Part 2

Environmental governance

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In this part of the Companion, we turn from concepts of 'environment' and 'nature' to consider how environmental problems are addressed, a subject we have labelled 'environmental governance'. Governance can be regarded as a descriptive label, useful for highlighting the changing nature of policy processes, and the way that governing is achieved (White, 2015; Richards and Smith, 2002). Probe beyond this general definition, however, and one encounters a complex and contested world in which questions abound: who is governing, over what spatial scale and with what effects? Analysts of governance are often especially concerned with shifts in the modes of governance – classically summarised as state, market and hierarchy – and the myriad connections between them, in the ways that influence is exerted. Environmental problems have themselves alerted us to the challenges of effective governance, and created pressures to re-think the modes, scale and goals that governance arrangements should take. And as environmental governance has expanded, so we have seen increased interest in the social dimensions of such activities; asking not merely does environmental governance work for the environment, but are its outcomes and processes socially just?

The upsurge in interest in promoting sustainable development, visible around the world through the 1990s, coincided with wider debates around the changing nature of the state, and whether traditional state-centred approaches to the delivery of goals, often referred to as 'government', were shifting towards more networked, multi-actor modes of steering. Such shifts heralded a much messier institutional world for environmental planning but one that also offered greater sensitivity to the diverse, complex realities of steering societies towards greater sustainability. Non-governmental organisations (NGOs) being more engaged in policy making, efforts to align environmental and business interests and the cross-scale nature of much environmental action are just three examples to which one could point. States are still present in governance processes – often directly and coercively so – but also manifest in techniques by which they seek to coordinate the actions of others, rather than relying solely on traditional 'command and control'. Understanding the power of governance forms requires that we give greater attention to the actors – plus their tools and goals – that hold together these new governance systems and give them reach across time and space.

The chapters in this part intersect with issues of governance in diverse ways but have been organised into three themes: goals, actors and arenas. The first three chapters examine the goal**s**

and principles that society should pursue and considers how they can be better institutionalised in governance systems. Dimensions of justice feature prominently each.

Goals of intra-generational equity are central to **Chapter 9** by **Juliana Maantay**, which focuses on environmental justice. She charts the growing recognition that the poor and people of colour tended to be inequitably affected by environmental burdens but also the issues that arise in trying to cement such concerns into planning processes. Her review covers efforts to construct quantitative, spatial assessments of the social distribution of environmental goods and bads, and the challenges of linking spatial associations to actual health effects. Maantay examines environmental planning interventions that seek to raise the visibility of environmental justice problems (like 'Fair Share' guidelines and participatory geographic information systems [GIS]) but also those that exacerbate them, highlighting the injustices that can arise from zoning and 'green gentrification'. She observes how constructions of spatial scale attached to justice claims can distort our conceptions of fairness, with regional or national framings obscuring the displacement of harms to other countries. Climate change is the prime example, and dealing fairly with climate change is, says Maantay, the 21st-century's environmental justice challenge.

In **Chapter 10**, **John Barry** highlights the pathologies of unquestioning adherence to economic growth as a goal in modern society. He notes how obsession with increasing gross domestic product (GDP) has undermined planning in many countries, which is often reduced to a facilitator of market-based growth and competitiveness and trammelled by pressures for deregulation and accelerated development delivery. His chapter also traces how planning's growth dependence is intertwined with fossil fuel consumption, in assumptions of increased (car-based) mobility and carbon-intensive sprawl. For Barry, planning must play a central role in attaining any 'just transition' to post-growth and low carbon futures, and he makes the case for incorporating both ecological 'ceilings' and social justice 'floors' (after Raworth, 2017) as steering devices. Promoting such transitions entails a more pro-active and creative role for planning – and the state more widely – in coordinating and fostering creative responses; a vision of planning much broader than a mere corrective mechanism to be wheeled in when markets fail.

The underrepresentation of future generations is addressed by **Jonathan Boston**, in **Chapter 11**, in his review of the scope for anticipatory governance in the environmental field. From the recognition that anticipating future problems is essential to effective environmental planning, Boston explains why environmental problems are especially vulnerable to short-termist bias: arising from inter alia the effects of uncertainty, power asymmetries between present and future, and the relative intangibility of future environmental effects. To redress this, Boston explores sets of 'intervention logics' that might mainstream long-term interests and encourage timely preventative solutions: legal constraints on policy and decision makers; improving foresight capacity, and better accounting for environmental assets that underpin cross-generational welfare. In a reminder of the social and political embeddedness of environmental governance, he explains how it is hard to separate the efficacy of these instruments from the wider political culture, including qualities like trust and solidarity, which affect the capacity of societies to create and maintain durable agreements.

