BOTTOMS-UP: CAPABILITIES, COOPERATION, AND CLIMATE CHANGE ADAPTATION

GREGORY S. ALEXANDER

ABSTRACT

This paper discusses climate change and climate change adaptation from the perspectives of human flourishing and capabilities theory. It discusses how the human capacity to cooperate enables successful, albeit small-scale, neighborhood, or bottoms-up, initiatives at climate change adaptation. The paper uses three examples of neighborhood groups that worked together to develop different strategies for responding to the impacts of climate change in their areas. Finally, the paper offers a brief reflection on the basis of human cooperation.

This brief paper attempts to make three points about climate change adaptation. First, it connects the topic of climate change with human flourishing theory and particularly the human flourishing theory of property. Second, drawing on the capabilities theory developed by Amartya Sen and Martha Nussbaum, it discusses how certain human capabilities, notably cooperation, enable a private, or bottoms-up, approach to climate change adaptation that augments public or regulatory efforts to adjust to the effects of climate change. The paper uses three examples of neighborhood groups that worked together to develop different strategies for responding to the impacts of climate change in their areas. Third, and more broadly, the paper argues that humans are social beings who cooperate with each other not simply as a matter or reciprocity but also as a matter of mutual concern, and that this cooperative characteristic of humans is the basis of a bottoms-up approach to climate change adaptation.

By way of background, the paper begins with a brief account of the devastating wildfires that have swept through parts of Northern

California in recent years. It describes how citizen groups in response to these have organized themselves to adjust to these changed conditions that not only threaten their property but potentially their lives as well. In Part II, the paper then moves from description to theory. It provides a short summary of the human flourishing theory of property. Part III then shows how human flourishing depends on capabilities. It further discusses how at least in some circumstances resulting from climate change, capabilities may be the means, rather than the ends, as the capabilities theory usually posits. Part IV provides three examples of neighborhood groups that have developed various strategies aimed at adapting to climate change. These examples illustrate the ability of individuals to cooperate with each other in small-scale efforts, leading to the success of a bottoms-up strategy in climate change adaptation. Part V builds upon Part IV with a brief discussion of the nature of cooperation generally, its foundation, and its limits. Finally, Part VI comes full circle and briefly discusses how human flourishing is possible in a world of climate change.

I. WILDFIRES IN SONOMA COUNTY, CALIFORNIA

I live in the Wine Country of Northern California, Sonoma County. I live in the fire country of Northern California. Since 2017, my wife and I have been evacuated from our home outside of Healdsburg three times because of massive wildfires nearby. Fortunately, on all three occasions our house escaped the fire, but unfortunately, several of our neighbors' homes did not.

Wildfires are a too-familiar part of life in Sonoma County. Just since 2015, Sonoma County has experienced five major fires that have destroyed thousands of acres, taken homes and other structures, and in some cases taken lives. The 2017 Kincade Fire, which torched 77,758 acres and leveled 5,643 structures, is the largest fire in Sonoma County history.[1] Combined with the Tubbs Fire, the Nuns, Atlas, Redwood Valley, Pocket and Sulphur fires destroyed over 195,000 acres.[2] The 2017 Tubbs Fire was at the time the most destructive wildfire in California history.[3] It burned parts of Napa, Sonoma, and Lake counties, inflicting its greatest losses in the city of Santa Rosa.[4] The Tubbs Fire was one of more than a dozen large fires that erupted

1. Janet B. Weber, *A Look Back at Wildfires in Sonoma County and on the North Coast*, THE PRESS DEMOCRAT (Nov. 14, 2019), https://www.pressdemocrat.com/article/news/a-look-back-at-wildfires-in-sonoma-county-and-on-the-north-coast/.

2. *Id.*

3. *See* CAL. DEP'T OF FORESTRY & FIRE PROT., TOP 20 MOST DESTRUCTIVE CALIFORNIA WILDFIRES (2024), https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/calfire-website/our-impact/fire-statistics/ top-20-destructive-ca-wildfires.pdf?rev=9e4974c273274858880c2dd28292a96f&hash=29E21CBFCE8D9885F606246607D21CEB (last visited Nov. 8, 2024).

