such as political ecology, sustainable development, and environmental economic geography. This entry re ects an institutional perspective on environmental economic geography (Patchell and Hayter 2013).

In terms of format, the study begins with the interlocking concepts of resource cycles, governance, and multifunctionality. Second, we examine the role of resources as inputs to industrialization with respect to their diverse impacts on resource peripheries. Third, resource con ict and resolution are discussed in relation to a rethinking of the meaning of development.

Key dilemmas of resource-based development: governance, multifunctionality, and cycles

Relationships between resources and development are problematical. Their meanings and values are socially driven and judgmental, and vary over time and space and between people at particular times and places. Always intimately local, resource–development relationships have become global in scope, "o cially" signaled by the United Nations (Brundtland 1987) following earlier alarms of environmental destruction. Resource and development relations are complicated because: resources are viewed as birthrights whose governance raises questions about public interest and the ow of bene ts into the future; resource use o ers multifunctional (industrial and nonindustrial) values that are often incompatible; resource cycles based on industrial exploitation generate signi cant positive and negative externalities; and – because resources are distributed according to nature's endowment – they are often remote from where people need or want them. These themes are interrelated.

Resource endowments are derived from nature but are culturally de ned. Social evaluations of nature typically evoke deeply rooted attachments and the bias that resources should be used or designated to enhance broadly based "local" (national, regional, community) development goals. Given that air, water, and food are necessities for life itself, the wise use of resources in general typically invokes reference to the public interest. This challenge of wise use became manifestly greater following the Industrial Revolution, which began in the late eighteenth century and heralded sustained increases in economic growth, population, and demand for resources. In tandem, the governments of leading nations prioritized economic growth through the spread of market institutions, industrialization, and trade. In this pursuit of the public interest as the wealth of nations, the privatization of resource ownership and/or control became widespread, often at the expense of common property resources. The search for productivity and new markets in turn stimulated processes of discovery and innovation that created new or diversi ed existing resource use. Indeed, even if it is not often recognized in contemporary literature, innovation, with its high-tech focus, has been a signi cant, often sophisticated impulse in the resource sector, creating new products while opening up new resource spaces and extending existing ones. In the case of oil, for example, the opening up of conventional and unconventional sources in deep sea and Arctic locations, and of oil sands and shale oil deposits, has depended on important technological improvements, as well as generating increased (nancial and environmental) risks.

Yet, signi cant government involvement, inevitably justi ed as in the public interest, has proceeded, inter alia, with the privatization of resource exploitation (Bridge 2013). Governments remain vitally entangled in resource management, stimulated by their role as resource owners, by society's demand for the wise use

Resource cycles

In response to industry's escalating materials needs, export-driven resource exploitation has been pushed to all parts of the globe. In that process peripheral regions and communities have been created and subject to patterns of development and decline shaped by resource cycle dynamics. Resource depletion is an obvious reason for decline, but competition from other places and substitution by new materials and technologies also threaten resource-based development. While the distinction between renewable and nonrenewable resources is a basic dichotomy, de ned by the implications of depletion and renewal, the sustainability of the former is not necessarily inevitable, or likely. If nite mineral deposits will inevitably be depleted, sh and forest resources similarly experience resource (S-shaped) cycles of discovery, boom, bust and collapse, or rationalization. In practice, the evolutionary trajectories of resource cycles vary. Typically reliant on distant, specialized markets, resource cycles are punctuated by short-term business uctuations that in turn complicate longer-term trends and understanding of fundamental turning points. Indeed, the trajectories of resource industries during lengthy periods of postmaturity can be geographically and temporally uneven, with highly varying entry and exit rates of rms among subindustries, as illustrated by British Columbia's forest sector (Edenho er and Hayter 2013).

Initiation and expansion of resource exploitation occurs through many con gurations of rms with di erent size, networking, and ownership characteristics. Irrespective of these con gurations, all rms must respond to market demands and with repercussions for the viability of production facilities and communities. Although most closely interrelated with the community, small local rms are the most fragile in terms of dependence on distant markets because they often lack the capacity to ride out market uctuations or to diversify. Larger rms may have such capacity and may be able to switch resource locations. In either case, given concerns about community or regional welfare, governments typically play a large role in resource development.

The developmental role of governments varies during resource cycles. In the early stafnthe

the context of biofuels in the United States and Canada (Kedron and Bagchi-Sen 2011).