Boston's chapter makes clear that refining the goals for environmental planning needs to proceed in tandem with attention to how those goals get picked up and translated into practice. This brings us to the second theme in this part of the Companion – **actors**, which is addressed across six chapters.

The first of these, **Chapter 12** by **James Palmer**, helpfully brings together discussion of a key actor quality (expertise) with two factors that mediate the relationship between actors in environmental planning: knowledge and trust. Palmer articulates the importance of seeing knowledge and expertise not as pure, universal, science-based categories separate from the

political worlds of environmental planning but as emergent, culturally specific phenomena, intimately bound up with social, political and economic concerns. He shows how if we take care to interpret how and when different forms of knowledge come to matter, and whose judgement it is that we come to trust and on what basis, we can see that what constitutes knowledge and expertise with environmental issues is constantly shifting, with qualities often reflecting the specific, situated controversies being addressed. Indeed, effective expertise can derive precisely from the capacity to fuse scientific knowledge with contextually specific concerns. Yet this also explains why experts face difficulties speaking authoritatively across the heterogeneity of environmental planning controversies.

In **Chapter 13**, **Nathalie Berny** and **Ellen Clarke** examine two sets of actors that have long been seen as central to the dynamics of environmental policy and planning: grassroots and environmental NGOs. They review the expansion of these categories of environmental mobilisations within and beyond the West, and stress the need to challenge simplistic dichotomies between 'local' or 'radical' grassroots organisations and 'reformist' NGOs. To do this, Berny and Clarke show the insights that can be gained by focusing on the transformative effects of environmental NGOs and grassroots organisations, and the actual strategies that each adopts – especially the relationships between them. They show how multi-scalar strategies have become a key feature of the shifting dynamics of environmental activism, as grassroots groups use strategies that (after Rootes, 2013)'transcend the local', such as networking with actors in different locations and appealing to non-local environmental NGOs for support. An unfortunate indicator of the strength of this multi-scalar working, they note, is the growth of national legislation seeking to prevent transnational cooperation between NGOs.

As the limits of government capacities to resolve environmental problems have become clearer, so there has been an upsurge in interest in how the individual could be enrolled to co-produce environmental planning outcomes. This is the terrain for **Chapter 14** by **Erin Roberts**, which assesses the array of conceptual approaches to understanding sustainable behaviour. She begins with the 'cognitive paradigm', which locates agency firmly in the individual and explains behavioural outcomes from variations in dispositional factors. Roberts then outlines how 'contextual paradigm' approaches view the agency of individuals as shaped by diverse external structures, for example, rules, norms and material elements of social life. Seeking to transcend the agency-structure dualism are theories focusing on social practices ('practice theories'), which maintain an interest in material infrastructures and technologies but incorporate the agency of publics as embodied individuals, with bodies and minds that affect how practices are performed. As Roberts makes clear, the preferred conceptual approach matters greatly, as how individual agency is understood can bias for particular types of policy intervention, as well as according people very different scope for moral reflection.

Moral reflection on individual rights and responsibilities is central to debates about 'green citizenship', the subject of **Chapter 15** by **Bronwyn E. Wood** and **Kirsi Pauliina Kallio**. They explain why conceptualising citizenship appropriately for environmental challenges has created much contestation, with the dominant citizenship traditions – liberal and civic republican – both relying excessively on normative models and failing to account for the structures of injustice and power. These dominant traditions also overlook the multiple ways in which people actually live and act as citizens, such as actions that foment connections to environmental problems at spatial scales – local and transnational – outwith the confines of the nation state. Drawing on Isin (2008) and Latta (2007), Wood and Kallio note that citizenship is not something that needs to be in place *before* action on environmental issues but can emerge from existing struggles for greater sustainability, as people and communities become political. By acknowledging its practice-based dimensions, expressions of citizenship can be seen as diverse and spatially complex.

Growing interest in the networked nature of many spheres of environmental governance has prompted more attention to the elements that facilitate networks and hold them together. **Ross Beveridge** explores these 'in-between actors' – intermediaries – in **Chapter 16.** Intermediaries can be defined as having roles in facilitating, brokering, negotiating and disseminating knowledge, which are crucial to the functioning of networks, and they have expanded in significance where governments have retreated from direct policy delivery. But this relational definition of intermediaries – based on their role and position vis a vis other categories of actors – can also make them elusive, mutable and unstable. Thus, consultancies and regulators might be classic intermediaries but so too, depending on the situation, might be environmental NGOs or local government. Beveridge makes clear that intermediaries are not just neutral go-betweens but inevitably interpret and translate the tasks and knowledge that they handle, often profiting from their role, with implications for other actors and the outcomes achieved. This, he argues, makes them clearly political, raising questions of accountability and transparency.