4. *Tubbs Fire*, WIKIPEDIA, https://en.wikipedia.org/wiki/Tubbs_Fire (last visited Mar. 7, 2024).

in October of that year. These fires burned simultaneously in eight counties in what was called the "Northern California firestorm."[5]

It is hard to describe the devastating effects of these fires on people's lives. The Tubbs Fire provides a particularly powerful example. "It destroyed more than 5,643 structures, half of which were homes in Santa Rosa," and killed twenty-two people.[6] In the city of Santa Rosa, the fire destroyed much of the Coffey Park neighborhood, including about 1,300 structures, mostly detached homes.[7] Five percent of the city's housing stock was destroyed.[8] Of the 2,900 homes destroyed in Santa Rosa, over 200 of them belonged to doctors associated with the area's hospitals.[9] Among the losses was the destruction of the Santa Rosa hillside home of late *Peanuts* creator Charles Schulz.[10] Large sections of the city were evacuated.[11]

Just two years later and only a few miles away, the Kincade Fire struck the communities of Healdsburg, Windsor, and Santa Rosa.[12] The fire destroyed 77,758 acres,[13] damaging or destroying over 120 buildings, including wineries.[14] Virtually all of Sonoma County was under an evacuation order, the largest such evacuation in Sonoma County history.[15]

The Kincade Fire was just the largest one in what was a bad fire season in California. By the end of the year, 7,860 fires were recorded, totaling an estimated 259,823 acres of burned land.[16] Three deaths

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5. *One Death and 1,500 Structures Lost in Northern California Firestorm, Among Worst in State's History*, L.A. TIMES, (Oct. 9, 2017), https://www.latimes.com/local/lanow/la-me-ln-napa-fires-20171009-story.html.

6. *Tubbs Fire*, *supra* note 4.

7. Anjali Singhvi & Derek Watkins, *Satellite Images Show 1,800 Buildings Destroyed by Fire in Santa Rosa*, N.Y. TIMES (Oct. 1, 2017), https://www.nytimes.com/interactive/2017/10/12/us/santa-rosa-california-fires-damage.html.

8. Laura Nelson, *Death Toll from Northern California Fires Jumps to at Least 34; 5,700 Structures Destroyed*, L.A. TIMES (Oct. 1, 2017), https://www.latimes.com/local/lanow/la-me-ln-fires-20171013-story.html.

9. Martin Espinoza, *1 Out of Every 6 Doctors in Santa Rosa Lost Their Home in Fires*, THE PRESS DEMOCRAT (Oct. 2, 2017), http://www.pressdemocrat.com/news/7546178-181/hundreds-of-sonoma-county-doctors.

10. Paul Payne & Randi Rossman, *Fires Grow in Sonoma, Napa and Mendocino Counties as Death Toll Rises*, THE PRESS DEMOCRAT (Oct. 1, 2017), https://www.pressdemocrat.com/article/news/fires-grow-in-sonoma-napa-and-mendocino-counties-as-death-toll-rises/.

11. *Tubbs Fire*, *supra* note 4.

12. *Kincade Fire*, WIKIPEDIA, https://en.wikipedia.org/wiki/Kincade_Fire (last visited Mar. 11, 2024).

13. *Id.*

14. *See* Amy Larson & Erica Pieschke, *Kincade Fire Destroys Wineries in Alexander Valley*, KRON4 (Oct. 29, 2019, 2:42 PM), https://www.kron4.com/news/bay-area/kincade-fire-destroys-wineries-in-alexander-valley/.

15. *Kincade Fire, supra* note 12.

16. *2019 Incident Archive*, CAL. DEP'T OF FORESTRY & FIRE PROT., https://www.fire.ca.gov/incidents/2019/ (last visited Mar. 11, 2024).

resulted from these fires, which also destroyed twenty-two structures.[17]

Powerful, huge wildfires have become part of life in California. Over the past fifty years the total area burned by seasonal wildfires has been increasing.[18] The ten largest California wildfires all happened just in the last twenty years. Of these, five occurred in 2020 and eight after 2017.[19]

Multiple factors have contributed to these fires, but clearly one major factor is climate change. Of the twenty largest fires in California's history, eight have occurred since 2017.[20] There has been a fivefold increase in summer burned area in forests in northern and central California between 1996 and 2021 compared with the period between 1971 and 1995.[21] The results of a recent study published in the journal *Proceedings of the National Academy of Sciences (PNAS)* found that nearly all of the observed increase in burned areas in California over the past half-century is due to human-caused climate change.[22] In fact, taking the West as a whole, anthropogenic climate change accounts for 45% of total forest burned area from 1984 to 2015.[23]