In the late stages of resource cycles government attention becomes more focused on problems of decline, especially in regions and communities that remain resource-dependent. Declining coalmining and depressed rural areas in Europe and North America gave birth to the original regional problem areas. They stimulated the introduction of regional development policies in the 1930s and expansion in the 1950s. In practice, the challenges of rejuvenating resource communities in these regions have proven enduring while in recent decades the number of declining resource towns has increased. In the decline stage, the established community often adds local perspectives on development plans that are "placed-based," highly varied, and made in the context of changing social structures (Markey, Halseth, and Mansen 2012). To pre-empt the building of communities only to see them painfully closed, companies and governments have developed a strategy of using fly-in fly-out workforces for resource projects in new spaces. Proponents are spared significant sunk costs and future policy challenges while providing companies with employment (albeit high-wage) flexibility.

Resource exports and regional (community) development

Can resource exploitation generate long-term development? In evolutionary explanations of capitalist development over the last 250 years (Patchell and Hayter 2013) resource inputs have been recognized as significant to, but not a primary causal factor of, industrialization. Rather, "paradigmatic" transformations evolve through interdependent institutional developments in science, technology, society, politics, and the markets that are favorable to entrepreneurship and innovation.

That said, resources nevertheless played a role in the development of industrial cores, if this is not always appreciated. For example, referring to a hearth of the Industrial Revolution, Potter and Watts (2010) interpret the evolutionary trajectory of Sheffield's metalworking activities (steel, cutlery, and tools) as the quintessential example of localized Marshallian (positive and negative) externalities in the form of local skilled labor pools, suppliers, and knowledge spillovers. In their model, without reference to dates or periods (or institutions), "Embryonic agglomeration … starts with a mutation process … in which Geography is crucial" (Potter and Watts 2010, 421–422), by which they mean various knowledge-based advantages that accrue to pioneering new and growing firms from clustering together. However, Sheffield's case also reveals the importance of local access to resources during the embryonic stage that culminated in Benjamin Huntsman's innovation of crucible steel in the 1760s. Thus Sheffield's dispersed metalworking sites enjoyed close access to several key industrial resources (charcoal, coal, iron, clays, sandstones, millstone grit and limestone, plus local agriculture), while the rivers and streams that crossed the city once powered the largest concentration of water wheels in Europe (and were organized along common property lines). Huntsman himself relocated to Sheffield to access these resources and conduct

provinces. In contrast, major steel and heavy industry locations in Korea and Japan relied on imported raw materials. Now, whether local supplies have never existed or have been exhausted, core regions and cities see resources as inputs to diversi ed ranges of manufacturing goods that can be imported. For new resource-based economic spaces, however, d

resources. Innovative activity has also often been stimulated by locally distinct resource conditions (Walker 2001).

Regional and national contexts and situations further shape urban and regional diversi cation. Among rich Western economies, for example, Canadian and Scandinavian approaches to export-driven forest exploitation evolved di er-ently. The latter emphasized forest privatization, domestic companies, and in-house research and development (R&D) investments that have collectively stimulated stronger export-oriented forward (e.g., furniture) and backward linkages (e.g., machinery). In Canada, forests are publicly owned by provincial governments, foreign direct investment (FDI) is signi cant, government R&D is important, and linked developments are less export-oriented. In the oil sector, while Norway exerts control through a state-owned company (SOC), Statoil, and taxes it heavily (78%) to fund a national heritage fund (over

that conspire to restrict enclave diversi cation. These may be summarized broadly in terms of geographic, institutional, and boom and bust perspectives. In this context, geography implies site (endowment) and situational factors that shape resource cycles. Markets have enormous centripetal tendencies, and the ability of resource towns and peripheries to diversify may be limited by their small size, isolation, increasing costs, resource exhaustion, vulnerability to competition, and possibilities of substituting other inputs. However, whether or not resource peripheries inevitably su er declining terms of trade is debated.

"Staple traps" and "resource addiction" are virtual synonyms with respect to institutional constraints on resource diversi cation. The terms describe narrowly based competencies, capital and human inertias, and conservative attitudes among corporations, governments, and communities that mutually reinforce resource dependence. Thus resource-based corporations tend to be powerfully locked into established strategies, constrained by highly specialized managerial expertise, immobile resources, dedicated machinery, and the expense of large-scale investments to modernize operations and maintain market share. Further, the implications of exible mass production in resource industries are variable, and often not an option. It is worth recalling that the local role of MNCs in resource exploitation has long been criticized, not only within radical literatures such as dependency theory but also in Baldwin's (1956) neoclassical analysis. In Baldwin's comparison of the production functions of MNCs with local entrepreneurs, the resource plantations of the former were less likely to diversify local economies than local pools of entrepreneurial risk-takers who reinvest pro ts locally, purchase locally, and stimulate external economies and more accessible infrastructure. Nevertheless, FDI in resource exploitation is an important in uence, increasingly originating within developing countries. Resource-based and global production networks are typically orchestrated by large organizations with in uence over the location of value-adding activities.