This recognition of the interwoven nature of the actors involved in environmental planning is expanded to embrace nonhuman actors in **Chapter 17** by **Jonathan Metzger**. He questions the dominant, Western conception of environmental planning as exercises in correcting imbalances between human life and its surrounding but separate environment. Instead, the human predicament should be seen as fundamentally entangled with and dependent on the fate of innumerable other beings. Such 'more-than-human approaches' to environmental planning take us beyond commonplace notions of human dependence on ecosystems. They force us to recognise the sheer difficulty of ever fully knowing how the planet's life-sustaining webs unfold, the deep entanglement between human existence and the existences of other entities and the challenges of becoming morally sensitised to these attachments. In considering how more-than-human perspectives might reshape environmental planning, Metzger finds clues in experiments with expanding human needs analyses that include other beings, some drawing on indigenous peoples' ways of relating to the Earth, because of the way they highlight interdependencies and avoid encouraging fantasies of unitary, sovereign subjects.

The third theme, and a crucial dimension of environmental governance, concerns the **arenas** in which policy and planning debates play out, their spatial and institutional contours, and how they affect the exercise of agency.

A pivotal set of arenas is addressed in **Chapter 18** by **Patricia McCarney**. She summarises the expanding expectations being placed on cities to deliver more sustainability and resilience to their growing citizenry and three sets of challenges that they face. First, cities face challenges in pulling together governance processes that are rooted in different scales and sectors, as well as governing cohesively those processes that flow across jurisdictional boundaries – an endemic struggle as cities spread. Second are the challenges of bringing down to local level those sustainable development agendas configured by global institutions. McCarney pinpoints the high salience of urban governance to many of UN's 'Sustainable Development Goals' established in 2015 but also the relative invisibility of cities in this agenda. To this she adds a third challenge, the need to further develop globally standardised sets of sustainability indicators by which benchmarking, learning and progress can be achieved.

As well as the more tangible arenas of governments and business boardrooms, environmental planning also unfolds within the virtual, less clearly bordered arenas of media and communications, with wider implications for the cultural politics of the environment. This is the focus for **Chapter 19** by **Marisa B. McNatt**, **Michael K. Goodman** and **Maxwell T. Boykoff**. They explain the dynamic, multi-directional communication processes between science, policy, publics and the media: science and politics have clearly shaped media coverage of climate change, but mass media 'news' has also shaped ongoing scientific and political considerations,

deliberations and decisions. McNatt et al. stress the need to consider shifting modes, with the rise in digital and social media, raising a host of important questions: how does this affect the quality and quantity of coverage or affect public awareness and engagement? How has this shift affected the distribution and power of 'claims makers', including the attribution of 'expertise'? Simply pushing for 'more media coverage' of the environment is no panacea for better environmental planning, as the form and style of coverage can affect beliefs about the efficacy of action.

One theme that connects many of the chapters in Part 2 is the recognition that our understanding of environmental governance – our theories, analyses and prescriptions – always need sensitivity to the heterogeneity of situated problems with which environmental planning is asked to wrestle (Marres, 2007). It is to these problems that we turn to next in Part 3, 'Critical environmental pressures and responses'.

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9

Environmental justice and fairness

Juliana Maantay

What is environmental justice? What is fairness?

Environmental Justice (EJ) is a concept now acknowledged internationally as a major factor in planning and policy, public health and human rights, and although affecting virtually every part of the globe, the initial recognition of EJ began in the United States. 'Three out of every five Black and Hispanic Americans lived in communities with uncontrolled toxic waste sites' (United Church of Christ, 1987, p. xiv). This was just one of the many shocking findings in the United Church of Christ's 1987 seminal report *Toxic wastes and race*, leading to charges of 'environmental injustice' and even 'environmental racism' in the United States. New cases of environmental injustice unfold every day. In 2007, a follow-up report at the 20th anniversary of the original 1987 publication painted an almost equally bleak picture of environmental justice in the United States (Bullard et al., 2007). Exactly what is environmental justice (or injustice), and how can we identify and address it?