California's wildfires are only one example of how climate change is destroying property, both natural and human-made. Consider hurricanes. Evidence suggests that human-caused pollution has played a substantial role in some of the recent marked increases in hurricane activity in the tropical North Atlantic.[24] Drought is another example. According to the U.S. Drought Monitor, as of February 2024, 21.59% of the contiguous U.S. was classified as experiencing moderate to exceptional drought.[25] Droughts have always occurred, of course, but climate change has altered their pattern, making them more frequent,

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17. *Id.*

18. A.P. Williams et al., *Observed Impacts of Anthropogenic Climate Change on Wildfire in California*, 7 EARTH'S FUTURE 892 (2019).

19. *See* CAL. DEP'T OF FORESTRY & FIRE PROT., *supra* note 3.

20. *Wildfires & Climate Change*, CAL. AIR RES. BD., https://ww2.arb.ca.gov/wildfires-climate-change (last visited Nov. 8, 2024).

21. Marco Turco et al., *Anthropogenic Climate Change Impacts Exacerbate Summer Forest Fires in California*, 120 PROC. NAT'L ACAD. SCIS. no. 25 (2023).

22. *Id.*

23. Philip E. Higuera & John T. Abatzoglou, *Record-Setting Climate Enabled the Extraordinary 2020 Fire Season in the Western United States*, 27 GLOB. CHANGE BIOLOGY 1 (2024).

24. Sandra Banholzer et al., *The Impact of Climate Change on Natural Disasters*, *in* REDUCING DISASTER: EARLY WARNING SYSTEMS FOR CLIMATE CHANGE 21, 34 (A. Singh & Z. Zommers eds. 2014).

25. NAT'L CTRS. FOR ENV'T INFO., NAT'L OCEANIC & ATMOSPHERIC ADMIN., FEBRUARY 2024 DROUGHT REPORT (2024), https://www.ncei.noaa.gov/access/monitoring/monthly-report/drought/202402.

longer, and more severe.[26] According to the United States Geologic Survey, since 2000, the western United States has experienced some of the driest conditions on record.[27]

The financial impact of these disasters is massive. As of early 2025, the U.S. has sustained 403 weather and climate disasters since 1980 where overall damages reached or exceeded $1 billion, including Consumer Price Index adjustment to 2024.[28] The total cost of these events is nearly $3 trillion.[29] In 2022 alone, the cost of climate-related disasters in the United States totaled more than $176 billion—the third costliest year on record.[30] In 2023, there were twenty-eight weather and climate disasters, surpassing the previous record of twenty-two in 2020.[31] The total cost of these was at least $92.9 billion. In California, over the 2017-2021 period, by one estimate average annual losses totaled over $117.4 billion.[32] The rate of these billion-dollar events is accelerating. The 1980-2023 annual average of billion-dollar weather/climate disasters is 8.5 events (CPI-adjusted), compared with the annual average for the most recent five years (2019–2023) of 20.4 events (CPI-adjusted).[33] Between the years of 2017 and 2023, 137 separate billion-dollar disasters have killed at least 5,500 people and cost more than $1 trillion in damage.[34]

We tend to assume that the only effective responses to such disasters are governmental actions by federal, state, and/or local agencies. In this paper, I want to suggest why this assumption is misguided. In addition to public action, private actors can and in some cases have taken the initiative of organizing themselves into neighborhood groups that prepare for the possibility of future climate-change events that would destroy or cause serious damage to their properties. The aim of these groups is to mitigate the likelihood of disaster and, should disasters occur, to protect themselves and their property. My point in discussing these organizations is not to suggest

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26. *Droughts and Climate Change*, U.S. GEOLOGIC SURV., https://www.usgs.gov/science/science-explorer/climate/droughts-and-climate-change (last visited Mar. 17, 2024).

27. *Id.*

28. NAT'L CTRS. FOR ENV'T INFO., NAT'L OCEANIC & ATMOSPHERIC ADMIN., *supra* note 25.

29. *Id.*

30. U.S. DEP'T OF THE TREASURY, THE IMPACT OF CLIMATE CHANGE ON AMERICAN HOUSEHOLD FINANCES 1 (2023), https://home.treasury.gov/system/files/136/Climate_Change_Household_Finances.pdf.

