

Community-Engaged Research

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Research closely linked to organizing and advocacy has played a crucial role in the struggle for environmental justice (EJ). Consider some of the most influential studies that helped give birth to the modern EJ movement in the U.S., which did not include community-engaged research (CER) as we will define it below, but did help set the stage for it by demonstrating the value of research that responds directly to community priorities. Research by Robert Bullard (1983) for a 1979 civil rights lawsuit in Houston, TX, provided the first systematic evidence that hazardous waste sites were disproportionately located in neighborhoods of color. Later, organizing against toxic contamination in primarily African American communities inspired the Congressional Black Caucus to order the first federal government study of racial and income disparities in hazardous waste siting (U.S. General Accounting Office 1983). A larger study by the United Church of Christ's Commission for Racial Justice (1987) established these linkages more clearly, and found that race predicted proximity to hazardous waste facilities more powerfully than income, property values, or closeness to waste production. Over the next six years the federal government began to adopt many of the report's recommendations.

Responding directly to calls by grassroots leaders and EJ advocates to document environmental racism, these studies influenced public discourse and policy significantly because they were connected to organizing, litigation, advocacy, and regulation to address the emerging issue of environmental justice. The fact that the researchers who conducted these studies were affiliated with academia, a government agency, and a civil society organization demonstrates that EJ research can emerge from diverse institutions. Recalling the early days of this movement in the U.S., activist Vernice Miller Travis said:

We gave birth to a conversation that people would recognize as their own. We gave it a language, we gave it words, we gave it a science base, we gave it a public policy base, and we gave it a base that was rooted in the power and mobilization of people on the ground so it couldn't be denied. (U.S. Environmental Protection Agency 2014)

By integrating their studies into a current political discussion driven by a growing movement, researchers supported activists and advocates to develop the language, science, and policy of EJ.

In the years that followed, EJ researchers incorporated CER approaches by involving community members themselves in the research process to develop local capacities for public participation and to accomplish more and better research. CER has contributed to the EJ movement in several important ways (Cole and Foster 2001). CER has documented disproportionate threats from environmental dangers to EJ communities, inspiring campaigns to block the siting of additional hazards. CER also helped to provide the evidentiary basis for demands for investment in healthier and safer facilities, more protective regulations, and more effective enforcement. CER aided EJ leaders in understanding how local problems were part of larger systemic patterns of injustice rooted in historic racial, economic, and political oppression. CER also helped to justify policy changes, suggest organizing and legal strategies, and identify promising policy instruments. While research using a traditional approach has contributed to each of these goals as well, CER did so by partnering with community organizations to build their capacities to conduct research with and without academic and other professional researchers and strengthen their influence over the research agenda. Thus, CER contributed not only to the analysis of causes, solutions, and strategies for change, but also to the development of grassroots leadership that has been crucial for building EJ knowledge and the movement.

This chapter prepares researchers to contribute to this body of work by providing a definition of CER as a research paradigm and introducing its main goals and evaluative criteria. We go on to describe some of the major types of and influences on CER that emerged in the Global North and South, and Indigenous research traditions. While we value the large body of EJ research that has not employed CER, including the foundational studies mentioned above, we argue that CER can make a unique contribution by building research partnerships, practices, and knowledge about EJ that strengthen grassroots leadership of the EJ movement, and that produce research with greater reach, rigor, relevance, and reflexivity. To show how CER makes a distinctive contribution to enacting justice in the research process, we employ the dimensions of EJ defined in chapter 1 to introduce a justice framework that relates CER and EJ, which is used to examine CER practices in the chapters that follow.

DEFINING COMMUNITY-ENGAGED RESEARCH

CER as a Paradigm

Community-engaged research is an umbrella term for a paradigm—an overarching theoretical framework of beliefs and understandings that guide research practice—used by professional researchers (in academia, government, and independent research institutes), students, and community partners to co-create knowledge. As a paradigm, CER is not defined by a specific choice of methods for gathering or analyzing data—such as surveys, ethnography, or geographic information systems (GIS)—but by the fact that “participation on the part of those whose lives or work is the subject of the study fundamentally affects all aspects of the research” (International Collaboration for Participatory Health Research 2013, 5). CER is also defined by its beliefs that knowledge is inherently social and action oriented, that it is co-produced by researchers and communities, and that these partnerships must address power relations inherent in knowledge production, respect local cultures and assets, be of practical benefit to communities, and advance liberation and equity (Israel et al. 2013b; Wallerstein and Duran 2017).

Like other paradigms, CER can embrace a broad range of disciplines, theories, and research methods. CER has been applied across the social and natural sciences, arts and humanities, and professional and applied fields (Chevalier and Buckles 2019; Lepczyk et al. 2020; Wallerstein et al. 2017). Similarly, CER researchers employ many theories, especially critical race, feminist, and decolonial theories (Deeb-Sossa 2019; Smith 2021). CER embraces diverse qualitative and quantitative methodologies of different origins, such as community-based participatory research (emerging especially from the U.S. health sciences), participatory action research (from the Global South), community-based research (in Canada), collaborative action research (especially in Australia), and participatory appraisal (in development research). Additional CER methodologies include collaborative inquiry, reflexive practice, feminist participatory research, tribal participatory research, research justice, street science, citizen science, community science, and many others (for summaries, see Davis and Ramirez-Andreotta 2021; Israel et al. 2013b; Wallerstein and Duran 2017).

CER is also enabled by multiple institutional relationships, such as individual projects, long-term collaborations with community partners, and community-university partnerships to improve local capacities and conditions over decades (Raphael 2019b; Welch 2016). As discussed in chapter 4, the kinds of community partners and the degree of their engagement in a CER project can vary considerably. In addition, this research is conducted not only by academics, but also by researchers in community-based organizations, coalitions, and network organizations; in independent research institutes and government agencies; and by advocates, lawyers, and others. (Therefore, we use the term *community-engaged research*

to refer to this work as a whole, and reserve *community-engaged scholarship* for studies involving researchers in academic contexts.) Researchers who do CER for EJ often collaborate with grassroots organizations of people who live on the frontlines and fencelines of environmental injustices, coalitions and national networks of community-based organizations, intermediary research and policy organizations, large national and international environmental organizations, tribal governments, or other government agencies (Davies and Mah 2020b).

