ecosystem services', including questions relating to the urban provision of water services characteristic of UPE. Such concerns over extraction and conservation are also present in the DOPE conference database, notably in cluster Do-B, with significant terms being 'industry', 'extraction', and 'oil.' This cluster also highlights national – and even regional – concerns, with case studies of 'fracking' and of the 'Appalachian' region, a recurrence that is understandable since the University of Kentucky is the organizer and host of the DOPE conferences.

Cluster Po-A (27%)		Cluster Po-B (28%)		Cluster Po-C (25%)		Cluster Po-D (20%)	
nature	65,723	oil	192,3	park	121,4	water	180,5
political	47,148	palm	157,3	war	105	urban	94,7
practice	46,75	Latin	101,6	belong	91,9	service	89,7
literature	40,097	large	97,4	conservation	89,4	injustice	80,9
discursive	37,843	river	93,9	wildlife	75,8	change	79,1
grassroots	36,898	project	90,3	fence	66,5	climate	69,3
conceptual	35,1	scale	80,5	reserve	60,6	distribution	55,3
Marxist	29,767	crop	72,9	indigeneity	58,8	justice	53,2
neoliberal	29,763	mine	68,2	forest	53	inequality	47,5
form	29,74	flex	67,1	area	51,6	REDD	46,5
relation	28,596	company	66,9	unending	51,5	access	43,5
argue	27,552	plan	66,8	hunt	49,9	gender	43,3
alternative	26,489	America	66,7	Africa	46,8	system	41,5
debate	24,735	industry	63,1	poach	45,4	grind	39,7
theory	23,66	extraction	54,2	illegal	43,7	intervention	39,2
methodology	21,92	production	50,6	Saharan	42,6	adaptation	39,1
agenda	19,503	investment	50,1	person	42,5	policy	39
shift	19,316	sector	46,6	militarization	40,7	city	38
tool	19,248	extractive	44	border	40,7	payment	34,6
insight	19,248	government	41	protect	39,9	socio	34,1
notion	19,004	expansion	40,1	white	39,6	Ecosystem services	31,7
ontological	18,823	plurinationality	38,5	colonial	35,8	poverty	30,6
that	18,808	basin	38,1	fieldwork	35,1	user	29,3
definition	18,739	dam	37,3	man	33,2	pollution	28,5
engage	18,577	state	34,9	village	32,5	resilience	27,1
experience	18,317	repression	33,1	military	32,4	attention	26,9
accumulation	18,317	certification	32,2	log	31,7	gender	43,3
resistance	17,822	violence	29,1	live	30,7	governance	26,7

Table 8: Keywords of clusters identified in the analysis of abstracts and titles of presentations at the two POLLEN conferences (Wageningen 2016 and Oslo 2018)

The rural livelihoods focus of cluster 3 in the Scopus corpus, which as we noted earlier was strongest in the 1990s, is partially reflected in the cluster Do-C of the DOPE corpus, with shared terms such as 'rural',

'household', 'interview', and a preoccupation with the impacts of climate change on farmer communities. The POLLEN corpus has no corresponding cluster.

Cluster Do-A (18%)		Cluster Do-B (30%)		Cluster Do-C (28%)		Cluster Do-D (24%)	
theory	63,445	industry	71,95	climate	56	violence	49
science	56,538	extraction	54,8	participation	51	black	40
humanity	49,532	oil	51,99	level	45	anti	32
investigation	45,397	mine	51,53	study	42	counter	31
human	44,885	region	42,34	household	36	intimate	31
relational	37,675	state	39,23	decision	35	racism	27
interdisciplinary	37,269	native	35,51	adaptation	34	body	25
assemblage	36,407	fracture	31,65	increase	33	person	23
concept	35,525	land	29,72	improve	31	resistance	23
technology	35,161	company	29	reduce	31	feminism	23
nature	33,768	foreign	28,9	organization	30	everyday	22
distinction	31,207	regulation	28,53	rural	29	disease	22
view	28,59	hydraulic	27,57	interview	29	ethnographic	21
ecology	26,824	coal	26,62	management	26	death	21
Anthropocene	26,743	boom	24,92	development	26	white	21
metabolism	26,743	appropriation	24,25	result	25	who	20
Earth	26,362	lease	24,25	conduct	25	peasant	20
think	25,675	mineral	24,09	semi	25	biopolitical	20
society	24,899	archival	23,4	factor	24	autonomy	20
Marx	23,194	fracking	22,69	change	24	narrative	19
hybridity	23,194	corporation	22,55	participant	23	malnutrition	19
anthropocentric	23,194	operation	22,55	finding	23	nonhuman	18
field	22,901	sand	21,79	low	23	ethnography	18
critique	22,866	bank	21,08	service	22	medium	18
realm	22,347	tourism	20,63	area	21	bodily	17
disciplinary	22,225	mile	20,49	datum	21	protest	17
mode	20,873	period	20,4	empowerment	21	biopolitics	17
object	20,804	Appalachian	20,37	address	21	postcolonial	17

Table 9: Keywords of clusters identified in the analysis of abstracts and titles of presentations identified at the DOPE conferences in 2013, 2014, 2015, 2017, 2018 and 2019.