31. *See* Adam B. Smith, *2023: A historic year of U.S. billion-dollar weather and climate disasters*, CLIMATE.GOV (Jan. 8, 2024), available at https://www.climate.gov/news-features/blogs/beyond-data/2023-historic-year-us-billion-dollar-weather-and-climate-disasters(last visited Ma. 17, 2024).

32. *See The economic, fiscal, and environmental costs of wildfires in California*, GORDON AND BETTY MOORE FOUNDATION, available at https://www.moore.org/article-detail?newsUrlName=the-economic-fiscal-and-environmental-costs-of-wildfires-in-california

33. See Smith, *supra* note 31.

34. *See id.*

that private responses to climate change-induced disaster are more efficient or otherwise superior to public responses, but that bottom-up efforts can be an effective approach that complements top-down regulatory actions aimed at moderating the harmful effects of climate change.

This practical point leads to a deeper theoretical point. For bottom-up approaches to succeed, the agents involved must cooperate with each other. Sustaining cooperation in any setting that involves management of common-pool resources represents a challenge because it requires overcoming the temptation to free-ride.[35] Conventional economic theory predicts resistance to cooperation for reasons of rational self-interest. Nevertheless, cooperation does occur, suggesting that actors often calculate what is in their rational self-interest in more sophisticated ways than is often believed.

This paper will use the examples of neighborhood groups in Northern California and elsewhere to discuss a bottom-up approach to climate-change adaptation. These groups illustrate how in some cases, the human capacity of cooperativeness may be a means to the desired end of protecting property, which is necessary for humans to enjoy flourishing lives. This point reverses the means-end relationship that is posited in the human flourishing theory of property. That is, what I wish to discuss here is how climate change creates conditions in which it may be possible, even necessary, to reverse the means-end relationship assumed in the human flourishing theory. The key is whether and how we use certain capabilities that are essential to living a flourishing life. I will begin with a brief account of the human flourishing theory and the key role that capabilities play in it.

II. THE HUMAN FLOURISHING THEORY OF PROPERTY

For some years now, I have been developing a theory that argues that the fundamental purpose of property is to facilitate human flourishing. The theory derives from Aristotle who argued that property's core value is *eudaimonia*, which literally translates into happiness. A better translation is human flourishing, or living a fulfilling life.

There are two important characteristics of my conception of human flourishing. First, it is morally pluralistic; that is, it rejects the notion that there exists a single irreducible fundamental moral value to which all other moral values may be reduced. Rather, it conceives of human flourishing as including (but not limited to) individual autonomy, personal security/privacy, personhood, self-determination, community, and equality. These values cannot be reduced to a single basic value because they are incommensurable; that is, there is no

35. *See* Stefano Carattini, Simon Levin, and Alessandro Tavoni, *Cooperation in the Climate Commons*, 13 REV. OF ENVT'L ECON AND POL'Y 227, 227 (2019).

available metric by which one can commensurate goods such as equality and personhood (it is as if one states that Einstein's genius was "better than" Mother Theresa's compassion—the comparison makes no sense.) They are all aspect of human flourishing, and cannot be balanced one against the other, although rational choices can be made between them in cases where they come into conflict with each other.

The second defining characteristic of flourishing is that it is objective. This is why flourishing is a better translation of *eudaimonia* than happiness is. The problem with "happiness" is that it connotes something which is subjectively determined. It is for me, not for you, to pronounce on whether I am happy, or on whether my life as a whole has been a happy one. Contrast this to my being healthy or flourishing. Here we have no difficulty in recognizing that I might think I was healthy, either physically or psychologically, or think that I was flourishing and just be plain wrong. It is all too easy for me to be mistaken about whether my life is *eudaimon* (the adjective from *eudaimonia*) not simply because it is easy to deceive oneself, but because it is easy to have a mistaken conception of *eudaimonia*, or of what it is to live well as a human being—believing it to consist largely in physical pleasure or luxury, for example.

