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Green infrastructure and planning policy: a critical assessment

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Advocates of the green infrastructure (GI) concept claim it offers a progressive planning approach that facilitates synergies between economic growth, environmental conservation and social development. Although widely endorsed by both planning practitioners and academics, little academic literature exists critically evaluating what GI entails or the potential implications of its institutionalisation within planning practice. This paper addresses this deficit by critically examining the interpretation and representation of the GI concept in planning policy. The paper first critically analyses international interpretations of GI. Following this, the particular attributes of GI's interpretation in the Republic of Ireland are investigated. The paper demonstrates how the emergence of GI in Ireland relates to broader debates on attempts to reconcile environmental concerns with development aspirations in planning policy. It is deduced that GI may represent an approach to planning policy formulation wherein habitat conservation initiatives are primarily designed and justified relative to the ecosystems services they are seen to provide to society. The paper also cautions against the risks posed by confining GI debates to the deliberations of technical specialist. The paper concludes by identifying some issues that may arise in the implementation of a GI approach and suggests ways to enhance the potential benefit of the concept's use in spatial planning.

Keywords: green infrastructure; planning; sustainability; Ireland

Introduction

How to both interpret and deliver sustainability through the planning system has long been a preoccupation of land-use governance debates (Owens and Cowell 2011). Much of this has centred on finding new ways to address the perceived imbalance between economic growth and nature conservation by raising the profile of the environment in policy activity (Dryzek 2005, Carter 2007). Such efforts have often focused on devising and presenting new initiatives that promise to reconcile environmental protection and economic growth in a way that is mutually beneficial (Cowell and Owens 2006). These have included such concepts as "environmental compensation" (Boucher and Whatmore 1993), "the compact city" (Jenks *et al*. 1996), and "socio-ecological systems" (Selman 2012). Such initiatives have often enjoyed widespread support upon their initial presentation. However, they are characterised by difficulties in implementation as their interpretation becomes a matter of disagreement.

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A comparably recent development in such activity has been the emergence of the "green infrastructure" (GI) concept. Although understandings of GI vary (Wright 2011), what interpretations of the concept share is a belief in the ability and necessity of planning, designing, constructing and managing nature to deliver desired benefits from particular "environmental resources", be they watercourses, green open spaces or tree-lined streets (Mell 2013, Rouse and Bunster-Ossa 2013). Thus, those who advocate GI presuppose the requirement for land-use intervention so as to supply and/or enhance the specific benefits that may be provided by the environment.

The Republic of Ireland has not been immune from the problems of squaring nature conservation with economic development, nor has it been impervious to the variety of policy initiatives proposed to remedy this issue (O'Mahony and Keohane 2011). Accordingly, GI has become a popular topic in Irish land-use planning debates. However, what is most striking about GI in Ireland is the speed with which it has gained traction among planners and allied professionals. Although largely unknown among the planning fraternity prior to November 2008, the GI concept has since enjoyed a meteoric rise in popularity among Irish land-use planners and allied professionals. Indeed, over the course of just three years, from 2008 to 2011, the concept moved from obscurity to frequent reference in Irish land-use policy at national, regional and local levels.

Despite this meteoric rise on the policy agenda, GI has been subjected to little critical assessment in Ireland. This reflects a broader lack of debate on the issue at an international level, with critical deliberation on GI conspicuous by its absence. Consequently, there is a gap in our knowledge regarding the potential implications of institutionalising the GI concept in a planning policy context. This paper seeks to address this deficit by critically examining the interpretation and representation of the GI concept in Ireland. This investigation is then related to broader debates in planning and environmental policy.

The paper draws upon the detailed analysis of 131 policy documents identified as potentially relevant to the study and collated as an "archive".[1] "Initial coding" of this archive was undertaken. This form of analysis was employed to: (a) explore "theoretical possibilities" (Charmaz 2006, p. 47) in the collated documentation; (b) facilitate sensitivity to recurring "themes" in it (Rapley 2007); (c) assist in the identification of interviewees and; (d) inform the production of a master interview guide. As a result of the initial documentary analysis it was possible to develop a "purposive sample" (Patton 2002, Hennink *et al*. 2011) of interviewees drawn from a cross-section of national, regional and local government, as well as from the voluntary and private sectors. A semi-structured interview format was adopted as it enabled "openness to change of sequence and forms of questions in order to follow up the answers given and the stories told by the subjects" (Kvale 1996, p. 124). In this sense, the interview format invited interviewees to "express themselves openly and freely and to define the world from their own perspective" (Hancock and Algozzine 2006, p. 40). At the closing of all interviews, participants were asked to suggest others who they thought relevant to the advocacy of GI in Ireland. This form of "snowball sampling" (Flick 2007) was employed as it was considered unlikely that the purposive sample of interviewees would have comprehensively identified all agents pertinent to the advancement of the GI policy approach. Such snowball sampling thus enabled both the expansion of the interviewee sample and the thorough identification of those involved in the emergence and evolution of the GI concept in Ireland. However, care was taken to avoid "enmeshing the researcher in the network of the initial participant interviewed ... leading to or reinforcing the silencing of other voices" (Schwartz-Shea and Yanow 2012, p. 87). This risk was offset by ensuring a sufficient variety of non-associated and professionally diverse interviewees in the initial purposive sample. These processes of interviewee identification and

contact continued until "saturation" (Rubin and Rubin 2005) was reached wherein it was determined that additional interviews would not add any new insights or perspectives significant to an understanding of the emergence and evolution of GI planning in Ireland. The research process assembled a substantial archive of documents, notes and interview transcripts. From this, a broadly representative selection of interview material and documentary citations is employed in this paper. Such references have been carefully chosen to speak for views shared by the majority of interviewees and commonly detailed in various documents. Hence, all references employed are an effort to negotiate the limitations of space by remaining vigilant of the need to appropriately represent shared interpretations without eclipsing individuality or diverse perspectives.

This information is employed to first examine non-Irish interpretations of GI. This provides the backdrop against which the particular attributes of GI's interpretation in an Irish context are then investigated. The paper subsequently discusses how the emergence of GI in Ireland relates to broader debates on attempts to reconcile environmental concerns with development aspirations in land-use planning policy. In particular, it is suggested that Irish interpretations of GI may reflect an implicit international turn towards reappraising how habitat conservation initiatives should be justified in land-use governance. The paper proposes that this may constitute an instantiation of the ecological modernisation paradigm in planning policy. It also identifies some issues that may arise in efforts to implement GI and critically appraises the potential of the concept to facilitate more sustainable forms of planning. The purpose of the paper is not to condemn or condone GI. Rather, it endeavours to stimulate greater critical reflection on the deployment of GI thinking and offer some suggestions on how this may be undertaken.