A wide array of definitions is given for 'environmental justice', ranging from the official ones promulgated by governmental oversight agencies to ones developed by grassroots organisations and the communities most affected by environmental injustice to ones put forward by academics, researchers and expert advocates. Some definitions touch on just the basics, and others are more expansive, situating environmental justice in a context of associated human rights to housing, health care and economic equality (Bullard, 1994; Harvey, 1997; Hofrichter, 1993; US EPA, 1995). Although many definitions have focused on the disproportionate environmental burdens borne by the poor and communities of colour, expanded definitions of EJ include other vulnerable populations, such as the very young, the elderly, the infirm and immune-compromised, pregnant women, immigrants and future generations (Greenberg, 1993). At a minimum, EJ involves the right for all people to live in a healthy environment, one free from hazardous conditions and noxious substances, and adherence to the goal that no specific population should bear a disproportionate burden of the waste products of modern life and industry.

Although many definitions of EJ have similar aspirations at their core, some stress equal enforcement and implementation of environmental laws and regulations, and others take a more distributional tact, emphasising the uneven geographical locations of pollution as the root of the problem, concentrating pollution in some areas and not others, affecting some populations and

not others. These two approaches are related but use different strategies in attempting to achieve environmental justice. The regulatory approach implies that if environmental laws were effective in preventing human and ecological harm and were applied with the same vigour everywhere, we would have less environmental injustice. The distributional approach implies that if pollution were not concentrated in some areas but rather distributed evenly, we would have less environmental injustice. Is either of these approaches capable of addressing the problem?

The concept of EJ is predicated on the ethics of 'fairness', but here is where things get complicated. We may think we understand the concept of 'fairness', but what is fairness in the context of environmental justice? For instance, would it be 'fair', and would environmental justice be served if everyone was polluted equally? The definitions of environmental justice often include the words 'equity' and/or 'equality' (Bryant, 1995). These words are frequently used interchangeably but have generally come to denote quite different aspects of justice. Equity and equality often are equated, respectively, with 'process' and 'outcome' forms of justice. Equity is said to pertain to 'fairness' in administrative and regulatory procedures, including equal opportunity to participate in decision-making processes, while equality connotes evenness of results (or the real potential for equality of results) (Renn et al., 1995). To avoid confusion, in this chapter the word equity is used in its broadest sense to encompass both procedural equity and outcome equality, meaning not only 'fairness' but also the potential for actually achieving equality of outcomes.

Nevertheless, the difference between process equity (or procedural fairness) and outcome equity is an important distinction to make since the way policy makers have responded to accusations of environmental injustice has primarily been to create additional public participatory processes, 'Fair Share' guidelines and other mechanisms to try to ensure 'fairness' in siting noxious facilities. However, recent history has shown us that process fairness has not necessarily resulted in equitable outcomes.

Unfortunately, many governmental agencies have framed the equity question in terms of fairness in distribution and siting, which assumes the existence of pollution as a natural and accepted part of industrial production and modern life, rather than focus on eliminating the pollution for everyone.

The beginnings of the EJ movement

The United States is an important starting place for understanding the emergence and evolution of the EJ movement. Developed nations in Europe and elsewhere were much slower than the United States to recognise the impacts of environmental injustice in their own countries. This was partially due to the way environmental injustice had been framed initially: primarily as a racial discrimination issue. However, since the populations of many developed countries contain a much smaller proportion of racial and ethnic minorities than does the United States, the fact of environmental injustice was not as readily apparent or supported by quantitative analysis due to the small numbers statistical problem. But once the definition of EJ was expanded to include other factors, such as class, poverty, immigrant status and overall deprivation, similar disproportionate impacts were found throughout the world (Adeola, 2009; Basu and Chakraborty, 2016; Carruthers, 2008; Chaix et al., 2006; Dunion and Scandrett, 2003; Grineski and Collins, 2008; Margai and Barry, 2011).

The EJ movement in the United States began in earnest in the 1980s. It was preceded by a strong wave of new-found environmentalism in the United States shortly after WWII, and the general public was becoming more aware of the dangers of pesticides; degradation of water and air quality; the problems of population growth, hazardous waste disposal, and environmental

health impacts; and habitat destruction and the consequent loss of species. This heightened awareness was thanks in large part to publications that popularised new ways of thinking about environmental problems and the need to take immediate action, such as Rachel Carson's *Silent Spring* (1962), Paul Ehrlich's *The Population Bomb* (1968) and Buckminster Fuller's *Operating Manual for Spaceship Earth* (1968). These seminal books helped inspire the modern day mainstream environmental movement, culminating in the first Earth Day celebration and the creation of the federal Environmental Protection Agency, both in 1970. But it was some nationally notorious events (for example, the Cuyahoga River near Cleveland, Ohio, bursting into flames and the infamous Love Canal housing development in Niagara Falls, New York, built atop an illegal hazardous waste dump, with a concomitant plethora of rare diseases amongst the inhabitants) that galvanised public opinion.