Now, it is important to emphasize that in characterizing the human flourishing theory as an objective theory, this does not mean that the theory claims that there is one and only one way to live a life that goes maximally well. Far from it. There are many diverse paths to leading a fulfilling life, many ways of flourishing. At the same time, not every way of living that a person may choose to pursue, no matter how excellent an individual may become at his chosen path, is one that maximizes his well-being. A life dedicated to being an honorable soldier may be a flourishing life, but a life dedicated to being an excellent hitman is not.

It is important to understand, especially in the context of property and property theory, how this conception of human flourishing differs from the concept of welfare and how the human flourishing theory differs from those theories that go under the label "welfarist." Modern legal welfarists sometimes suppose that the concepts of welfare and human flourishing are synonymous,[36] but they are not—at least not in the sense in which welfare is used by law-and-economics analysts.[37] Welfare is an imprecise term, and it certainly could be understood to have the same meaning as flourishing. After all, welfare seems to mean "faring well," which is more or less what flourishing is all about. But the question is, faring well in what sense or respect? Law-and-economics analysts define "faring well" in a particular way—whether

36. *See* JOHN O'NEILL, ECOLOGY, POLICY AND POLITICS 71 (1993).

37. *See* LOUIS KAPLOW AND STEVEN SHAVELL, FAIRNESS VERSUS WELFARE (2002).

one's personal preferences, taken as givens, are satisfied. One fares more or less well according to the degree to which one is able to maximize the satisfaction of one's personal preferences. Welfarism, in this sense, supposes that there is one and only one good—maximization of preference satisfaction.[38] All other values can be reduced to that single, irreducible value. In this respect, welfarism, as a moral theory, is a value monist theory, unlike a theory based on human flourishing, which is value pluralist.[39]

Human flourishing, unlike welfarism, is not a desire-fulfillment theory of how a person's life can go maximally well. It is an objective theory. That is, it contends that "certain things are good or bad for us, whether or not we want to have the good things, or to avoid the bad things."[40] Recall that not every way of living that a person may choose to pursue is one that maximizes his well-being. For a Nazi SS officer, a life devoted to murdering Jews, no matter how excellently performed, is not a well-lived life.

III. FLOURISHING AND CAPABILITIES

How can one measure human flourishing? Economists and others committed to welfarist theory measure welfare in terms of resources. For welfarists, human welfare is a matter of satisfying subjective individual preferences, revealed through exchange transactions. Some years ago, the Nobel laureate economist Amartya Sen developed an alternative approach to measuring well-being, one that does not focus on resources or preferences.[41] Sen's insight is that flourishing is a matter of what a person is able to do rather than what he has. That is, the well-lived life should be measured by a person's capabilities rather than by a person's possessions or by the satisfaction of his subjective preferences. The focus is on the tools that people need to lead fulfilling lives. What a person actually does with their capabilities (which Sen called "functionings"[42]) is up to them, but their life simply cannot go well unless they at least possess certain essential capabilities.

The capabilities approach was originally developed by Amartya Sen and Martha Nussbaum. Sen conceives of capabilities as real freedoms people have in order to achieve their potential ways of living. The

38. *See* Daniel M. Hausman & Michael S. McPherson, *Preference Satisfaction and Welfare Economics*, 25

ECONOMICS AND PHILOSOPHY 1 (2009).

39. Gregory S. Alexander, *Pluralism and Property*, 80 FORDHAM L. REV. 1017 (2011); Gregory S. Alexander,

The Social-Obligation Norm in American Property Law, 94 CORNELL L. REV. 745 (2009).

40. DEREK PARFIT, REASONS AND PERSONS 493 (1984).

41. *See* Amartya Sen, *Capability and Well-being*, in MARTHA NUSSBAUM AND SEN eds., THE QUALITY OF LIFE 30 (1993).

42. Amartya Sen, *Rights and Capabilities*, in TED HONDERICH ed., MORALITY AND OBJECTIVITY: A TRIBUTE TO J.L. MACKIE 217 (1985).

freedoms are real in the sense that a person has the means that are necessary to accomplish what that person wishes to do with their life. We might think of these freedoms as "enablements," or even empowerments, because their role is to enable individuals to experience states of physical and mental wellbeing. The theory is freedom-promoting insofar as it allows individuals to choose for themselves whether and how they exercise these capabilities. Put differently, capabilities promote freedom in the sense of having opportunities.