What does GI mean? International interpretations

At the international level, academic literature specifically employing the term "GI" is limited but growing (Kruuse 2011, Butler 2012; Grant 2012). What does exist suggests that GI has a varied heritage. Many academics locate its precursor in attempts to tackle habitat fragmentation (Sandström 2002, 2008, Karhu 2011). Others identify its origins in an emerging consciousness in the nineteenth century of a need to supply recreational spaces for urban populations while simultaneously attend to public health and flooding problems (Benedict and McMahon 2006, Mell 2008). However, common to most interpretations of GI is reference to "networks". This may be manifested in policy discussion wherein reference is made to GI as "ecological networks"[2] and grounded in landscape ecology (Opdam 2002, Jongman and Pungetti 2004, Opdam *et al*. 2006), recreation-focused "greenway networks" (Little 1990, Fábos 2004), or varying combinations of these (Walmsley 2006). Such combinations often expand ecological and recreation networks-focused planning concepts to include climate change adaptation functions (Ahern 2007, Gill *et al*. 2007, Handley *et al*. 2007, Gill *et al*. 2009) and/or urban growth management (Amati and Taylor 2010, Thomas and Littlewood 2010).

This shared focus on networks suggests common ground for a unanimous interpretation of GI's meaning. Therefore, it is surprising to note that academic literature citing GI reveals significant differences in understandings as to what it entails. This is reflected in the fact that much of the academic literature on GI frequently allots considerable attention to a discussion on how to define what GI means (Benedict and McMahon 2002, Sandström 2002, 2008, Tzoulas *et al*. 2007, Mell 2009, Wright 2011). In many cases, such efforts assume the form of comparing and contrasting several competing definitions in an effort to formulate an all-encompassing description (Kambites and Owen 2006, Allen 2012).

Nevertheless, locating such a description has proved elusive, with efforts to synthesise varying definitions serving as much to expand and add vagueness to interpretations of the term's signification as they have to clarify its meaning.

Indeed, variations of interpretation emanate from numerous sources, with limited academic reference made to the term in Dutch (Hajer 2003)[3], Swedish (Sandström 2008, Erixon *et al*. 2013), German (Hasse 2010), Brazilian (Herzog 2010) and New Zealand (Ignatieva 2010) contexts regarding "networked" approaches to nature conservation planning. Citation of GI has also been made in an Australian context with regard to the engineering "green walls and roofs" (Rayner *et al*. 2010, Williams *et al*. 2010) and the principles of landscape ecology (Kilbane 2013), and on the African continent with respect to models for urban water and waste management (Abbot 2012). However, the term "GI" is most frequently employed in northern hemisphere Anglophone nations, primarily the USA and the UK. It has also emerged as a concept advanced by the European Union (EU). Thus, this review focuses attention on the USA, the EU and the UK.

The USA

The greatest volume of planning activity specifically termed as GI has been undertaken in the USA. Here, a desire to reconcile environmental conservation with growth facilitation has been a consistent focus since the concept's endorsement in 1999 by the federal government through the auspices of The President's Council for Sustainable Development (PCSD). The PCSD interprets GI as a departure from "environmental restoration and preservation" in seeking "to guide more efficient and sustainable land use and development patterns as well as protect ecosystems" (PCSD 1999, p. 64). Thus, the interpretation of GI offered by the PCSD does not prioritise ecological preservation above other objectives, but rather seeks to advance new modes of ("sustainable") development. This view of social, economic and ecological commensurability was echoed in an academic context when in 2002 GI was proclaimed as "the ecological framework needed for environmental, social and economic sustainability" (Benedict and McMahon 2002, p. 12). With specific reference to the environmental, economic and community benefits provided by GI, Rouse and Bunster-Ossa (2013, p. 19) have more recently echoed such views by foregrounding the multi-functional potential offer by GI when asserting that "these benefits derive from the multiple and overlapping functions provided across different systems – hydrology, transportation, energy, economy, and so on – that can intersect in green infrastructure". While interpretations of GI in the USA vary in focus from ecological conservation (Marcucci and Jordan 2013), to recreation space provision (Erickson 2006) and aesthetic enhancement (Pincetl 2013), they most frequently show a concern for stormwater management (USEPA 2004, Chau 2009, Novotny *et al*. 2010, NYC 2010, Brown and Caldwell *et al*. 2011). Here, practice examples seek to illustrate the viability and cost effectiveness of a biomimicry approach to drainage design (CF 2007, Stenning 2008, EPA 2010) that promotes broad multi-functionality and connects local initiatives with state policy (Weber *et al*. 2006, Allen 2012). In this sense, a GI approach is advanced as a means to enhance local ecological and cultural distinctiveness so that it becomes "both 'effective' as an agent of environmental quality and 'affective' as an expression of local conditions" (Rouse and Bunster-Ossa 2013, p. 6). Consequently, deployment of the term in North America has led some to conclude that GI is not so much a design concept as it is "a philosophy or organizational agenda strategy that provides a framework for planning conservation and development" (Benedict and McMahon 2006, p. 15). However, the particulars of such a "philosophy" are left largely unspecified with understandings of what GI involves

"tailored to appeal to diverse constituents with message points that address a particular professional discipline or resource issue" (William 2012, p. 17).

The EU

The EU[4] ostensibly promotes a less diffuse array of interpretations of GI than is evident in the literature emanating from the USA. In the EU, GI is primarily interpreted as a "networked" approach (Silva *et al*. 2010) to the safeguarding of ecosystems services provision for the mutual benefit of socio-economic and ecological requirements (Sundseth and Sylwester 2009). While noting that "no single widely recognised definition of GI is identified in the literature" (EEA 2011, p. 6), the EU has advanced the view that, "The concept of GI emphasises the importance of ensuring the provision of ecosystem goods and services for society and the value of functionally and spatially connected, healthy ecosystems" (Karhu 2011, p. 7). This focus on the society "servicing" dimensions of GI resonates with other initiatives endorsed and engaged in by Directorates-General of the European Commission that seek to reconcile ecological conservation with growth. The most notable of such initiatives is a programme on "The Economics of Ecosystems and Biodiversity" (TEEB) of which the EU is a partner with a number of governments and international organisations in seeking to apply "economic thinking to the use of biodiversity and ecosystems services" (TEEB 2010, p. 3). In this sense, GI is seen to offer "win-win, or 'no regrets' solutions ... within a financially viable framework" (EC 2012, p. 1). While at first this may appear to differ from American comprehensions of the concept, interpretation of GI by the EU encompasses the multitude of understandings of American academics and practitioners by focusing on GI as a means to ensure the provision of ecosystems services in facilitating more sustainable forms of growth. Accordingly, the EU advocates a broadly encompassing version of GI similar to that of some US advocates (Benedict and McMahon 2002, 2006, Rouse and Bunster-Ossa 2013), by including a broad array of functions beneath the aegis of "ecosystems services" (Karhu 2011). These include stormwater management, biodiversity conservation, climate change adaptation and recreational space provision. In this sense, GI is interpreted as a means to facilitate efficient, yet environmentally sensitive, economic growth (EEA 2011, p. 35). The EU does not specify a method on how to plan the GI that it is claimed can permit such development. However, it supports the concept through collating and publicising various projects considered to represent exemplars of GI activities (Sylwester 2009). Many of the projects indicated as possible prototypes for application throughout EU member states vary in the issues they address and rarely employ the term "GI" (Sundseth and Sylwester 2009).