Governments can perpetuate resource depen-

and unable or unwilling to seek alternatives during recessions. Unfortunately, when permanent downsizing occurs resource towns are frequently unprepared, and start contemplating diversi cation only when nancial resources have become limited, labor pools specialized, and competition

peoples – have di erent interests but have cooperated to oppose vested industrial interests, and to stimulate profound changes in the rules of the game for British Columbia's forest industry.

Analytically, stakeholder models have been used to conceptually frame resource con icts and to identify relevant stakeholders and their diverse powers, economic and noneconomic motivations, global–local connections, and relationships to one another (A olderbach, Clapp, and Hayter 2012; Hayter and Barnes 2012). Predominantly, stakeholder models have been elaborated in democratic, pluralist market economies that tolerate social action and criticism, and where protesting stakeholders are striving for legal and political acknowledgment of the resource values they promote. In the United States, for example, the idea of a *public trust doctrine* for natural resources such as oceans, shorelines, air, and (some) land, has been pioneered since 1970 when Michigan was the rst state to legally adopt this principle, with other states following. This doctrine itself is part of the trend toward the adoption of environmental legislation at the state scale, hitherto most e ective at national and local levels, which has directly and indirectly imposed conditions on or prevented industrial resource use. Aboriginal protests around the world are similarly driven to have aboriginal rights recognized and enforced (Mander and Tauli-Corpuz 2006).

large corporations and big government, often with the tacit support of labor. Increasingly, however, resource decision-making is pluralistic and contested, and engages multiple institutional perspectives that crisscross geographic scales. In tandem, environmental and cultural impact studies have become routine parts of these processes in many peripheries. Moreover, the "emerging geographies" (Moorcroft and Adams 2014) of these decisions are privileging environmental and cultural resource values and the local redistribution of bene ts and rents (Argent 2014) to a greater degree than in the past. The global expansion of conservation areas, the associated designation of ecologically and culturally based world heritage sites, the remapping of resource peripheries, and the spread of environmental certi cation and SLOs re ect this rethinking and reregulation of resource peripheries (A olderbach, Clapp, and Hayter 2012; Hayter 2003; Zimmerer 2006). The increased emphasis on tourism, ecotourism, and ecosystem services are related trends that o er employment alternatives to the industrialization of resources.

Moreover, pressures on resource peripheries to give greater priority to environmental values are strengthening, stimulated by the recognition that nature's ecosystem bene ts are huge; Costanza *et al*. (2014) have estimated that ecosystem services amounted to US$142.7 trillion globally in 2014, bigger than global GDP, and calculations can be made at regional levels as well. Such estimates are controversial, not least within the environmental movement, and the bene- ts identi ed apply abstractly to "everyone," while incorporating intangible development goals related to quality of life considerations and moral obligations. Nevertheless calculations of ecosystem services are escalating concerns over global climate change that is both altering biotic resource endowments and raising the intensity of debates over resource use, especially with respect to energy (Bridge *et al*. 2012). With the major exception of the Montreal Protocol, however, global governance of climate change has proven elusive. It may be that these negotiations focus too much on the energy sector itself and need to shift to emphasizing MNCs in end product industries without vested ties to conventional energy sources. In the meantime, an important question is whether continued resource con icts lead to desired long-run outcomes. Con ict may be necessary to provoke necessary changes in resource–development relationships but con ict solutions require consensus and involve forms of global social cooperation that are diverse and complementary.

Conclusion

In recent decades a profound shift has occurred in social attitudes to resources. Resource peripheries are being asked by a host of diverse local and global interests to serve an increasingly wide range of economic, cultural, and environmental bene ts. No longer are they seen as just sites for specialized (but marginal) inputs drawn from peripheral places to supply industrial cores, which are readily substituted and cast aside, whether or not communities develop around them. Rather, according to the green paradigm or sustainability transition models, resource territories need to sustain values that link the local with the global in environmental, cultural, and quality of life as well as economic terms. In understanding this transformation in resource–development relationships, geography, with its inherent appreciation of variation and the need to integrate economic, political, social, and environmental perspectives, has an important role to play.

Community-based natural resource management; Conservation and capitalism; Construction of nature; Cores and peripheries; Corporate environmental responsibility; Development; Ecological footprint; Economic geography; Ecosystem services; Energy resources and use; Environment and development; Environment and resources, political economy of; Environmental degradation; Environmental governance; Environmental impact assessment; Environmentalism, grassroots; Geography and the study of human–environment relations; Neoliberalism and the environment; Political ecology; Regional development models; Regional development policies; Resource curse; Resource extraction; Water con icts

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