Sen has provided no specific list of necessary capabilities. Rather, he emphasizes practical capabilities such as being free from avoidable diseases, being adequately fed, or participating in community activities.[43] He says that we should understand these in terms of the substantive freedoms people have reason to value rather than in terms of utility or preference-satisfaction. On this view, poverty is understood as capability-deprivation rather than lack of wealth.

Martha Nussbaum has developed a list of ten essential capabilities.[44] These are real opportunities based on personal and social circumstances. These include the following:

1. *Life,* meaning the ability to live to the end of a human life of normal length.
2. *Bodily health,* which includes being adequately nourished and having adequate shelter.
3. *Bodily integrity,* which means being able to move freely from place to place; to be secure against violent assault, including sexual assault and domestic violence.
4. *Senses, imagination, and thought.* To be able to uses the senses; to imagine, to think, to reason—all informed and cultivated by an adequate education. This capability to use one's mind is protected by guarantees of freedom of expression, including both speech and religion.
5. *Emotions.* This means being able to have attachments to other people and things; to be able to love, to grieve, to experience justified anger, etc.
6. *Practical reason,* defined as being able to form a conception of the good and to engage in critical reflection about the planning of one's life.
7. *Sociability*, understood as the ability to live with others, to recognize and show concern for other humans, to engage in various forms of social interaction; to be able to imagine the situation of another.

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43. *See* AMARTYA SEN, DEVELOPMENT AS FREEDOM 75 (1999).

44. *See* MARTHA NUSSBAUM, CREATING CAPABILITIES: THE HUMAN DEVELOPMENT APPROACH 33-34 (2011).

8. *Other species.* This means having the capacity to live with concern for other animals and nature generally.
9. *Play,* meaning the ability to laugh and play.
10. *Control over one's environment.* Nussbaum breaks this capability down into two parts: (a) *political*: this means the ability to participate effectively in political choices that affect one's life; (b) *material*: this means being able to hold property and to have property rights on an equal basis with others. More broadly, it includes the ability to have equal employment rights with others, and within work, to work as a human being, in meaningful relationships with other workers.[45]

Sen has introduced the notion of conversion factors into his discussion of capabilities.[46] Whether a person has the capability to live or act in a certain way depends upon the existence of conversion factors. Sen confines his discussion of conversion factors mainly to marketable resources, like goods and services,[47] but conversion factors need not be so limited. The development of capabilities is not solely a matter of what resources one has available, but also the circumstances in which one lives. They include *internal* factors, such as intelligence, physical skills, physical or mental handicaps, and height; *social* factors, which include gender practices in a society, social norms, social hierarchies, and government policies; and *environmental* factors, including the physical or built environment in which a person lives, and the provision of public goods. So, for example, a person cannot convert adequate supplies of food into nutrition if he suffers from a persistent medical condition that affects his absorptive capacity.[48] Similarly, education for women will not be converted into political power for them in a society that denies women the right to vote or hold political office.[49]

What these conversion factors indicate is that a person's capabilities are not strictly a matter of a person's abilities or innate talents but rather opportunities that are either enabled or constrained by conditions that are internal (personal) or external (social/environmental). In Sen's sense of the term, then, capabilities are opportunities that are either made feasible or constrained by other factors which may be internal or external to the person.

This focus on capabilities does not mean that property is irrelevant. To the contrary, property serves as one input in the creation of capabilities. Property itself does not equate to possession of essential

45. *Id.*

46. *See* AMARTYA SEN, INEQUALITY RE-EXAMINED 19-21, 26-30, 37-38 (1992).

47. *See id.*

48. *See* Shankaran Nambiar, *Capabilities, Conversion Factors and Institutions*, 13 PROGRESS IN DEVELOPMENT STUDIES 221 (2013).

49. Id.

capabilities; that depends upon the conversion factors that are present in one's life. Still, property, or rather *having* property, is critical to the development of these capabilities. The converse is also the truth: not having property means that the probability of your developing the necessary capabilities is very low. Having property is obviously necessary for a reasonably long life, for example. The poorer you are, the more likely you are to die prematurely. The same holds true for health. Owning property is no guarantee of good health, but the opposite is certainly true—a life of penury correlates strongly with ill health.