As such, the understanding of GI forwarded by the EU is more an aspiration for "networked" focused planning activities (Silva *et al*. 2010) that facilitate commensurabilities between ecological conservation and economic development than it is a currently exercised set of defined practices (EEA 2011). It is in this context that the European Commission has formally endorsed GI (EC 2013), conceiving it as a means to meet its targets for biodiversity protection (EC 2011) in a manner that does not compromise economic development (Silva *et al*. 2010). However, as with the case of the USA, there is an absence of academic literature critically appraising interpretation(s) of the concept in an EU context.

The UK

What is specifically termed as "GI" in Europe is most prolifically represented in the literature emanating from the UK. Here, the term GI has been advanced under various readings in

Northern Irish (DoE(NI) 2013), Welsh (TEP 2011) and English (LCRP 2010, PCC 2010, CGIF 2011) planning policy and proposed statutory guidance (DCLG 2010), as well as in non-statutory guidance by The Scottish Government (SG 2011, 2012), and the advocacy activities of planning-focused QUANGOs (CABE 2009, NE 2009, LI 2013). Despite this, a surprisingly limited quantity of academic literature has been published concerning GI in the UK, with the particular interpretation of GI varying between authors. Notwithstanding such variations, the majority of this work shares a focus on urban areas, although Davies *et al*. (2006) have advocated its applicability to the rural environment, with Amati and Taylor (2010) noting its potential as a peri-urban planning mechanism to contain metropolitan growth. Perhaps, the most restricted interpretation of GI in the UK centres on its understanding as a planning strategy to facilitate climate change adaptation (Gill *et al*. 2007, Kazmierczak *et al*. 2010). However, Kambites and Owen (2006) represent a more common reading of the concept by forwarding a broad and encompassing interpretation of the term. Indeed, these authors supply a long list of GI's advocated functions and benefits, ranging from educational and recreational resource provision through to landscape protection and local economic development. In doing so, they conclude that spatial, socio-ecological, user and administrative "connectivity is an inherent attribute of green infrastructure" (Kambites and Owen 2006, p. 490).

While considerable effort is expended on advocating the benefits of GI, vagueness as to what it signifies is evident in much UK practitioner literature (TCPA 2011, LI 2013), government sponsored advocacy (CABE 2009), and national planning policy (DCLG 2012). Such ambiguity is compounded by the propensity of many of the concept's UK advocates to label celebrated historic planning publications as GI, or to classify selected planning programmes from other countries as GI, even though such programmes are not normally referred to as such by those engaged in their formulation and implementation (Kambites and Owen 2006, Mell 2008). This has increased latitude for interpretation of the term, with, for example, some studies employing "GI" to primarily describe planning for environmentally sensitive access to green open spaces in urban areas (GLA 2012), while others largely interpreting it as a means to facilitate regional economic development (LCRP 2010, AGMA 2011), and yet others endorsing it principally in the context of climate change adaptation (NWCCP 2011).

In the limited academic literature acknowledging the uncertainty of GI's signification, it has been suggested that the lack of a fixed definition is a positive trait by proposing that, "Ambiguity has been an attribute in that it allows the concept to adapt to the varied requirements of different spatial and temporal situations" (Wright 2011, 1014).

With an atypical focus on the analysis of GI policy discourse rather than its uncritical promotion, Horwood cautions against framing green space in terms of economic benefit, suggesting that this may imply such spaces "are only of value insofar as they contribute economically" (2011, p. 972). Thomas and Littlewood (2010) also infer a more critically reflective interpretation of GI by examining it not in terms of its advocated multi-functionality, but instead choosing to investigate its potential "as a strong discursive competitor for the green belt" (Thomas and Littlewood 2010, p. 204). These authors present a more nuanced appraisal of what GI implies. Specifically, they conjecture that GI may be conceived as a form of "ecological modernization" (Dryzek 2005) that offers a means of "lubricating the frictions" (Thomas and Littlewood, 2010, p. 212) found between economic development and the protection of nature. However, these authors fail to develop this line of examination, with their analysis on the potential role of GI's discursive constitution in advancing ecological modernisation concluding that GI is unlikely to easily displace the "political resilience" of green belt policy approaches to containing urban sprawl.

Consequently, with rare exceptions, both academic and practitioner literature in the UK is largely uncritical of GI. As with that emanating from the USA and the EU, the UK literature specifically addressing GI seeks more to promote its benefits than critically appraise the reasons for its emergence, the form of its representation, or the potential consequences of its institutionalisation.

In summary, what these different perspectives on GI indicate is a variety of interpretations addressing an array of issues. This diversity reflects the range of disciplines that GI thinking seeks to synergistically integrate. While a desire to enhance the "multi-functional" potential of landscapes is a common feature of almost all GI discourses (EC 2012, LI 2013, Rouse and Bunster-Ossa 2013), most interpretations are positioned relative to a particular discipline, be it engineering, ecology or others. Consequently, most interpretations show a tendency to emphasise issues of specific disciplinary concern when discussing GI. Hence, approaches termed as GI may range from a focus on ecological networks grounded in theories of landscape ecology (Silva *et al*. 2010), to those primarily concerned with regional development founded on theories of economic competition (AGMA 2011), or to those directed at recreation facilitation rooted in perspectives regarding accessible green spaces provision (NE 2010). However, what these approaches share is a conviction that GI supplies a "framework" to reconcile divergence between ecological conservation, economic development and social equity.

Having thus briefly reviewed the predominant international understandings of GI, this paper now turns to the emergence of GI in Ireland. The paper then critically assesses Irish interpretations of GI and relates these to the spectrum of international readings of concept. From this, a number of conclusions are drawn on how the Irish GI story may offer insights into the ways land-use policy may unintentionally bias growth over environmental conservation and privilege specialist "engineering" discourses at the expense of inclusive deliberation.