This environmental movement was focused on conservation and preservation of the natural world and the desire to live in cleaner environments. It was assumed that bad environmental practices and pollution affected all of us more or less equally, and it was not until the 1980s that there was a growing recognition that poor people and communities of colour were much more adversely impacted by environmental burdens than was the rest of the country's population.

The 1987 *Toxic wastes and race* report by the United Church of Christ's Commission on Racial Justice quantified the disproportionate siting of hazardous waste facilities amongst communities of colour. This damning analysis was quickly followed by dozens of other studies by researchers and activists all over the United States, which looked at race and other socio-economic characteristics in relation to the location of a variety of environmentally burdensome facilities and land uses (White, 1998). Nearly all of the US-based research found a strong spatial correspondence between race and poor environmental conditions, including exposure to accidental chemical releases, Toxic Release Inventory facilities, Superfund, Petrofund and hazardous waste disposal sites (Goldman, 1993; Maantay, 2002a). There were also a number of critical commentaries on environmental justice, which helped make it a serious topic for academic study (for example, Pellow and Brulle, 2005; Pulido, 1996).

In addition to the surge in scholarly interest in EJ, dozens of grassroots and community-based organisations were formed and became active in the struggle for environmental justice (Perez et al., 2015; Taylor, 2011), some of which became important voices in the overall environmental movement.

The analysis of environmental justice – measuring EJ

The existence of environmental injustice was well known by many of those who were living it, and it was well documented anecdotally through verbal narratives and other qualitative means. But after the pattern was named and identified as characterising a certain condition, EJ needed to be measured using quantitative methods. It is difficult to solve a problem unless it is understood and quantified.

This coincided with the advent of more user-friendly geographic information systems (GIS), and it has been argued that without GIS, EJ research would not have exploded the way it did. GIS – computerised mapping and spatial analysis – made it possible to move EJ research beyond just anecdote and theoretical critical commentary. GIS allowed a systematic body of evidence to accumulate, using quantitative methods with duplicatable results, which meant EJ research could be considered 'scientific' and thus more 'useable' to policy makers and government officials (Maantay, 2002a).

For the next 15 years, most research surrounding EJ issues in the United States was undertaken essentially to 'prove' the existence of environmental injustices by looking at the locations

of environmental 'bads' in relation to where minority populations and poor people lived. This was later expanded to examine the flip side of this – access/lack of access to environmental 'goods', such as healthy food options, parks and open spaces, and other health-promoting amenities (Maroko et al., 2009).

In nearly every study, race was a predictor for disproportionate environmental burdens (Maantay, 2002a). These results were echoed in many other studies in subsequent years, as well as studies finding curtailed access of minority and poor populations to environmental 'goods'. The cartographic and geostatistical evidence was overwhelming: poor people and minority people tended to live in much less salubrious places: places that were more polluted, with less access to things that make the environment good, and by extension, that could make their lives good.

Largely missing from these early EJ exposés, though, was an analysis of the actual impacts, health and otherwise, of living in areas with poor environmental conditions. Many of the EJ analyses conducted up to this point had looked at simple proximity to a hazard, and everyone captured within a certain distance radius was deemed to have been exposed. But what were the actual differences in people's health, life expectancy and wellbeing between those living near hazardous conditions and those who were not? One of the most important trends in EJ research has been the attempt to identify the populations affected and quantify the adverse health outcomes resulting from environmental injustice.

This type of health-based analysis was difficult to come to grips with, in terms of valid research design. Datasets on health outcomes are hard to obtain, especially at a patient record level, due to confidentiality restrictions, and aggregating health outcomes to larger geographic extents tends to obscure the correlations between environmental conditions and disease. Additionally, many diseases have long latency periods, and people are mobile, making it nearly impossible to ascribe living in a certain location to likelihood of exposure or acquiring a disease. Therefore, it's more complicated to prove the connection between adverse health outcomes and the disparate environmental factors in the home and work places (Maantay, 2007).