In summary, in all three, there is a theoretical/conceptual cluster, but POLLEN conferences tend towards the radical UPE cluster 2, and DOPE towards the less Marxist-centered cluster 1. The radical dimension of POLLEN is confirmed by the fact that even if there is a strong focus on critique of resource extraction and conservation in all databases, in POLLEN there is, compared to Sco4 and Do-B, the additional presence of potentially more 'activist' keywords (indigeneity, injustice, justice, inequality), especially in Po-D. Furthermore, the Scopus cluster 2 of Marxist urban metabolism analyses (which is very Europe/UPE centered) is partially reflected in the (European) Po-D but not at all reflected in DOPE, which confirms its European weighting.

What was once a focus on rural agrarian livelihoods in the South (Scopus cluster 3, dominant in 1990s) has lost centrality to the subfield. But it has not disappeared – it instead diversified into questions of larger scale rural extractive industries and their impacts (Po-B), into the impacts and marginalization caused by conservation (Po-C), and injustices for water users (Po-D), as well as – perhaps more directly – household climate change adaptations (Do-C). This latter focus (Do-C) is more 'policy oriented' compared to the more 'critical injustices' highlighted in Po-B, Po-C, Po-D.

A novelty emerging from DOPE is Do-D. Cluster Do-D, with top terms 'violence', 'black', 'anti', and 'intimate', and 'body' stands out from the others, reflecting a strong sub-theme at DOPE conferences on feminist, post-colonial, and intersectional approaches to political ecological themes.

These results can be interpreted as strengthening and nuancing our third hypothesis on the spatialization of the epistemic communities, since radicality seems different in strength and nature across both sides of the Atlantic. Marxist, radical, and activist themes are more prevalent at POLLEN, whereas more policy-oriented, and conceptual approaches are represented at DOPE. But the DOPE conferences also show significant undertones of radical activist research too. For instance, cluster Do-B takes aim at large-scale capitalist resource extractivism, whereas Cluster Do-D investigates racism and unequal gender relations. Our findings highlight the structure of the internal diversity of political ecology, as well as the existence of some regional fault lines. On the one side, a strong Marxist renewal translates into European research networks sharing a radical advocacy ambition grounded in radical approaches. On the other side, the North American and particularly US research community appears as more plural, with radical approaches to racism coexisting with critical deconstruction among its epistemic communities.

Table 10 summarizes the results from the different databases, showing how the deconstructivist and radical perspectives are represented in the different databases. It notably confirms our hypothesis 2, highlighting that even if the radical perspective is important across most of the database, it dominates only in POLLEN. In the other arenas, it coexists with more deconstructive approaches.

8. Discussion

By moving between different arenas where political ecology is being made in the previous section, we have explored the guiding principles of the field, its institutional structure and its evolution. Four main lessons can be drawn.

First, if as we suggested earlier, the concept of epistemic communities incorporates a shared 'culture for political action', then our analysis sheds light on internal differences within political ecology between a policy orientation and a radical advocacy orientation. Furthermore, we quantify and spatialize this opposition, and observe how the cultures for political action evolve under the growing threat of climate change. On the one side, both the bibliometric approach as well as our reading of texts that review the field demonstrate the pull of policy relevance in part of the political ecology corpus. This practical ambition concerns one third of the texts of the Scopus database, and is most-pronounced in studies using large data sets and particularly in accounts of rural livelihoods in African contexts. In recent years, policy-oriented political ecology research increasingly addresses climate change, for instance through its impacts on health and gender disparities, in order to identify the evolution of vulnerabilities and to inform policy by designing adaptation strategies. Our analysis highlights a separate set of publications that trend towards advocacy as a form of political action. Here, researchers study diverse conflicts over resource use and extraction, as with the management of natural areas, mines or infrastructures, often highlighting the point of view of organized and vocal local communities and indigenous groups. In this advocacy-oriented group, environmental policies are approached using a critical perspective, aimed at highlighting the unequal power relations underlying their design.

	Deconstructivist		Radical	
Scopus	Cluster 1 - critical theory	Cluster 3 - critical rural studies	Cluster 2 - Radical UPE	Cluster 4 - Radical anti-extractivism/conservation activities
JPE	JPE 3 - critical theory	JPE 2 - rural livelihoods		JPE 1 (extractive resource management) & JPE 4 (anti-conservation)
POLLEN			Po A (radical theory)	Po B (anti-extractivism), Po C (conservation) & Po D (anti-green economy)
DOPE[1]	Do A (deconstruction theory)	Do C		Do B (anti-extractivism)

Table 10: summary of the different clusters of the databases. Note: A further cluster, Do D, (gender and racial issues) is not fully represented in the pre-existing categories shown here.