The emergence and evolution of GI in Ireland

The GI concept was initially introduced into Irish land-use planning debates by a loose coalition of ecologists, planners and heritage officers[5] working with or within the local authority system (Tubridy and O'Riain 2002, UCD *et al*. 2008). Their desire to introduce the concept was motivated by a concern about the sustained attrition of ecosystems integrity perceived to result from ongoing habitat fragmentation. This issue was rendered more problematic by the fact that previous efforts to address such fragmentation in planning by the concept of "ecological networks" was perceived to have had little success consequent of a failure to communicate the importance of biodiversity among the planning fraternity (Interviewee A4), and as such, "there didn't seem to be that much done with it" (Interviewee B10). This loosely aligned coalition of actors thus assumed that biodiversity was not a priority for the planning system as "often what has occurred is that primary infrastructure ... the roads, drainage, water supply, gets priority and after that everything is a weak second cousin" (Interviewee B11). Locating a means to give greater profile to biodiversity in planning policy was thus seen as essential to redressing the perceived imbalance between growth and conservation. To many in this coalition, remedying such an imbalance was thought to rest on communicating the importance of habitats to society. Rebranding habitats as green "infrastructure" was thought to facilitate this. As noted by the Irish Sustainable Development Council (Comhar):

> There is general dissatisfaction with the mechanisms currently available to input information on biodiversity to spatial plans. Respondents, to whom the concept was introduced directly

> for the first time, considered that the concept of Green Infrastructure and mechanism of Green Infrastructure planning will be more attractive than ecological networks because of the clearer focus on benefits to people. (COMHAR 2010, p. 22)

Separate to the initial coalition of ecologists, planners and heritage officers, but equally frustrated by the lack of attention given to their issues of concern, was an array of actors such as local authority park superintendents, transport planners and landscape architects. Such actors sought to raise the profile of their planning objectives, which included, "recreation, tourism, visual amenities, sense of place, sustainable mobility, food, timber, other primary products, regulation of microclimates" (Interviewee B12). These actors viewed connotations with the word "green" in the term GI as addressing their particular issues of concern. This interpretive latitude was encouraged by the loose coalition of ecologists, planners and heritage officers, as expanding the concept's applicability was seen to boost its value by furnishing the "strength in numbers" (Interviewee A10) considered necessary for placement on the decision agenda. Consequently, the perception emerged that GI offered "a brand, a concept which pulls together things that planners have struggled in getting buy-in for at an individual topic by topic level" (Interviewee C10). As a large coalition of planning and allied professional disciplines emerged, the range of issues seen as encompassed by the GI concept became increasingly grouped together by their broad association with "green spaces" (Interviewee B2). Employing the term GI was thereby seen to raise the profile of various green space issues as it shifted perceptions "away from this idea ... that land that isn't being developed is just sitting there doing nothing ... it isn't just sitting there doing nothing, it's doing something" (Interviewee B20).

This reframing of green spaces from "doing nothing" to "doing something" was facilitated by emphasising their potential as a "multi-functional resource" (SDCC 2010, p. 257) and was widely attributed to perceptions of "use in this green stuff" (Interviewee A5) prompted by their labelling as "infrastructure". Widespread familiarity with the word "infrastructure" and its normative inferences as "something you have to have" (Interviewee C3) was perceived as generating a "narrative of necessity" wherein those promoting the GI concept stressed that it "should be viewed as critical infrastructure for Ireland in the same way as our transport and energy networks are as vital to sustainable development" (COMHAR 2009, p. 39). Consequently, the GI concept was seen as advancing the argument that greater consideration for green space planning "isn't just a potential discretionary or stylistic approach" (Interviewee A7), but rather is "something you have to have" (Interviewee C3).

This opinion reflected shared interpretations of GI's signification by analogy with conventionally conceived "infrastructure", but it also resonated with conventionally conceived planning. In Ireland, planning activity related to such "infrastructure" is generally predicated on a "technical-rational model" (Owens *et al*. 2004, 1945) of knowledge acquisition and solution specification summarised as "surveying it, mapping it and capturing it and then on that basis you proceed forward" (Interviewee A10). Accordingly, GI policy formulation was also viewed as following "a typical rational planning methodology" (COMHAR 2010, p. 61) comprising "the old processes of survey, analysis, plan" (Interviewee B17). In this sense, the connotations that helped to convey the importance of habitat conservation specifically, and an array of green space issues more generally, shaped conceptions of GI as "the planning, management and engineering of green spaces and ecosystems in order to provide specific benefits to society" (UF and IEEM 2010, p. 2).

In summation, a loose coalition of ecologists, planners and heritage officers seeking to promote the consideration of habitat conservation in planning policy sought to establish a

means to elevate the degree of consideration assigned it in land-use governance. They initially advanced the term "GI" in referencing habitats. This was viewed as facilitating greater attention for nature conservation resultant from widespread familiarity with the word "infrastructure" and the connotations of indispensability ascribed to it. However, by virtue of the word "green", the term GI was increasingly seen to encompass a broad spectrum of issues associated with green space that were perceived as neglected in planning policy. Thus, GI was employed as a linguistic device facilitating the reconceptualisation of broadly conceived green spaces from residual areas to locations providing crucial services to society. In this context, the view that GI supplies a problem remedying "proactive term" (Interviewee B10) shows neatly how "(t)he struggle to define [a] situation, and thereby to determine the direction of public policy, is always both intellectual and political" (Schön 1991, p. 348).

A critical assessment of GI in Ireland

(Re)valuing nature?

The emergence and ascension of GI on the policy agenda has undoubtedly given greater representation to a range of formerly "weak second cousin" (Interviewee B11) issues in planning policy activity. This is most notable at the regional (DRA and MERA 2010, SERA 2010) and local levels of land-use governance (DCC 2010, FCC 2011, KCC 2011). Such success has involved stressing the multi-functionality of green spaces. In doing so, the GI approach has advanced the perception of these areas as "environmental resources" (Interviewee A2) capable of delivering a range of services to society. Given the presentation of GI as analogous to conventionally conceived infrastructure, expounding the benefits of green spaces is thought to require a means of quantifiably demonstrating their value. This has resulted in the entanglement of GI discourses with nascent Irish efforts to advance habitat conservation by an economic evaluation of their services to society (DoEHLG 2008). Such a phenomenon may be observed in the efforts of the Irish Sustainable Development Council (Comhar) to forward a GI discourse focused on the monetarisation of "natural assets", where priority is stressed on the "Identification, quantitatively and qualitatively of the economic and social benefits of ecosystem services delivered by Green Infrastructure in monetary terms and also the social gains to health and quality of life" (COMHAR 2010, p. 23).