Actual exposure is, therefore, much less straightforward to measure and prove than simple proximity to a hazard, and there are many confounding variables and limitations in trying to definitively show correlation between adverse health outcomes and living in an environmentally hazardous area. However, we can now do more precise analyses to accurately delineate the geographical extent of the impacts and the numbers and characteristics of the potentially exposed populations. A wide variety of geostatistical methods have been applied to EJ studies, such as geographically weighted regression (GWR), spatial autoregressive (SAR) models, Bayesian modelling, cluster analysis, multi-level or hierarchical modelling, dasymetric disaggregation of population and modelling of actual and predicted environmental conditions (Chakraborty and Maantay, 2011).

Developments in life course dynamics and activity space studies have also become part of the standard toolbox to better assess the health-environment-EJ linkages. Once we can fully take into account people's intra-day movements, day-to-day travels, and their longer-term geographic mobility, we can more fully account for neighbourhood effects such as environmental and socio-demographic conditions (Kwan, 2013). Substantial work has also been done on creating indices for various purposes, such as ranking vulnerability to gentrification; differential risk from flooding and other natural and industrial hazards; the segregation/health relationship; and psycho-social stressors (Maantay, 2013; Maantay et al., 2010).

A relatively new development in EJ research is 'visual storytelling' or cartographic narrative techniques (Moore et al., 2017). These methods are less purely quantitative and more intuitive and involve mining data for exploratory purposes and communication. This kind of 'undisciplined' geo-visualisation can be a valuable tool in EJ research, and it can be effectively coupled

with participatory GIScience processes, volunteered geographic information (VGI) and crowd-sourced data from social media. These are all excellent ways of portraying issues and bringing the story to the public's attention.

Through development of robust methodologies, we have become more adept at describing the problem, identifying the at-risk populations and demonstrating some of the health impacts. In a review of over 30 studies investigating the correlation between residential proximity to environmental hazards and adverse health outcomes (including pregnancy abnormalities, pre-term infants, childhood leukaemia, brain cancer, bladder cancer, lymphoma and various tumours, a majority of the studies showed a connection (Brender et al., 2011). But it should be cautioned that even this is no longer enough. Now the focus needs to be on using geospatial technologies to develop solutions, which brings us into the realm of policy and planning. In capitalist, market-based economies, how can at-risk vulnerable populations be protected? What is the best mechanism to address the issues of environmental injustice, health disparities and general inequalities?

Environmental justice policies and regulatory issues

Federal and state regulatory agencies

In the United States, EJ evolved from a social justice movement to real changes to the regulatory and legal environments. In 1982, grassroots protests and activism in reaction to the siting of a hazardous waste landfill in a majority Black community in North Carolina started a national conversation about 'environmental racism', which brought together two important and heretofore unconnected American movements: Civil Rights and Environmentalism. These protests helped to instigate the 1983 study on Environmental Justice by the US General Accounting Office and later the 1987 *Toxic wastes and race* study, two landmark documents in the history of EJ. Both of these reports confirmed the existence of disproportionate impacts of environmental hazards on communities of colour, specifically hazardous waste disposal sites. Virtually from the beginning, the EJ movement had the support of the faith-based community, similar to the impetus of the Civil Rights movement in the 1950s and 60s, thus giving the EJ movement a moral and ethical high ground that was difficult for politicians to argue against. In 1991, the First National People of Color Environmental Leadership Summit was held in Washington DC, which resulted in the delineation of the Seventeen Principles of Environmental Justice (Mohai and Bryant, 1992).

In 1994, President Bill Clinton signed Executive Order 12898 on Environmental Justice, which instituted the US federal government's official recognition of the need to assess the environmental justice implications of government programs, plans, policies and activities in accordance with Title VI of the Civil Rights Act of 1964. At the federal level, all governmental actions require an EJ assessment prior to new projects or policies being implemented. Federal agencies must consider environmental justice in their activities under the National Environmental Policy Act (NEPA).

The federal Environmental Protection Agency (EPA) also became active in EJ work in around 1992, creating an Office of Environmental Justice responsible for coordinating the Agency's efforts to integrate environmental justice into all policies, programmes, and activities, and has developed a new environmental justice mapping and screening tool called EJSCREEN (US EPA, 2016). This is based on nationally consistent data and is an approach that creates an index combining a number of environmental and socio-demographic indicators in maps and reports, in order to identify and prioritise what the EPA calls 'EJ communities'. Other offices within

the EPA manage and disseminate data such as the Toxic Release Inventory (TRI) reporting, as well as information about locally used, stored and released hazardous substances under the Emergency Planning and Community Right to Know Act, and maintain various other publicly available datasets on environmental quality indicators that are mandated by law. These databases have played a crucial role in EJ research, allowing national level EJ analyses to be undertaken with consistent data, yielding more reliable results.