Despite its internal diversity, CER is a coherent paradigm because it includes a common set of philosophical assumptions about reality (ontology), knowledge (epistemology), and values (axiology) that inform the purposes and conduct of research (DeCarlo, Cummings, and Agnelli 2021). Because of its unique set of assumptions, CER draws upon but does not fit exclusively within any of the other research paradigms that are most frequently mentioned in methods textbooks, including qualitative (or constructivist or interpretative), quantitative (or positivist), critical (or emancipatory), or postcolonial (or Indigenous) research traditions (DeCarlo, Cummings, and Agnelli 2021; Denzin, Lincoln, and Smith 2008; Pabel, Pryce, and Anderson 2021). CER is least aligned with positivism, which aims to produce objective, value-neutral, quantifiable, and generalizable knowledge. However, as chapter 6 shows, CER can employ both qualitative and quantitative methods or a combination of these kinds of methods. In addition, the purposes of CER are often aligned with critical and postcolonial research. However, unlike any of these approaches, CER understands knowledge as co-produced by professional researchers and community partners, and CER is evaluated largely by whether it shares power with and benefits all parties to the research by creating a web of reciprocity and mutual benefit (described further below). For example, only CER *requires* researchers to co-develop the research agenda with community partners and to involve them in the research process to the extent that community partners desire.

Therefore, the most relevant framework for understanding CER is one that contrasts it with expert-oriented approaches to research of all kinds (quantitative, qualitative, or critical) (Saltmarsh 2010). Like CER, an expert-oriented approach is defined by its assumptions about the relationship of researchers and communities, and about knowledge and power, not by whether researchers employ a particular research method, such as surveys, ethnographies, or ideological critique (see table 2.1).

The main ontological differences between expert-oriented and CER approaches concern where and with whom real knowledge resides. An expert orientation assumes that authentic knowledge originates in research institutions (academic, government, or independent), where it is governed by disciplinary and methodological expectations, and produced by credentialed professional researchers (O'Meara and Rice 2005). Knowledge travels outside these institutions when policy makers or the public consume it as a good or service, or when researchers

TABLE 2.1. Expert-Centered and Community-Engaged Research Paradigms

	Expert-Centered Research	Community-Engaged Research
Ontology <i>What is real?</i>	Research institutions are primary seats of knowledge	Research institutions are collaborators in a network of knowledge production
	Disciplines are primary governors of knowledge	Authority over knowledge is shared with relevant communities
	Researchers are expert producers of knowledge, which is consumed by or applied to communities	Knowledge is co-created with communities and inherently action oriented
	Research is <i>on</i> or <i>for</i> the community	Research is <i>with</i> the community
Epistemology <i>How we know?</i>	Knowledge emerges from researcher expertise	Knowledge emerges from researcher and community expertise in facilitating co-production of knowledge
	Knowledge is vetted by professional peer review	Knowledge is vetted by professional and community peer review, where it is applied and tested for relevancy and action
	Applied knowledge is spread by replicating best practices	Relational, contextual, local, and experiential knowledge is spread by adapting promising practices from one community to others, while respecting their differences
	Knowledge flows unidirectionally from experts to communities	Knowledge flows multidirectionally among experts and communities
Axiology <i>What is valued?</i>	Dominant knowledge systems, even if hegemonic and colonizing	Recognition of diverse knowledges, knowledge as power, and Indigenous and decolonizing knowledge
	Community engagement to advance researchers' goals	Community partnerships, participation, and control of research, and outcomes that advance liberation, equity, cultural recognition
	Extractive partnerships	Reciprocal, mutually beneficial partnerships
	Researchers' assets cure community deficits	Community assets strengthen capacity for just practices with and within the community
	Technocracy and vanguardism	Grassroots leadership by those most affected

apply it to communities as a remedy or design, much as a doctor prescribes an approved treatment or an engineer applies calculations to design stable structures. In contrast, CER sees research institutions as one node in a larger web of knowledge production and circulation. Within this network, researchers co-produce knowledge with equally authoritative community actors, who do not simply

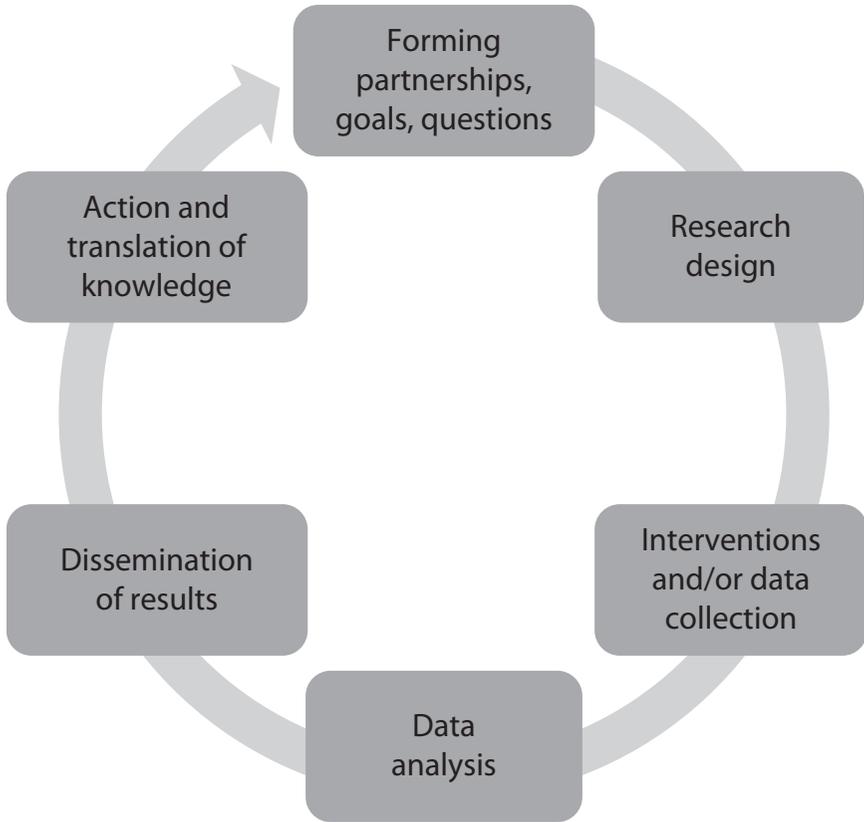


FIGURE 2.1. The CER process.
Adapted from Bacon et. al. (2013).

provide raw data or access to research sites, but contribute to ways of understanding local conditions and experiences in diverse contexts, and to the goals that motivate research and endow it with meaning. The participatory research process is itself a form of joint action in a community—building local capacities and leadership, for example—and informs further actions to change policies, practices, and power relations, including power relations between researchers and communities (Kindon, Pain, and Kesby 2007). Thus, CER understands research as a relationship and process that unfolds *with* communities, rather than on them (as a passive object) or for them (as a client or ward). Ideally, this is a cyclical process of shared inquiry and collaboration to design and conduct studies, and implement actions based on the findings, which leads to new questions and interventions for future research partnerships, deepening the relationship between communities and researchers (see figure 2.1).