This foregrounding of economic arguments for the allocation of greater attention to nature in policy formulation resonates with broader international discourses that advance financial justifications for environmental conservation by seeking to promote "the utilitarian framing of beneficial ecosystems functions as services in order to increase public interest in biodiversity conservation" (Gómez-Baggethun *et al*. 2010, p. 1209). Such reasoning is reflected in the growth of literature on ecosystems services (Fisher *et al*. 2009), the international endorsement of this logic by way of the Millennium Ecosystems Assessment (MEA 2005), and the development of market-based instruments for conservation, such as bio-prospecting (Heal 2000, Herring 2007), Payments for Ecosystems Services Schemes (Robertson 2004, Engel *et al*. 2008), and the aforementioned TEEB approach advocated by the EU (TEEB 2010).

However, unease exists in the fields of political ecology (Peet and Watts 2004), ecological economics (O'Neill 2007) and conservation science (Peterson *et al*. 2010) regarding the appropriateness of mainstreaming such ecosystems services arguments in policy provision. Here, concern is expressed that the ambiguity of sustainable development discourses

(Hannigan 2007) may facilitate the "reinvention of nature" (Escobar 2011, p. 211). Such debates question "how utilitarian framing of ecological concerns and market strategies can modify the way humans perceive and relate to nature in a way that in the long run may be counterproductive for conservation purposes" (Gómez-Baggethun *et al*. 2010, p. 1209). Here, apprehension regarding the growth of such economically focused discourses centres on a concern that the perceived value of "ecosystems services do not follow changes in the quantity or quality of these services, but they are socially constructed and reflect the intensity of social preferences towards them" (Kosoy and Corbera, 2010, p. 1234). Therefore, attempting to justify GI planning activities by cost benefit assessments of how they can "maximise ecosystem services" (UF and IEEM 2010, p. 3), may conceal cultural prejudices and risks failing to assist the conservation of habitats seen as less valuable relative to contemporary economic, social or aesthetic aspirations[6] (Barry 2007). Nevertheless, concern for this is largely absent from both academic and practitioner literature discussing GI, nor was it evident among those interviewed regarding the emergence and evolution of GI in Ireland.

Repositioning the burden of proof?

Advocates of the GI concept claim that it gives greater weight to the consideration of a broad spectrum of green space issues in planning policy formulation through connotations with "things that we need" (Interviewee B1) prompted by the word "infrastructure". However, by blurring the boundaries between a model "of" a situation and a model "for" it (Yanow 2000, p. 43), the GI metaphor may implicitly reposition the burden of proof regarding green space planning. Here, a tacit reallocation of emphasis may arise such that a subtle shift occurs from a requirement that policy proposals demonstrate no or negligible adverse effects on the environment towards an expectation that the environment should demonstrate ecosystems services for society (UF and IEEM 2010, KCC 2011). In this sense, GI may be seen to furnish a "discourse of reassurance" wherein "No tough choices need to be made between economic growth and environmental protection" (Dryzek 2005, p. 172) as an expectation emerges that planning for nature can and should be tailored so that ecosystem functions facilitate development. This possibility is rendered more real by the lack of critical attention afforded GI in Irish academic literature and its uncritical support by planning and allied practitioners.

Thus, whereas GI emerged in Ireland as a response to the perceived low profile of ecological issues in planning policy formulation, rather than addressing this by simply endowing such issues greater weight of consideration, it may stimulate a re-evaluation on *how* such issues should be considered. This may entail a repositioning of natural heritage policy from a perspective that prioritises the protection of ecological integrity for its intrinsic value towards a focus on anthropocentric utility. Here, a modification of planning perspectives may occur wherein the justification for conservation policy is increasingly seen as relative to the perceived capacity of ecosystems to deliver human-centred services. In this sense, and given the range of issues encompassed by the green spaces to which GI is deemed applicable, "GI planning" may be substituted for traditional forms of "nature conservation planning" such that GI planning becomes a matter of anthropocentric functional selectivity as opposed to binding habitat conservation. Hence, GI may prompt an adjustment to planning activity so that "no distinguishable line can be drawn in practice between ecological knowledge and value judgments" (Evans 2007, p. 147). Such an amendment may be assisted by the presumptions of land-use compatibility implicit in the promotion of GI as:

> ... multi functional at every scale ... All environments have potential to restore biodiversity and this can be enhanced with GI planning. GI projects generate tourism and employment dividends by improving access to existing natural assets and opening up new recreational and leisure opportunities. (UF and IEEM 2010, p. 4)

Accordingly, the anthropocentric functional efficiency of natural environments may be appraised, and may even be justifiably "improved" by GI planning. Here, the meaning making activity that gives new status to green spaces may "shift the terms of debate away from environmental protection towards environmental management" (Taylor 2005, p. 170) as a "technical-rational model" (Owens *et al*. 2004, p. 1945) of planning practice obscures the value judgements inherent to decision-making (Kallio *et al*. 2007). Thus, compromising the existing ecological integrity of an area by intentionally transforming or consciously affecting its ecological characteristics may be legitimated relative to the principles of a GI planning approach should such compromising activities be deemed to enhance the provision of services to society. This reflects assertions by Hajer with regard to Dutch environmental politics during the 1990s, when he concluded that, "If nature is seen as infrastructure, we can also make a move from conservation to the actual creation of new (and better?) nature" (Hajer 2003, p. 106). Such a possibility is implicit in Irish planning documentation referencing GI (UF and IEEM 2010, KCC 2011), and is lucidly illustrated by a consultant planner when asserting,

> It's the forward planning of resources that appeals to me. It's the idea that you can create resources whereas in the past we've always spoken of these things as resources that must be protected or conserved at all cost and act against their diminishment. What appeals to me is the idea that we can enlarge and improve upon the functionality of environmental resources and create systems ... we need to make better systems, we need to make complementary systems to natural ones ... it's like we can make engines of environmental services basically. Using these building blocks, physical building blocks and proper policies, correct policies, any cities can be engines for environmental resources, if they design and manage them properly. (Interviewee A2)

In this sense, "statements about the natural world represent social and institutional constructions" (Irwin, 2001, 74) wherein GI discourses reflect an epistemology favourable to aspirations for anthropocentric utility (Forsyth 2003). Here, lack of critical attention to the associations and implicit assumptions informing GI may reposition the principles underpinning planning policy on habitat conservation. This may unintentionally intensify the original impetus for the introduction of the GI concept by expediting habitat attrition through viewing green spaces as "what facilitates development" (Interviewee B18).