Environmental impact assessment

Most US states and many cities have their own local departments of environmental protection, within which environmental justice concerns may be addressed through the environmental assessment process, including a public participation component, although often the public has virtually no impact on the outcome despite involvement. Additionally, the entire environmental assessment process is advisory only, being used by the decision makers as one of many inputs in the approval process – its recommendations being non-binding.

Zoning and land use planning

Zoning and land use planning are potentially the most reliable controls municipalities have to combat environmental injustice but often have been used for the opposite effect. The ostensible purpose of zoning is to plan for the uses to which land will be put within a city or township, to protect the wellbeing of the residents, and allow commercial enterprises to flourish. Zoning is one of the most widespread and influential sets of regulations that exist in the United States and have the power to organise, shape and protect the character of their landscapes and welfare of their populations (Babcock, 1966). In fact, zoning acts as a gatekeeper in many places, dictating where the often necessary-but-noxious land uses can and cannot go (for example, waste water treatment plants, landfills, solid waste transfer stations, recycling centres) by specifying separation of certain uses, in effect ensuring environmental injustice by only allowing these uses in places that have been zoned for them. The places zoned for them are often in or near less affluent residential areas or communities of colour, thus having the effect of protecting the wealthier areas while sacrificing the less affluent. Zoning has been shown to be one of the root enabling causes of environmental injustice, and even revisions and updates to older zoning plans generally perpetuate environmental injustice by increasing the areal extent of industrial zones and the permissible level of environmental burden in less affluent and minority neighbourhoods, and reducing the areal extent of industrial zones and level of burden in 'better' neighbourhoods. This is done in such a normative way that it often escapes notice as a biased regulatory initiative or policy (Maantay, 2002b, 2002c, 2002d).

NIMBY-ism and 'Fair Share' guidelines

NIMBY-ism is a phenomenon related to zoning and land use planning. '*N*ot *I*n *M*y *B*ack *Y*ard' is usually a local protest effort to stop some undesirable project from locating in a specific area for which it has been earmarked. The NIMBY approach is often effective and in the past had tended to pertain to mostly middle- and upper-class neighbourhoods having the political clout and know-how to get things done within the established system. The contentious land use would then often be shifted to a poorer or more minority neighbourhood, where (at least in the past) the people were less politically powerful and, for a variety of reasons, were less able to combat the project (Heiman, 1990; Lake, 1993).

Some cities, notably New York, instituted 'Fair Share' guidelines to help address this inequitable state of affairs after it was pointed out that poor neighbourhoods were usually the recipients of unwanted land uses (NYC DEP, 1991). These guidelines recommended a procedure for examining the distribution of unwanted land uses within a community and trying to ensure that any one area was not overly saturated with them. Zoning still effectively limits the possible locations of many facilities, and physical requirements dictate their locations (waste water treatment plants, for instance, need to be on the waterfront for operational reasons). But it did put private developers on notice (as well as city planners) that EJ would need to be taken into consideration more comprehensively now and that it would be procedurally more difficult to ignore the wellbeing of people in poor neighbourhoods, just as it had always been (politically) impossible to ignore the wishes of the wealthier ones.

Community-led planning and public participatory GIS

Many cities and even some counties have instituted procedures supporting community-led plans and planning initiatives. There are provisions for communities to engage consultants and develop their own proactive planning (rather than the reactive planning often engendered by NIMBY-ism).

Community-led planning often includes Public Participatory GIS (PPGIS), which involves community members in the planning process by utilising GIS as 'a way of enhancing local peoples' abilities to share and analyze their knowledge of lifestyles and conditions' (Chambers, 1994, p. 3) and has proven to be an effective way to inject a degree of community input and control into the planning process. PPGIS has been effectively used all over the world, from urban to rural to tribal and indigenous environments (Harris et al., 1995), and has been particularly successful in counter-mapping – the production of maps and spatial analyses for advocacy and activist purposes to challenge the official viewpoint of the community and to offer a measure of empowerment to local areas trying to plan and take charge of their own futures. This idea of counter-mapping and PPGIS has been instrumental in the demonstration and rectification of environmental injustices (Aberley, 1993; Weiner et al., 1995).