CER also rests on different epistemological assumptions than the expert-driven approach. In the latter, knowledge springs from researchers employing their expertise—whether it is to produce quantifiable data and generalizable conclusions (as in positivism), or empathetic and insightful interpretations of informants’ experience of the world (as in constructivism), or trenchant analyses of oppression and emancipation (as in critical research). In CER, knowledge emerges from the interactions between researchers’ and community partners’ expertise. This expertise includes capacities for facilitating the co-production of knowledge, such as building relationships and mediating conflict among research partners; engaging community residents in research; translating among different languages, cultures, and disciplines; generating relevant findings and disseminating them to diverse groups; and brokering and implementing action plans in response to research results (Karvonen and Brand 2014). These kinds of expertise require intentional relationship building between researchers and community partners, and explicit training and personal transformation to develop researchers’ cultural competencies and cultural humility to work less ethnocentrically and more respectfully with community partners (see chapter 3). In the expert-centered paradigm, professional peer review evaluates the production of new knowledge to ensure its quality, while CER also includes community review, which adds criteria related to the quality of community participation and potential for practical improvements (discussed below). Rather than disseminate practical knowledge by replicating successful models in new contexts, CER sees practical knowledge as inherently rooted in and bound by the context in which it is created, which can be carefully adapted to other places and peoples, but not mechanically transplanted. Like the entire process of knowledge creation, translating knowledge involves a mutually beneficial relationship among researchers and communities, rather than a one-way flow of enlightenment from experts.

CER’s values (axiology) challenge experts’ tendency to ignore or accept how they wield power by applying dominant knowledge systems and cultural assumptions. For example, mainstream Western scientific, economic, and cultural conceptions of nature often present it as a warehouse of “natural resources” or a suite of “ecosystem services” for humans to manage and use, rather than seeing nature as humans’ kin or as bearers of rights, as many Indigenous and other peoples do. CER leads researchers to recognize diverse contextual concepts and systems of knowledge, to question hierarchies of power, and to challenge knowledge and cultural biases rooted in colonialism, racism, and the exploitation and destruction of people and nature. This requires researchers not simply to conduct studies that advance understanding of how to challenge oppression in the world (as in other critical research), but to collaborate with community partners in ways that practice equitable power relations and pursue mutual benefits. If traditional experts collaborate with community organizations, they tend to do it extractively—to

enable data gathering, assemble an audience for a study, or derive credibility in the eyes of potential funding agencies. Instead, CER strives to create reciprocal relationships, in which community partners are co-equal participants in designing the research and identifying desired benefits to the community.

Conventional experts often see communities as sources of deficits—deprived of sufficient resources or critical consciousness—which experts can fix by mining raw data about community problems and pathologies, and producing analyses that light the way to solutions. The implicit theory of change can be technocratic (leadership by the best-trained and most expert) or vanguardist (leadership by the most critically conscious). Community-engaged researchers understand that even the most stressed and oppressed communities possess valuable assets, such as schools, churches, nonprofit organizations, health and social services, informal social ties, and mutual aid networks, which can also incubate critique of oppression. CER aims to build on this infrastructure of existing strengths, sources of resilience and resistance, and latent potentials to conduct research and plan responsive actions (Sharpe et al. 2000). In a CER theory of change, the research process makes as important contributions as research outcomes. By sharing authority over knowledge and developing communities' capacities to know and transform themselves, CER strives to strengthen grass-roots leadership and power.

CER TRADITIONS AND INFLUENCES

CER has developed from diverse influences and traditions in the Global North and South, and from Indigenous research. We present each of them to ground researchers in how these different strands of CER arose from specific historical and institutional conditions and struggles, and to familiarize researchers with the most widely influential kinds of CER practiced today. Much CER draws on more than one of these traditions, which are not mutually exclusive. Knowing how and why these approaches emerged is important preparation for CER.

The Global North

In North America and Europe, inspirations for CER emerged from efforts to apply research in communities to improve agriculture, planning and development, public health, social services, and democracy (Wallerstein and Duran 2017). While not practicing the extent and kinds of community participation that CER does today, these precursors sowed seeds for some of the ideas and practices of CER. For example, the U.S. Department of Agriculture's Cooperative Extension, created in 1914 and run through the nation's land grant universities, co-developed research and educational programming with local farming communities (see chapter 10). In its early years, the program reflected rural reformers' views that farming communities, not just academics, could contribute important local

knowledge, and that agricultural modernization depended in part on strengthening local democracy and civic life (Shaffer 2017). Sociologists such as those associated with the Chicago School in the 1920s used ethnographic methods to draw on local knowledge, producing social science that aimed to intervene in, not simply describe, social problems of urbanization and industrialization (Munck 2014). At the same time, the philosopher John Dewey (1916, 1934) provided an influential rationale for efforts to develop community-based learning and research to address practical problems and social issues, by urging schools to model the life of democratic communities, make learning an experiential and collaborative experience among teachers and students, and connect formal education and research with tackling social problems in field settings. Dewey's thinking was deeply influenced by his observations of Jane Addams's Hull House in Chicago and the urban settlement house movement, which integrated civic education, community organizing, and social services for immigrant youth and adults (Saltmarsh 2008).