GI as ecological modernisation?

Although, Irish GI policy remains in its infancy, its focus on the provision of "benefits to society" (UF and IEEM 2010, p. 2) may be seen as one national manifestation of an ascending international approach in conservation policy concerned with emphasising the instrumental value of environments as a means by which to advocate for their preservation. At a global level, the narratives embodying this paradigm focus on highlighting the variety of generalised ecosystems services provided to society (MEA 2005). However, at supranational and national tiers of governance, such narratives frequently stress the need to facilitate the multi-functional benefits of green spaces so as to obtain socio-political and economic support for the advancement of issues associated with these areas (EEA 2011).

It is in this context that the emergence of the GI concept in Ireland may be understood as furnishing a mechanism to address the profile problem of green space issues in planning policy formulation. This is conveyed by one local authority officer when noting,

> ... the whole nature conservation is totally changed [*sic*], it's now about ecosystem services, you know we've moved into a different place, it's not just about making sure everything is ok and we're not damaging it ... so the green infrastructure paradigm ... or ecosystem services paradigm is about how do we continue to provide these viable functions for society, while doing what we need to do, like building a road, not just how do we do minimal damage ... (Interviewee B20)

The prominence given to arguments centred on "use in this green stuff" (Interviewee A5) as a method to assist conservation echoes the GI approach to planning advocated in the USA, with several authors assuming compatibilities between biodiversity conservation and the human use of environments so as to garner support for green space consideration in policy formulation (Erickson 2006, Rouse and Bunster-Ossa 2013). Similarly, such an approach is advanced by the supranational European Commission (EC 2012, 2013) via the concept of GI, whose essential features the European Environment Agency identifies as "connectivity, multi-functionality and smart conservation" (EEA 2011, p. 30). This confirms previous discussions by the European Commission on the potential for GI planning to provide a range of ecosystems services to society concurrent with the protection of ecosystems (Sylwester 2009, Karhu 2011). Such a turn to accentuating the multi-functional potential of green spaces in seeking their conservation is also evident in Ireland's closest neighbour, the United Kingdom. For example, Kambites and Owen (2006) and Amati and Taylor (2010) describe the multi-functional and society servicing potential of GI, with Mell surmising that the GI concept conceives "connective matrices of greenspaces" that provide "a number of complementary benefits for ecological, economic and social spheres ... increasingly viewed as [a] concept that both planners and practitioners can draw on" (2008, p. 69). Other authors identify emerging arguments in England for a departure from traditional green belt policy and a move towards a more multi-functional approach to peri-urban green space planning as a means to realise the potential services provided by such areas for urban residents (Thomas and Littlewood 2010, Wilson and Hughes 2011). Echoing such assertions, those advocating the GI concept in Irish planning policy discussions stress the anthropocentric multi-functionality of green spaces by arguing that, "at the end of the day people have to benefit from this" (Interviewee B9).

By appealing to such suppositions on anthropocentric "use" as a prerequisite for "conservation", the GI planning approach may be conceived as an extension of the ecological modernisation paradigm into Irish land-use policy formulation. This is conventionally understood as "a potential basis for reconciling economic development with ecology and providing 'win-win' outcomes for nature and economy" (Thomas and Littlewood 2010, p. 212). The ecological modernisation paradigm is most commonly seen as facilitating synergies between nature conservation and economic development (Redclift *et al*. 2000) via the application of technocratic solutions to environmental problems (Hajer 1995) or as a "restructuring of the market economy" (Carter 2007, p. 227). In this sense, integrating GI into planning policy may be seen to offer the prospect of addressing numerous green space issues without challenging the orientation of a planning system focused on development facilitation (Kitchin *et al*. 2012). As such, calls for a GI approach to Irish land-use policy formulation may be understood to reflect a broader international move towards the "positive-sum game" (Hajer 1995, p. 26) of ecological modernisation.

Delivering GI

Perpetuating technocracy?

Should Irish GI planning represent a national instantiation of the ecological modernisation paradigm, this may perpetuate existing technocratic approaches to environmental issues. This is because ecological modernisation "does not call for any structural change but is, in this respect, basically a modernist and technocratic approach to the environment that suggest that there is a techno-institutional fix for the present problems" (Hajer 1995, p. 32). Suggestions that this may be occurring are supplied by the pervasive association of GI with conventionally conceived forms of "infrastructure". This association prompts conceptual correlations with "systems", "mechanics" and the "scientific" (Interviewee A2) in stimulating views on how GI can be "planned", "designed", "delivered" and "managed" (KCC 2011, Chp. 14, 19) in ways that reconcile ecological conservation with anthropocentric utility. In this sense, a GI approach to green space planning is perceived as a rational process utilising a coherent scientific methodology in the deduction of conclusions (Interviewee E4). As an activity resonant with "the traditional view" (In't Veld 2009, p. 121) of land-use planning as a technically and rationally grounded endeavour (Owens *et al*. 2004, Owens 2005), such an interpretation prompts assumptions as to what constitutes "a proper planning process" (Interviewee A10). Accordingly, reasoning from association with the word "infrastructure" buttresses scientific framings of "evidence-based policy" and gives force to specialist technocratic perspectives on how proper planning can and should be conducted (Throgmorton 1993).

In this sense, Irish approaches to GI may well reflect broader issues in attempts to recalibrate land-use governance towards greater ecological sensitivity. Such issues centre on the perceived need to legitimise policy proposals by framing them within a discourse that assumes the veracity of conclusions derived by methods typically employed in the natural sciences (Adelle *et al*. 2012). This requirement to negotiate implicit "hierarchies of evidence" (Pawson 2006) which privilege quantitative approaches by equating them with objectivity, thus prompt discourses of technical expertise in the advocacy of new planning approaches. Here, beliefs concerning the necessity and feasibility of separating science from social complexity resonates strongly (Forsyth 2003, Fischer 2009), as "scientific" practices which eschew local social context advance a "postpolitical" perspective of environmental governance in which "ideological or dissensual contestation and struggles are replaced by techno-managerial planning, expert management and administration" (Swyngedouw 2010, p. 312). For example, in a review of several case studies employing quantitative ("objective") ecosystems services approaches in planning, Ernstson and Sörlin (2013) show how such approaches frequently silence local ecological knowledge and disregard user perceptions of their environment. Similarly, in the context of recent debates concerning urban planning for resilient social-ecological systems (Ahern 2011, Davoudi *et al*. 2012, Wilkinson 2012), Evans cautions that "the scientific assumptions of resilience ecology run the risk of political foreclosure" (2011, p. 232). Here, it is contended that conceiving urban environments as social-ecological systems "threatens to de-politicise urban transformation ... by constraining governance within a technocratic mode that remains inured to the tropes of scientific legitimacy" (Evans 2011, p. 233).