Second, our account uses the polysemic concept of epistemic communities to emphasize the internal differences in political ecology. Political ecology appears to have a 'shared scientific culture' centered on key journals (e.g. *Geoforum*, *Journal of Political Ecology*) and canonical references such as Bryant and Bailey (1997) and Blaikie and Brookfield (1987), as well as a shared foe in Hardin's 'Tragedy of the Commons' (1968). However, UPE clearly sits apart, representing a more recent timeframe and a separate set of canonical references such as Swyngedouw and Heynen (2003), Keil (2003), or Lawhon *et al*. (2014). It is also set apart by a reliance on Marxist vocabulary, mobilized in a clear theoretical ambition to reconceptualize urban environments as ever-evolving metabolisms through which nature is being transformed under the pressure of neoliberal policies.

Third, our research shows that these divergences reflect differences in the structure and culture of academia across national boundaries. The authors from Global South universities publish more case studies and show no clear trends in their adoption of radical 'advocacy' versus critical 'deconstruction' approaches.

On the contrary, advocacy and Marxist approaches in the most recent decade were more prominent in continental European universities and some English ones such as Manchester and Cambridge, while this pull is more diffuse in American universities. We argue that this dynamic might be traced to the extraordinary influence and research outputs of certain European researchers who are working in national contexts where disciplinary divides are a powerful organizing force, and where traditions that embrace more radical 'political ecologies' have long existed (Benjaminsen & Svarstad, 2021). As such, political ecology is a way for European radical and activist geographers and other scholars to establish themselves in academia and use their marginal status as tool to gain prominence – a strategy successfully applied by the Institute of Environmental Science and Technology at Barcelona (ICTA-UAB), now a leader in the production of political ecology texts and training. In contrast, radical geographers have held a more mainstream position in the US, where a strong critical tradition has been part of geography, and perhaps also anthropology and sociology, since the 1970s (Kull *et al*., 2016).

A **final** contribution of the article has been to link these internal divergences in political ecology to the increased prominence of global environmental challenges and the dominance of certain policy discourses. Based on our reading across the field occasioned by this review, one could argue that an increase in an advocacy-oriented culture of political action in part of the political ecology community is in response to the dominance

of policy solutions to current environmental issues that are rooted in green economy discourses, linked to the rise of the Sustainable Development Goals, carbon offsetting, and the rapid shift away from fossil fuels in the energy sector. While a subset of political ecology texts tend to investigate how such policy options play out when applied to conservation or carbon trading – using a critical, deconstructive approach – another subset strongly rejects them in favor of radical degrowth narratives critiquing the foundations of the green economy. The latter tend to set aside their critical, deconstructive tools and emphasize promoting and defending a degrowth social and economic pathway for society. This form of analysis, while more prominent in European political ecology, is gaining momentum in North American scholarship, as we show in the convergence of POLLEN and DOPE conferences where future political ecology is actively being made.

9. Conclusion

Our analyses show that the impressions we had at the European political ecology conferences we mentioned in the Introduction have an empirical basis. Yes, some political ecology is taking a turn towards radical advocacy, advocating for social movements that contribute to public debates. This turning point is recent and European in origin, and here, political ecology has a theoretical vocation, notably in its (theoretical) attack on capitalism. On the other hand, a North American political ecology embraces a more policy-oriented form of political action when applied to particular cases, not all of those cases situated in Canada or the USA by any means. It emphasizes critical theoretical questions about science and public policies more than it does the processes of capital accumulation, and engages in dialogue with the world of international development through its anchorage in fieldwork. The North American approach is, however, also hybrid, with radical approaches targeting extractivism, race and gender inequalities. In the Global South, the approaches taken are more diverse, even if they are more empirical. The differences we have analyzed between the stances of European advocacy, hybrid North American, and political ecology as practiced across the Global South (to generalize starkly) reflect differences in epistemological and practical commitments. Some want to challenge science, others capitalism; some want to question development actions, others to question major state and commercial projects. In the end, some want to *criticize* a dominant system to improve it, while others want to *change* it.

These differences are sufficiently strong and structured that if we take up the distinction between epistemic communities proposed in the first part of this article, it appears that political ecology, even if it shares a field of research, is split between two epistemic communities. One engages in critical dialogue, the other in opposition. These differences can be placed into perspective by recognizing context. Political ecology is a dominant approach in English-speaking geography and related disciplines, particularly in North America and Britain, while it is more marginal in continental Europe. The European marginality of political ecology is undoubtedly part of the explanation for the trends identified here: more radical researchers are investing in this field, since it is indeed a position of marginality that they aim to occupy. On the other hand, when the field is dominant, it is influenced by a more diverse pool of researchers.

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