Institutional efforts to develop CER in the U.S. accelerated in the 1990s. Proponents aimed to reverse the post-World War II specialization of academic knowledge, its retreat into a stance of value neutrality and objectivity, and the reduction of universities' purposes to producing knowledge and employees for the market (Boyer 1996; Post et al. 2016). Interest in CER also emerged to address academia's growing need to demonstrate its extramural contributions in response to cuts in public funding for higher education and state pressure to justify universities' tax-exempt status (Doberneck and Schweitzer 2017). Some universities launched place-based learning initiatives and anchor programs in their communities, which sparked new CER partnerships. These collaborations pursued two main goals: to provide opportunities for civic learning and research across the curriculum; and to strengthen community capacities to improve local education, health, services, and economic development (Hodges and Dubb 2012). Three CER approaches have become especially influential today.

Action Research. Initiated by social and organizational psychologist Kurt Lewin in the 1940s, action research challenged positivist assumptions that researchers could study objective social phenomena that existed separately from meanings created by researchers and participants as they acted in the world, and that theory could be separated from practice and applied universally across social contexts. Instead, Lewin and his followers developed research that aimed to solve social problems through an iterative cycle of planning practical interventions in a particular community, taking action, studying the results, and adjusting interventions accordingly. Thus, the concept of action referred both to the importance of studying social behavior in diverse real-world settings and to the goal of research improving social action (Lewin 1946). Lewin's own action research, focused on reducing racism in public housing projects, inspired other social scientists to apply this approach in fields as diverse as education, rural development, community

studies, public health and social work, and organizational studies, among others (Bradbury 2015; Kindon et al. 2007). Many action researchers aim to engage communities in researching their own problems and potential solutions as a contribution to a more democratic culture, workplace, and community.

Community-Based Participatory Research (CBPR). From the 1990s onward, health science researchers increasingly saw health inequities as rooted less in disparities of healthcare, lifestyles, or genes, and more in differences among the social, economic, and physical conditions in which people live (Corburn 2009). Researchers developed CBPR largely to engage communities most affected by the underlying causes of health inequities in studying and acting to address these disparities, which are rooted in issues of environmental and social justice (Shepard et al. 2013; Wallerstein et al. 2017; Wilson, Kenny, and Dickson-Swift 2018). CBPR has also strengthened translational research to speed the dissemination of applied findings from healthcare trials, campaigns, and therapies into wider practice among underserved communities and constituencies (Cyril et al. 2015; De las Nueces et al. 2012). National health institutes in the U.S. and other countries began to fund CBPR extensively in the early 2000s. By 2013, U.S. Surgeon General Regina Benjamin wrote that CBPR “has become the preferred model for conducting [health] research in communities” (quoted in Blumenthal, Hopkins, and Yancey 2013, xii). CBPR has influenced community-based research in public and environmental health, and many other fields, by developing frameworks for integrating CER into community organizing and policy advocacy to build community capacities for exchanging knowledge, organizational collaboration, and improving care (Cacari-Stone et al. 2014; Drahota et al. 2016; Minkler and Wakimoto 2022; and see chapter 9).

Citizen Science and Community Science. Practiced in the natural and social sciences, citizen science refers to “the scientific activities in which non-professional scientists volunteer to participate in data collection, analysis and dissemination of a scientific project” (Haklay 2013, 106). Community participation varies considerably in these projects (Cooper et al. 2021). In most citizen science, the community’s role is limited to gathering crowdsourced data, while professional scientists exercise control over funding, the research agenda, and data analysis. The primary goals are improving data sensing, democratizing access to scientific resources, and increasing the public’s literacy and interest in science. However, this mainstream version of citizen science has failed to engage many residents of EJ communities, instead attracting participation mostly from white, college-educated adults with above-average incomes (Pandya and Dibner 2018; Pateman, Dyke, and West 2021).

At the same time, mainstream citizen science has been successful at institutionalizing public participation in research. Citizen science is widely used

around the world to study environmental health and quality (Haklay and Francis 2018; Lepczyk, Boyle, and Vargo 2020; Pandya and Dibner 2018; U.S. Environmental Protection Agency 2015). Citizen science can produce data admissible in legal and policy processes (Emmett Environmental Law and Policy Clinic 2017; Mueller and Tippins 2015). In the 2010s, the U.S. Environmental Protection Agency (2016) and European Union launched new funding programs to support citizen science tools and programs, and the United Nations recognized citizen science methods as legitimate for measuring progress toward the UN's global Sustainable Development Goals (De Filippo et al. 2018).

A variant of citizen science, increasingly called *community science*, avoids the language of citizenship, which can be both exclusive (i.e., of immigrants) and coercive (particularly of Indigenous peoples who feel stronger affiliations to tribal governments and natural kin than to the nation-states in which their lands currently reside) (Cooper et al. 2021). Most importantly, community science goes beyond crowdsourcing data gathering to engage community organizations in co-designing research questions, grants and other research resources, and each aspect of conducting and disseminating scientific research.

Community science draws inspiration from action research and CBPR methods (Cooper et al. 2021). This approach also has roots in the radical science movement of the 1960s onward, which sought to democratize scientific research, and from science and technology studies, which revealed how mainstream scientific institutions and constructions of expertise reinforce epistemic, economic, and political domination (Davies and Mah 2020a). In response, community scientists advocate for open data (ensuring that anyone can freely share and use data) and open science (ensuring research is accessible) as important components of power sharing in the research process. EJ groups have employed this grassroots-led science in urban street science (Corburn 2005) and popular epidemiology (Brown and Mikkelsen 1997), which engage residents in research to inform community organizing on issues such as air pollution, toxic contamination, transportation planning, and access to healthy food (Davies and Mah 2020b).

The Global South

In South America, Africa, and Asia, CER arose from the 1960s onward amidst decolonization and other struggles against structural underdevelopment and authoritarian rule. Compared with CER in the North, the Southern tradition showed greater concern for emancipating knowledge and research from control by foreign and local elites, and supporting communities to empower themselves to create broader social transformation (Hall, Tandon, and Tremblay 2015). Two research traditions are especially relevant to EJ.