Consensus and conflict

Given the multitude of issues that GI planning is seen to address, many of those interviewed felt that implementing the concept requires a departure from conventional administrative arrangements wherein "ritual and routine tend to predominate in the definition and handling

of problems" (Torgerson and Paehlke 2005, p. 6). Hence, for many, implementing GI is conceived as "about getting the right expertise around the table . . . working together, listening to each other, understanding each other's perspectives and working with the community" (Interviewee A7). In this sense, several of those interviewed asserted the view that amendments to present conventions of policy formulation and implementation are required to facilitate new forms of collaborative planning where interlocutors would "develop skills in translation, in constructive critique, and in collective invention and respectful action" (Healey 1993, p. 248). This necessity to "work in a different way" (Interviewee C8) results from the widely held belief that "local authority structures are so fragmented ... they don't talk to each other" (Interviewee E4). Some perceived this "silo approach to planning" (Interviewee B14) as a prospective impediment to the delivery of GI as local authorities are the tier of land-use governance identified by most interviewees as crucial to the realisation of the GI planning approach.

While almost all planning authorities referencing a GI planning approach have retained traditional functional delineations within their administrative arrangements, Fingal County Council (FCC) in north County Dublin has undertaken a self-initiated reorganisation of its disciplinary divisions. This reorganisation was instigated with the intent of facilitating greater collaboration between the array of council professions deemed pertinent to land-use planning activities. In essence therefore, it was initiated to redress the "silo approach to planning" (Interviewee B20 and B21[7]).

FCC is a comparatively new organisation having been established in 1994 when three new local authorities[8] were created following the dissolution of Dublin County Council (Oireachtas 1993). Officers within the council suggest that this relative youth engenders perceptions of innovative possibilities wherein roles have not yet become "sedimented" (Peters 2005, Scott 2008). Moreover, interviewees also identified the age profile of the council's staff as an important factor in the institution's receptivity to new policy concepts. As noted by one official with respect to GI planning,

> Fingal has a lot of young staff, very young staff compared to some other local authorities I know of that have a lot of older staff, and I generally find older people far less receptive to new ideas or doing these sort of things [GI] than younger ones do. (Interviewee B22)

All FCC officials interviewed offered a similar assessment that the council's more recent establishment and age profile results in greater organisational dynamism relative to older local authorities wherein functional delineations are considered more entrenched. Consequently, those operating within FCC opine that the organisation's receptivity to new policy concepts may exceed that of other local authorities. This self-awareness of dynamic potential stimulates an organisational identity of pioneering pride in which experimentation is favourably received rather than criticised (Interviewee B21, B24). Recent academic literature discussing the idea of resilience in planning stress that such a willingness to experiment is key to the realisation of more ecological sensitive and holistic forms of planning (Ahern 2011, Evans 2011, Scott 2013). Indeed, consequent of the reorganisation of traditional functional delineations, those within FCC perceive that there is now a greater requirement, opportunity and desire for multi-disciplinary collaboration in planning policy formulation. As noted by one council official,

> I suppose there's less of an emphasis now on planners just going off writing the LAP [local area plan] on their own ... because we have engineers and the water people in the department, there's more of a, 'well lets synchronise transport with water, with planning, with parks'. (Interviewee B20)

This attempt to institutionalise multi-disciplinary collaboration has helped move activities surrounding GI planning beyond relatively undemanding assertions of green space multi-functionality and new ways of working. Rather, the requisite involvement of various disciplines resulting from this reorganisation has necessitated confronting and resolving interpretive divergence of what constitutes GI when seeking to formulate policy. This has yielded results as FCC is currently the most advanced local authority with respect to GI planning in Ireland, having formulated several local area plans that promote multi-functional green spaces as a key policy element framing area based development strategies (FCC 2013a, 2013b, 2013c). Such openness to new ideas suggests an acceptance of the shortcomings of "the traditional view" (In't Veld 2009) of planning by advancing more adaptive forms of governance wherein consciousness of knowledge limitations promotes "learning to manage by managing to learn" (Bormann *et al*. 1994, p. 1). In this sense, moving beyond the "silo approach to planning" has entailed "a transformation of the structural context and factors that determine the frame of reference" for planning activity (Pahl-Wostl 2009, p. 359).

Nevertheless, the case of FCC is conspicuous in its exceptionality as most Irish local authorities continue to operate on the basis of a "silo approach to planning". The persistence of this functional fragmentation coupled with the promotion of GI as a solution for an array of different policy issues risks a situation in which numerous agents perceive GI as representing their discrete objectives. Thus, while nominally acknowledging the multi-functional conceptual underpinning of GI, agents of particular professional disciplines may approach the concept from specific perspectives rather than addressing the functional integration of several land uses. Nonetheless, those seeking involvement in GI planning policy formulation may be able to cooperate by virtue of the term's vagueness. As noted by one interviewee,

> there are many different functions that can be achieved through green infrastructure . . . the difficulty is literally you have a meeting where people are talking about cross purposes because they're using a term that means completely different things to all of them. (Interviewee C3)

A potential dilemma of GI planning discourses is here identified. Although GI discourses may facilitate apparent communication and cooperation between a range of agents from a spectrum of interests, such discourses may conceal the actuality that those deploying the GI concept are discussing something different.

However, in the context of a "silo approach to planning", GI policy may echo debates over the meaning of sustainable development (Dryzek 2005, Carter 2007), wherein "any attempt to define the concept precisely ... would have the effect of excluding those whose views were not expressed in that definition" (Robinson 2004, p. 374). Consequently, in the absence of concerted efforts to facilitate and engage with collaborative working practices, the latitude for interpretation regarding GI may eventually lead to agent disagreement as to whose policy objectives and professional interests are represented by the GI concept. This was alluded to by an interviewee when indentifying the particular moment during the GI Conference in November 2008 when the possibility of such disagreement became apparent to him,

> The potential conflict was already arising at the conference. I can remember the chairman or previous chairman of the Landscape Institute stood up on the second day of the conference and made quite a rousing defence of the landscape architect's role in green infrastructure and his fear was very much that green infrastructure . . . would become an ecological planning mechanism, as opposed to a landscape planning mechanism. (Interviewee A2)

Thus, as experienced with many attempts to realise sustainable development (Blewitt 2008), in the case of GI, there may exist a paradox whereby the coalition of agents promoting it "can only be kept together by virtue of its rather vague story-lines" (Hajer 1995, p. 14). Without a willingness to experiment with new ideas and new ways of working (Ahern 2011), attempting the move beyond the vagueness of this discursive sphere into the realm of implementation may induce contested interpretations as to what GI means (Owens and Cowell 2011). Specifically, disputes may emerge as to who possesses the correct professional expertise and institutional mandate legitimating participation in the formulation of GI policy (Roe and Mell 2013). In such a situation, the coalition of support for GI may dissolve into a struggle for the right to enunciate on the concept consequent of "different interests with different substantive concerns trying to stake their claims" (Dryzek 2005, p. 146). Success by any party in such a contest would undermine the multi-functionality promoted by many as a key strength of the GI concept.