Green gentrification – a new form of environmental injustice

Gentrification also influences environmental injustice. When private or municipal development schemes are proposed for less affluent or minority neighbourhoods, the result is often displacement or worsening economic conditions for the poor or minority residents already living in the community. 'Green' gentrification occurs when private or public improvements in green amenities (parks, open space networks, waterfront improvements, etc) result in rising property values and subsequent marginalisation and displacement of the original residents (Gould and Lewis, 2016). Even community-led improvements such as community gardens can have this effect by improving property values, enhancing neighbourhood aesthetics, reducing crime rates and thus inadvertently encouraging outside investment in their neighbourhood, whereby through their own hard work the community has sown the seeds of their own destruction.

'Greening' plans need to be contextualised to ensure that this new greener future will benefit all the residents of the city and not follow the all too common trajectory of exclusion, displacement and expulsion of the poor and otherwise marginalised people from the improved areas. This, unfortunately, only results in a different but equally pernicious type of environmental injustice.

International implications of environmental justice

Environmental justice has been studied in locations worldwide, with similar results as those in the United States. However, beyond the EJ ramifications for individual locations, the global impacts transcend any given city or country, and it is essential to take the issue of scale into account. Environmental injustice is tricky to measure with any confidence because analyses can be skewed by the geographic extent of the study area as well as the unit of data aggregation used. What might appear as environmental injustice at the city level – using the census enumeration unit or postal code as the unit of analysis – might yield very different results at the state level using counties as the unit or at the national level using states as the unit (Maantay, 2007). Scale is an important consideration in any examination of EJ. Although it is practical and necessary to use pre-defined units of analyses, there really isn't any logical reason why jurisdictional boundaries are thought to be realistic in depicting EJ since environmental injustice does not occur in a geographic vacuum or in isolation from its surrounding/bounding areas. Highly precise quantitative analyses can often mask the true EJ outcomes and be misleading. This has been one of the main challenges in EJ studies.

For instance, in NYC, all landfills have been closed in the past decade due to public outcry against them and acknowledgement of their detrimental impacts, and have now mainly been turned into parks, so there is no longer a localised EJ concern for the residents proximate to the old landfills. However, the city's solid waste and sewage sludge hasn't just disappeared; it is exported to other states and countries, where governments are more willing to take a risk for economic gain, rather than prioritise safeguarding their residents' wellbeing. This enlarges the sphere of influence of NYC's garbage and sewage waste and thereby creates an environmental justice spill-over effect to areas far removed from the origin of the pollution.

Similarly, in 2006 there was an event which has been categorised as being amongst the worst man-made environmental disasters on record, namely the illegal and improperly handled dumping of more than 500 tonnes of toxic waste in the west African nation of Cote d'Ivoire, after which over 100,000 people became ill (Margai and Barry, 2011). The waste had originated in refinery operations of a Mexican state-owned petroleum corporation and had been refused at several European and other African ports. When the ship finally reached the Port of Abidjan, the toxic stew was presented as relatively harmless 'ship's slops' since it was known that the city had no proper facilities for storing toxic waste. It was off-loaded and spread across the city and surrounding areas, dumped at night in waste grounds, public dumps, and along roads in populated areas, over the course of three weeks. The substance gave off toxic gas and resulted in burns to lungs and skin, as well as severe headaches and vomiting, and the toxins also contaminated the food chain. The areas selected for the dumping tended to be locations inhabited by ethnic minority populations, who were also marginalised based on religion and language. This is only one instance in what has become a pattern of resource exploitation, toxic contamination and transnational pollution visited upon the less developed countries by corporations and governments in the developed world.

In fact, in terms of a global assessment of EJ, the United States and other developed nations perpetrate environmental injustice on the less developed countries, regardless of and in addition to the environmental injustice borne by sub-populations within their own countries (Westra and Lawson, 2001). It's a vast transference and shifting around of the pollution burden from the creators of the problem (who at least can be said to benefit materially from its creation) to the parts of the world whose populations are least able to absorb the tragic health and ecological impacts of this 'trade' and who benefit least from the rampant consumerism and concomitant

natural resource extraction that makes over consumption in developed countries possible (Castleman and Navarro, 1987). 'We won't be able to achieve sustainable development until we get justice in environmental protection . . . not only within the border of the United States but in the policies that are being exported abroad' (Bullard et al., 2007, p. ix).

The latest in the long list of transferred environmental justice issues is that of global climate change. The 5% of the world's population living in the United States is responsible for 20% of the world's greenhouse gas contributions, yet it will be primarily the people who live in coastal and other low lying areas in the less developed countries and in other vulnerable at-risk locations who will feel the brunt of climate change impacts and have the fewest resources to deal with them (Maantay and Becker, 2012). This is the environmental injustice story of the 21st century and one that perforce must be tackled on a global basis.

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