Participatory Action Research (PAR). The influential work of Brazilian educator Paulo Freire (1970, 1982) and Columbian sociologist Orlando Fals Borda

(1987, 2006) emphasized the role of education and research in liberating oppressed peoples to develop critical understanding of their conditions and develop their own transformative solutions. Freire advocated collaborative research as part of popular education that helped people living in poverty and oppression to develop a critical consciousness of the structural causes of their conditions of poverty, and transform them. For Freire, learning began with reflection on participants' own knowledge and experiences, helped them develop broader explanations and critiques of their conditions, and fostered their strategies and plans for social action. Fals Borda developed a parallel set of guidelines for PAR researchers, including respect for community knowledge and cultures, skepticism about elitist visions of history and science, and commitment to demystifying the research process for nonspecialists. PAR emphasized marginalized peoples' agency, liberation as the goal of research, and local and experiential knowledge as a source of resistance and change (Chevalier and Buckles 2019). PAR has informed CER for EJ on issues such as urban air pollution (González et al. 2007), climate justice activism (Reitan and Gibson 2012), and recycling co-ops (Gutberlet 2008).

Participatory Development and Conservation Research. From the 1960s onward, a host of CER approaches arose from demands to shift from top-down to bottom-up economic development and resource conservation planning (Cerneja 1985; Chambers 1997; Hirschman 1984). Participatory approaches offered grassroots communities one way to resist extractive and exploitive economic and agricultural plans, and "fortress conservation" schemes that banished local residents from protected lands to preserve biodiversity, imposed by national governments, multinational agencies such as the World Bank, and global NGOs. For example, participatory appraisal and planning (Chambers 1997) promoted collective and grassroots identification and framing of problems, participatory research and education, and experimentation with community-generated solutions based on local experience and knowledge. Other researchers inspired by similar aims employed action research and PAR to work directly with rural land reform movements and urban neighborhood organizations, eliciting Indigenous and local knowledge and experience to address issues of environmental and economic justice (Keahey 2021).

By the late 1990s, participatory strategies became co-opted and depoliticized by some governments and multinational NGOs, which failed to share substantive control over development and conservation policies and projects (Cooke and Kothari 2001). Nonetheless, researchers continue to find ways to integrate CER into authentic participation and to inform organizing to transfer power and resources to community-led conservation and development plans (Hickey and Mohan 2005, and see chapters 8 and 12).

Indigenous Decolonial Research

Across the Global North and South, Indigenous peoples' struggles for self-determination and the preservation of their ancestral lands, languages, and cultures after centuries of colonization have exerted growing influence on CER. Indigenous peoples' distinct worldviews and experiences of environmental injustice highlight the importance of incorporating respect for cultural and epistemological differences into research. CER can contribute to decolonization by elevating recognition of Indigenous knowledge, and by adopting research agendas and processes that restore Indigenous peoples' access to land and power over managing it (Neale et al. 2019).

Research by and with Indigenous peoples often adopts different conceptions of community, measures of environmental injustice, and definitions of health than are used in other EJ research (Gilio-Whitaker 2019; Vickery and Hunter 2016). For example, Native Americans may be defined by blood quantum levels, citizenship in a federally recognized tribe, residency on a reservation, or self-identification on census forms, and the method chosen can dramatically affect health statistics and policy responses. In addition, traditional EJ indicators, such as proximity of homes to industrial facilities, do not reflect Indigenous communities' broader connections to the land, which include needs for access to sacred sites, ceremonial plants, subsistence hunting and fishing, and sovereignty over their traditional lands. These criteria, which are part of the definition of public health and well-being for many Native communities, are not captured in typical health risk assessments (Arquette et al. 2002). CER has helped to integrate these culturally specific elements into research, including on EJ issues, although not without tensions with mainstream health science methodologies (see chapter 9).

Much Indigenous-led research and CER applies traditional ecological knowledge (TEK) to improve health, planning, natural resource management, climate mitigation, and biodiversity conservation. *TEK* is an umbrella term for the diverse and expansive knowledges that Indigenous peoples have accumulated over millennia and continue to develop about their homelands around the world. TEK encompasses "adaptations for the generation, accumulation, and transmission of knowledge; the use of local institutions to provide leaders/stewards and rules for social regulation; mechanisms for cultural internalization of traditional practices; and the development of appropriate world views and cultural values" (Berkes, Colding, and Folke 2000, 1251). This knowledge is recovered and passed down to new generations through ceremony, storytelling and oral history, music, arts and crafts, gathering of plants to make medicines, preparation of traditional foods, and increasingly through mapping, digital media, and formal CER and Indigenous-led research.

While some researchers use both Western scientific and TEK concepts and methods, TEK is not simply an input into mainstream science. Instead, TEK

presents alternative conceptual frameworks and ways of knowing that can ground environmental, biomedical, and social research in a more holistic understanding of just and sustainable relationships among humans and other nature (Finn, Herne, and Castille 2017; Smith 2021). Some aspects of these epistemologies are not easily translated from Indigenous languages or assimilated into Western conceptions of space, time, subjectivity, and gender relations (Smith 2021; Whyte 2018b). CER need not exoticize Indigenous peoples or romanticize their relationship to nature to recognize and respect these differences. For example, in contrast to dominant notions of scholarly independence, objectivity, or devotion to discovering abstract truth, in many Indigenous research methodologies what is most “important and meaningful is fulfilling a role and obligations in the research relationship—that is, being accountable to your relations,” which include nature (Wilson 2008, 77). Indigenous researchers also stress TEK’s importance for self-determination of Indigenous nations, including economic independence and spiritual renewal, regardless of TEK’s value to mainstream science and to other peoples (Whyte 2018b).

CER in Indigenous communities has also focused new attention on research ethics. As respect for Indigenous knowledge has grown among non-Indigenous researchers, so has the importance of exchanging it in more ethical and respectful ways than researchers have approached communities in the past, which typically involved a one-way extraction and archiving of Indigenous knowledge and artifacts. Changes to tribal laws and the development of tribal institutional review boards to vet research proposals on Indigenous lands have required outsiders to conduct research more collaboratively with Native communities, protected TEK from commercial exploitation and appropriation as intellectual property, and shielded knowledge of sacred sites and natural resources from those who would abuse them (Finn et al. 2017; Whyte 2018b). Principles of data sovereignty such as those of the Global Indigenous Data Alliance—collective benefit, *authority to control*, *responsibility*, and *ethics* (CARE) principles—provide guidance to CER researchers on how to comply with expectations for Indigenous data governance (see chapters 5 and 12).