Conclusion

This paper identifies and endeavours to address a knowledge gap regarding a critical appraisal of the GI concept in planning policy. The paper does not seek to condemn or condone GI. Rather, it unpacks the "blackbox" (Latour 2005) of the concept's meaning and provides a critically informed lens on its deployment. In doing so, it is shown how GI's allure as a solution to a range of complex and multifaceted planning issues may represent another turn in attempts to deliver sustainability through the planning system by presenting a new way to address the old problem of reconciling environmental protection with growth (Owens and Cowell 2011). The paper discusses is how the legitimation of GI by connotation with conventionally conceived "infrastructure" gave traction to the concept in Irish planning policy formulation. Also described is how this was consequent on the perceived resonance of GI with presumptions of planning as a form of "technical-rational" (Owens *et al*. 2004, p. 1945) activity.

However, it is suggested that the "essence of claims to rationality is that such claims embody certain assumptions about what is the appropriate, even logical course of action" (Rydin 2003, p. 4). Consequently, it is postulated that interpreting GI's meaning through the prism of traditionally conceived "infrastructure" may prompt perceptions of GI as a "techno-institutional fix" (Hajer 1995, p. 32) that perpetuates rather than challenges conventional modes of planning. Moreover, it is suggested that such an approach risks confining GI to a discourse of engineering expertise that frames the concept as a mechanical design endeavour, and as such, de-politicises ecologically focused policy formulation by foreclosing consideration of issues beyond technical solutions. This paper conjectures that should such technical–rational discourses be institutionalised as *the* approach to green space governance, planning practice may run counter to those objectives motivating the initial introduction of the concept into policy debates as a means to promote greater ecological sensitivity. Here, the development enabling orientation of traditional infrastructure may present GI as a "sustainability fix" that facilitates development "by accommodating both profit-making and environmental concerns" (Temenos and McCann 2012, p. 1389), but implicitly emphasises economic, physical and social development above that of environmental conservation.

In this sense, there appears to be an inherent tension in promoting a GI approach. The concept was originally seen as a means to raise the profile of ecological issues in planning by advancing a "narrative of necessity" through association with conventional "infrastructure". However, the very associations that give the concept its currency may undermine the

initial impetus for its deployment as it may result in a revaluation of nature towards development enablement at the expense of conservation. Furthermore, by easily integrating with existing modes of operation and failing to challenge working practices characterised by disciplinary segregation, the concept's use may ultimately dwindle as irresolvable dispute emerges over who has the right to pronounce on its meaning and applicability.

By reference to the innovative work of FCC, this paper suggests that overcoming these potential threats involves openness to experiment and receptivity to a greater variety of positions (Ahern 2011, Evans 2011). As such, it speaks to broader debates in ecological focused planning theory concerning the need to encourage novel ways of thinking and doing planning (Wilkinson 2012, Erixon *et al*. 2013, Ernstson 2013, Scott 2013). In particular, it is suggested that a commitment to the ecological dimensions of GI planning requires willingness to proactively engage in new forms of multi-disciplinary working that seek collaboratively derived and shared understandings of what the concept means, where it is applicable and how it can be implemented. Thus, rather than de-politicising deliberations by isolating GI within a range of segregated technical discourses, this paper recommends opening debate on GI to a broad base of actors and a plurality of perspectives. Accordingly, it proposes inclusive and doubtlessly arduous deliberations on whose objectives should be given representation in land-use policy. In doing so, it both acknowledges and foregrounds a view that "the production of socio-environmental arrangements implies fundamentally political questions, and has to be addressed in political terms" (Swyngedouw 2010, p. 314).

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Notes

1. These documents were identified through three rounds of review. The initial review entailed inspection of 203 documents identified as potentially pertinent to the study. Of this number, a total of 170 Irish planning-related documents were deemed relevant and collated to form a preliminary 'archive'. This included all development plans for the 29 county councils, 5 city councils and 5 borough councils in Ireland, in addition to the guidelines produced and/or operative within the 8 Irish regional authorities between November 2008 and November 2011. Each document was subsequently reviewed several times so as to determine its potential relevance to the emergence and evolution of the GI story in Ireland. This facilitated the reduction of the archive to 177 items prior to commencement of interviewing. The "initial" coding process was conducted here. Due to the ongoing collation of pertinent material as it became available, the archive increased to 131 items by conclusion of the interviewing period in November 2011. It is not considered that the content of the additional four items added to the archive following the initial coding would have influenced the design of the master interview guide.
2. An ecological network is today recognised as a framework of ecological components, e.g. core areas, corridors and buffer zones, which provides the physical conditions necessary for ecosystems and species populations to survive in a human-dominated landscape. The goal should be considered twofold: to maintain biological and landscape diversity, but also to serve as a network assisting policy sectors in the conservation of natural ecosystems (Jongman and Pungetti 2004, p. 3).
3. Hajer's (2003) analysis focuses on contested policy issues surrounding GI rather than an appraisal of GI in the Netherlands.
4. The EU is used here in reference to the organs of the European Union, including the European Commission and the various Directorates-General (Departments), Services and Agencies associated with it.

5. There are 27 heritage officers in Ireland, each located in a different local authority. They work on a broad definition of "heritage". Their function is to promote local heritage conservation by helping to coordinate and provide input to numerous council activities ranging from environmental and archaeology issues to built and cultural heritage matters. As such, their activities frequently interact with the local planning policy process. The ability of these individuals to disseminate and promote new heritage management concepts within the local authority in which they are situated is assisted by knowledge exchange between heritage officers. This is facilitated by the Heritage Officer Network. This network is coordinated by the Irish Heritage Council which operates as a state funded but independent heritage management and advocacy body.
6. For example, see Mell (2013, p. 160) with regard to issues of "valuing" GI in the UK.
7. Personal communication on 27 August 2011.
8. Fingal County Council, South Dublin County Council and Dun Laoghaire-Rathdown County Council.

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