Reciprocal Learning and Practice

Indigenous, Southern, and Northern traditions of CER increasingly engage with and learn from one another. Starting in the mid-1970s, Southern and Northern researchers began to interact as academic and community-based researchers forged institutional ties to strengthen CER. The Highlander Research and Education Center in Tennessee, which had trained organizers in the labor and African American civil rights movements, joined with counterparts in the Global South in emancipatory participatory research, adult education, and community organizing (Horton and Freire 1990). Additional ties were forged by networks such as the International Participatory Research Network (with centers in Canada,

India, Tanzania, the Netherlands, and Venezuela), Australia's Collaborative Action Research Group, the Action Research Network of the Americas, and the United Nations Educational, Scientific and Cultural Organization's Knowledge for Change Consortium. Contemporary volumes on CER reflect the mutual influence of Northern and Southern theories and practices (Bradbury 2015; Davies and Mah 2020b; Munck et al. 2014; Wallerstein et al. 2017), and of Indigenous methodologies and CER (Atalay 2012; Denzin, Lincoln, and Smith 2008; McGregor, Restoule, and Johnston 2018; Smith 2021; Wilson 2008; Windchief and San Pedro 2019).

WHY CER FOR EJ? WHY NOW?

A core argument of this book is that CER is necessary for research to advance and achieve EJ. In what follows, we present two kinds of supporting arguments. One is that CER can make unique contributions to the *quality* of EJ research, which we illustrate with a brief case study. A second argument is that CER employs research practices that align especially well with principles of EJ. We illustrate this argument by presenting a framework that summarizes how CER fulfills the four dimensions of EJ that were introduced in chapter 1. Taken together, the two arguments point to the importance of community knowledge, and reciprocal and mutually beneficial research, for contributing to EJ. We conclude with some thoughts about why a CER approach to EJ research is especially urgent in the current political context.

CER and Quality

Researchers have turned to community-engaged approaches because they make unique contributions to the quality of EJ research by strengthening its relevance, rigor, and reach (Morello-Frosch et al. 2011), as well as its reflexivity (Lockie 2018; Raphael 2019a; Hale 2008).

Relevance is about whether researchers are asking questions that matter to others. In response to professional reward structures and disciplinary demands, many academic researchers are “talking to ever smaller and narrower academic audiences, using a language that educated readers do not understand, publishing in journals they don't read, and asking questions they don't care about” (Hoffman 2015, A48). When research agendas respond to external cues, they mostly come from major funding institutions and government agencies, which rarely include representatives of EJ communities and often demand an expert-centered research approach. CER can ground the selection of research topics in community concerns and maintain this relevance throughout the research process as community organizations participate in all phases of the work.

CER can also strengthen the *rigor* of research by improving study design, data collection, and data analysis. Many EJ communities' mistrust of research institutions presents a major barrier to research that depends on community participation of any kind. Enlisting community organizations as co-researchers can help

to identify appropriate research sites and populations, and build the trust necessary to earn access to them by promoting deeper community understanding of the research process and confidence in its goals (Minkler, Salvatore, and Chang 2018). CER can therefore increase sample sizes, survey and interview response rates, and participation in interventions and treatments. Community members correct and enrich data analysis by providing contextual explanatory knowledge. Engaged partnerships can also unlock new sources of funding needed to conduct complex EJ studies.

Engaged research can also *reach* new audiences in ways that inform practice. Community partners bring valuable capacities to disseminate knowledge to diverse audiences and translate it into useful tools for practice, policy, and organizing (Cacari-Stone et al. 2014; Minkler et al. 2018). Researchers and partners express their research in many forms, from journal articles to policy briefings, white papers, fact sheets, opinion articles, testimony in regulatory forums, community activities and meetings, and so on. Community partners play a crucial role in building an active audience for this work, translating it into local languages and lay terms, promoting and applying its findings, and implementing or demanding responses from decision makers. Rather than publishing studies and hoping they have some effect, researchers build relationships and dialogue with their audiences throughout the course of their studies, increasing their reach and influence (Chen et al. 2010).

Participating in engaged research is also uniquely effective for teaching students about EJ. Environmental educators have long recognized the value of place-based learning and community-based learning for deepening students' understanding of abstract concepts and how global problems affect the local level (D'Amore et al. 2016). These active and collaborative pedagogies can also spark the personal commitments to places and communities that inspire students to study and act on environmental problems (Haywood, Parrish, and Dolliver 2016). Research collaborations with EJ communities align well with these ways of learning, and can enrich students' understanding of how social and economic inequities shape environmental conditions (Dittmer et al. 2018). CER projects can help environmental education to expand its scope beyond "pristine nature" to the places where people in EJ communities live, work, play, pray, and learn (Cachelin, Rose, and Rumore 2016).

CER also helps researchers to practice greater *reflexivity* about the nature and purposes of research, power relations within research teams, and whose interests the research serves. Reflexivity emerges from common CER practices of organizing community review boards to craft research agendas and vet project proposals, drafting detailed memoranda of understanding among partners that define their goals and roles throughout projects, holding co-learning workshops to explore the meaning of rigor and validity from researcher and community points of view, and ongoing dialogue and conflict resolution at each stage of the work (Minkler,

Salvatore, and Chang 2018; Wallerstein et al. 2019). These collaborative processes require in-depth consideration of research agendas and methodologies from multiple perspectives. While much academic research begins by asking what scholars in a discipline need to do to improve the field's understanding and influence, CER proceeds from the question of what the world needs from all professional researchers. This reflexivity pushes researchers to worry less about whether they are distinguishing themselves from other fields and more about whether they are collaborating well across disciplines and with community partners to address the most important concerns of EJ communities. While non-CER studies conducted by government agencies and independent institutes may have practical purposes and intended benefits, they still tend to be defined by the interests of officials, professional staff members, and donors, few of whom live in EJ communities.

Subsequent phases of CER projects also demand greater reflexivity. Co-designing research manifests the positional and situated character of all research (Muhammad et al. 2015). Researchers and community partners cannot avoid addressing their differences of power and privilege (Muhammad et al. 2017). When collaborators bridge their diverse perspectives, assumptions, and experiences, they can generate richer and less distorted knowledge about EJ communities than expert-driven studies do (Lockie 2018). This depends on continuous interaction at each stage of the research, not simply sensitizing researchers to different points of view at the start. It involves instructive conflict. Tensions between maximizing the rigor of research instruments and including community-driven research questions (by changing validated scales, for example) require all participants to clarify trade-offs between the internal and external validity of research (Minkler, Salvatore, and Chang 2018). CER draws overdue attention to research ethics controversies over collective consent to research and ownership of data (described above), and individualized reporting of data to participants in health studies (see box 2.1). Conflicts over disseminating research raise important questions about

BOX 2.1. THE NORTHERN CALIFORNIA HOUSEHOLD EXPOSURE STUDY

The Northern California Household Exposure Study (HES) of indoor air pollution around the Chevron oil refinery in the city of Richmond, CA, exemplifies CER's ability to increase the relevance, rigor, reach, and reflexivity of EJ research. The study was co-designed by academics at two institutions (Brown University and the University of California, Berkeley), an independent research institute (Silent Spring Institute), and a statewide EJ organizing and advocacy group (Communities for a Better Environment) (Balazs and Morello-Frosch 2013; Morello-Frosch et al. 2011). Communities for a Better Environment (CBE) offered invaluable local

(Continued)

BOX 2.1. (CONTINUED)

knowledge about methods of recruiting participants and choosing sampling sites, suggesting a control site that did not have significant air emissions from transportation or industry. The Silent Spring Institute contributed specialized knowledge of chemicals associated with oil combustion to analyze in the study, and supplemented the academic partners' capacity to teach CBE organizers how to conduct air monitoring, dust sampling, and interviewing. The partners' combined efforts helped the HES to document disproportionate exposure to indoor air pollution in Richmond compared with a control community without a refinery, and, more surprisingly, higher levels of multiple pollutants inside homes than outdoors.

CBE and Silent Spring then asked the academic researchers to communicate individual exposure results to all study participants who wanted to know this information, using a protocol that the research institute had used in a prior study. Given the lack of conclusive research on the health impacts of many chemicals, academic health researchers typically have not reported back to participants their personal exposure levels or tried to communicate the risks associated with them. The HES team collaborated to navigate the scientific and ethical challenges associated with this innovative kind of reporting. The research team co-designed materials in Spanish and English, including visual displays of collective and individual results, scientific uncertainties, and strategies for reducing exposure. CBE organizers met individually with households in the study to explain their exposures and the implications. Follow-up research found this strategy increased participants' knowledge of risks, provoked changes in behavior, and supported an organizing campaign to reduce emissions from the refinery (Adams et al. 2011).

In this example, the nonacademic partners boosted the study's *relevance* by involving fenceline residents in the study and inspiring a shift in research practice to include personal exposure reporting. Residents were highly motivated to act on this information, individually and collectively, because they had invested their time in the study and learned about potential risks. Personalized reporting demanded greater *reflexivity* from researchers about the purposes and impacts of their study as they grappled with how to report individual-level risks ethically and accurately to participants. The collaboration among academics, CBE, and Silent Spring strengthened the *rigor* of the study design by pooling different kinds of expertise, adding a control community, and prompting development of a new protocol for communicating findings responsibly. By presenting the findings in community organizing meetings and regulatory testimony, the partners also increased the study's *reach* beyond the academic literature, drawing on their experience and authority as researchers and policy advocates. The HES approach helped inspire other biomonitoring studies to report personal exposures, including a major study in 17 European countries (Exley et al. 2015). Silent Spring, a leading source of research on environmental contributors to breast cancer, used the study to draw cancer researchers' attention to the need to study the EJ dimensions of breast cancer. The study's findings also bolstered the credibility of CBE's local organizing campaign to persuade regulators to crack down on emissions from the Chevron refinery.

TABLE 2.2. Framework for CER for EJ

In EJ	Dimension of Justice	In CER
Reducing environmental burdens, and increasing environmental benefits and capabilities, for EJ communities and the earth	Distribution <i>Who ought to get what?</i>	Sharing of resources and work among researchers and communities Development of community capacities to conduct their own research and researchers' capacities to collaborate Co-ownership or community ownership of data
Participation and influence in environmental decision making by historically excluded groups, particularly in frontline communities Protection of individual and group rights through law, regulation, enforcement, and informed consent	Procedure <i>Who ought to decide?</i>	Community participation and influence in the design and conduct of research, including free and prior informed consent, and rights to control data
Respect for EJ communities' diverse environmental cultures and knowledges, and for the interests of future generations and non-human nature	Recognition <i>Who ought to be respected and valued?</i>	Decolonizing knowledge by recognizing the validity of and differences among local, experiential, and Indigenous knowledges
Restoration of nature and reparation of damages to EJ communities from colonialism, racism, economic exploitation, and other systems of oppression Systemic and structural transitions to create just power relations, regenerative economies, and reciprocal relations with nature	Transformation <i>What ought to change, and how?</i>	Transformation of academic and government institutions and research to repair their harms to and create just relations with EJ communities and nature

who contributes, who deserves credit, and how partners can speak to lay audiences accessibly without distorting research findings. In sum, CER requires extended social reflection on the most important questions that can be asked about research: why do it, for whom, and how?

CER and Justice

Prioritizing a CER approach to EJ research does not simply improve research outcomes, but advances justice in the research process. Table 2.2 draws on the dimensions of EJ (introduced in chapter 1) to illustrate how CER contributes to justice in the research process. The framework presents descriptors of CER and EJ as a whole, rather than an exhaustive or specific list of criteria for evaluating individual

research projects. As in chapter 1, the four principles of justice are presented as distinct dimensions, rather than a linear path that must be followed from one type of justice to another.

CER contributes to *distributive* research justice by encouraging researchers and communities to share tangible resources (such as grant money and labor) and intangible resources (such as authority and credibility with different constituencies), as well as the workload involved in research, on terms that all participants consider fair. Distributive justice can also involve training that builds community organizations' capacities to conduct research in the future, either with new research partners or on their own, which enhances their self-determination. This kind of justice also involves community partners' co-ownership or ownership of data generated by research, which can be a potentially valuable resource that is vulnerable to exploitation by others.

CER advances *procedural* research justice when community partners have both voice and power over each phase of the work, even if they freely choose to participate more fully in some stages than others. This also involves free, prior, and informed consent (FPIC), an international human rights principle that reflects Indigenous demands for self-determination. The principle extends beyond traditional research ethics requirements to encompass community-level consent to the research, with the community uncoerced and fully informed about potential consequences (as discussed in chapter 5). Procedural justice also entails the community's power to control the use of data generated by the study, as required in many Indigenous data sovereignty protocols to protect their sacred sites from vandalism or looting, and to block exploitive or unauthorized uses of biological or ecological specimens.

Recognition in research justice reflects calls to treat community-based sources of knowledge as valid, while respecting their differences from dominant knowledge systems (such as Western science), and striving to represent these knowledges fairly and accurately on their own terms. This may be referred to as epistemic or cognitive justice, or as decolonizing knowledge in contexts involving Indigenous and other formerly colonized peoples.

CER contributes to *transformational* research justice when its collaborative process or the goals of the research help to repair historic harms of omission and commission by research institutions against EJ communities. CER can build trust and address previously neglected needs for research on the most pressing issues confronting frontline and fenceline communities—what some call “undone science,” which is undone because it poses a threat to dominant interests (Frickel et al. 2010). CER can also begin to reverse a long history of extractive research practices and conclusions that have justified environmental destruction and other forms of oppression of EJ communities. As chapter 5 discusses in more depth, CER may also aid in larger efforts to enact restorative or corrective justice for the institutional impacts of academic and other research institutions, many of which were built on lands taken from Indigenous peoples, some of them built by conscripted

and slave labor, almost all of them funded and run by economic and political elites and, increasingly, run like for-profit corporations. By striving to practice more just relations with EJ communities and with nature, CER can help to prefigure much-needed changes in research and research institutions.

Why Now?

A hard turn toward CER is especially necessary in the current moment. Authoritarian political attacks, many of them made on behalf of extractive industries, increasingly aim to discredit researchers and research institutions because of the inconvenient news they can deliver—about the destruction and injustices caused by fossil-fuel-driven climate change, the industrial food system, racist policing of communities of color, the COVID-19 pandemic, and much more (McCarthy 2019).

We doubt that the authority of research will be enhanced, or that justice will be done, by defending the citadel of traditional science and research without transforming whose science it is and how research is conducted, and how and for what research is utilized. Years of experience have taught many in EJ communities that outside researchers take interviews and specimens but rarely share their findings, that regulatory science ignores evidence of harms by powerful polluters or demands impossibly high levels of certainty, and that when officials or researchers confirm that harm is real, they rarely help to stop it (Cable, Mix, and Hastings 2005; Cole and Foster 2001). In response to many external researchers' historic disrespect for the rights and knowledge of Indigenous communities, research became "one of the dirtiest words" in their vocabularies (Smith 2021, 1).

What would it mean for researchers and research institutions to embrace a research paradigm worthy of EJ communities' trust? We think it would include researchers and their institutions sharing their considerable resources with local partners, collaborating to shape the research agenda, respecting the knowledges that reside in EJ communities as additional sources of expertise, and building relationships aimed at regeneration rather than extraction. Partnerships grounded in reciprocal relationships can bridge gaps of knowledge and trust between community members and researchers who are genuinely committed to EJ, as they work alongside one another to establish common understandings of environmental threats and their causes, and devise just responses. In a research context defined by power, politics, and competing values, strengthening CER partnerships and practices to produce rigorous research is more important than ever. Developing just and effective remedies based on sound research depends on elevating attention to details of systematic data gathering and analysis, while understanding how power is structured and exercised. Community members who have invested themselves in conducting this kind of research and discovering the results for themselves are more likely to believe and act on the findings than if they are asked to passively accept outsiders' findings and recommendations (Balazs and Morello-Frosch 2013; Lewin 1948). Politicians and polluters are less likely to be able to persuade the public to dismiss the evidence and policy prescriptions that result

from community-generated studies than from research conducted by experts or advocates alone. In addition, CER that is directly disseminated to the public and policy makers can be harder for centralized authorities to censor, massage, or bury than reports by federal or state government agencies, in which political appointees can interfere in the work of researchers.

CONCLUSION

While we have argued that a CER approach should be at the forefront of EJ research today, this is not to suggest that CER is the *only* legitimate approach to doing EJ research. Some literature reviews, legal analyses, and documentations of environmental injustices that do not involve community partners can make important contributions to advancing EJ. Such studies may be necessary preparatory work to understand issues and evidence, and build credibility with future community partners. In addition, not every situation is ripe for CER. Researchers or their partners may lack full awareness of and commitment to the principles of collaboration. In some cases, involvement in research may pose a risk to the health and safety of community partners. Some communities may be so tired of taking part in studies, or so disappointed by the lack of tangible benefits from past research, that they refuse to participate. Some communities may lack organizations that could legitimately represent their interests, or that care enough about EJ, at the time of the study. In other instances, community organizations may prefer to devote their resources to organizing and to delegate a study to trusted researchers, as long as they remain accountable to serving the community's needs and do no harm. Some community and advocacy groups are quite capable of carrying out sophisticated research without the aid of outside researchers (Pastor, Benner, and Matsuoka 2009).

However, given the value of CER for EJ research, we think that the burden is on researchers to explain why they should *not* collaborate with the community that is the focus of a study, not why they should. The best tests of whether researchers have just reasons for not employing CER may be whether potential community partners can accept these reasons as legitimate or whether EJ is better served by researchers *not* partnering with community collaborators because it would make them more vulnerable to reprisals, or because no local organizations are interested in or supportive of EJ. Even when researchers do not enter into a formal collaboration, making good faith efforts to align a project with community organizations' goals ensures that the research maintains relevance and delivers local benefits, rather than working against community interests and purposes.

We also do not want to suggest that CER is easy. Even researchers and partners who have committed to a full collaboration must wrestle with fulfilling the promise of CER amidst imbalances of resources, expertise, and power. As discussed in chapters 4 and 5, it is challenging to produce research that is simultaneously useful

to community partners, recognized as a legitimate contribution to academic scholarship or the professional literature, and in compliance with foundation or government agencies' requirements and priorities. Additionally, many academic and government research institutions continue to raise impediments to CER. Nonetheless, those who conduct CER for EJ embrace these challenges as integral to their missions as engaged researchers and recognize that collaborating with community partners is a uniquely powerful way to integrate the theory and practice of EJ into research. The next chapter describes how researchers can prepare themselves to do that work.