Capability theory ordinarily posits that capabilities and functionings are the ends of well-being. That is, well-being, or flourishing, is understood in terms of people's capabilities to function, or their ability to take advantage of opportunities to act or engage in desired activities. What Sen sees as ultimately important is that people have the capabilities, which he understands in terms of freedoms, to do as they wish and lead the kind of lives they wish to pursue. There may be circumstances, however, under which capabilities serve as means rather than ends, and that what is usually understood as a means becomes an end. A disaster brought about by climate change is one of these circumstances.

No one is immune from the effects of climate change. Whether it is increasing and intensifying heat waves, stronger and more frequent hurricanes, or more intense storms, every part of the continental U.S. has experienced some consequence of the effect of climate change on weather. These effects create health risks by impacting the air we breathe, the water we drink, and even our food. Moreover, these effects pose direct threats to our lives. Climate-change disasters literally kill people. Recall that between 2017 and 2023, 137 separate billion-dollar climate-change disasters have killed at least 5,500 people.[50] Stretching out the time frame, during the period between 1980 and 2023, there were a total of 16,350 deaths associated with billion-dollar climate-change disasters across the United States.[51] Among these events, hurricanes were the most deadly, contributing to nearly 6,900 deaths during that period.[52]

When confronted with such dire conditions, the meaning of flourishing becomes reduced to a simple matter of preserving life and

50. *See* Adam B. Smith, *2023: A historic year of U.S. billion-dollar weather and climate disasters*, Jan. 8, 2024, available at https://www.climate.gov/news-features/blogs/beyond-data/2023-historic-year-us-billion-dollar-weather-and-climate-disasters (last visited March 23, 2024).

51. See Erick Burgueño Salas, *Fatalities due to major climate disasters in the U.S. 1980-2023, by type*, in *Cumulative deaths from billion-dollar natural disaster events in the United States between 1980 and 2023, by disaster type*, STATISTA, Jan 22, 2024, available at https://www.statista.com/statistics/1116981/billion-dollar-climate-disasters-deaths/ (last visited March 23, 2024).

52. *See id.*

home. Life and property are now ends rather than means, and certain capabilities serve as means to those ends. When survival in the face of climate-change disasters is at stake, certain capabilities may become acutely important. What I want to suggest is that among these capabilities is cooperativeness, the ability to work with others to achieve mutually desired goals. Cooperativeness, I will argue, is the essential capability in private, bottoms-up initiatives to respond to the threat of climate-change disasters.

As some economists have noted, cooperation is an anomalous behavior, seen from the perspective of traditional economic theory.[53] As Robyn Dawes and Richard Thaler observe, "Much economic analysis – and virtually all game theory – starts with the assumption that people are both rational and selfish."[54] Rather than cooperate with each other to achieve a common good, conventional economic theory predicts that group members will free ride off others. Yet cooperation does occur, and with greater frequency than economic theory ordinarily predicts. In a paper written by two behavioral economists,[55] the following story illustrates the point.

> In the rural areas around Ithaca [New York] it is common for farmers to put some fresh produce on a table by the road. There is a cash box on the table, and customers are expected to put money in the box in return for the vegetables they take. The box has just a small slit, so money can only be put in, not taken out. Also, the box is attached to the table, so no one can (easily) make off with the money. We think that the farmers who use this system have just about the right model of human nature. They feel that enough people will volunteer to pay for the fresh corn to make it worthwhile to put it out there. The farmers also know that if it were easy enough to take the money, someone would do so.[56]

There is an important and growing behavioral literature on cooperation. Elinor Ostrom famously demonstrated that cooperative behavior could be sustained within small groups over time.[57] Her work established that commons need not turn into tragedies. She found that cooperation existed under certain conditions. The groups she studied operated within geographic areas that were relatively moderate in size. Free-rider problems were relatively small where participants were, in game-theoretic terms, repeat players. They knew each other and regularly interacted with each other. They were largely homogenous socially and had, and knew they had, shared interests, so

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53. *See* Robyn M. Dawes & Richard H. Thaler, *Anomalies: Cooperation*, 2 J. ECON. PERSP. 187, 187 (1988).

54. *Id.*

55. *See id.*

56. *Id.* at 195.

57. *See* Juan-Camilo Cardenas & Elinor Ostrom, *What Do People Bring into the Game? Experiments in the Field About Cooperation in the Commons*, 82 AGRICULTURAL SYS. 307 (2004).

there was a high degree of social capital within the groups.[58] These factors greatly contributed to participants' ability and willingness to organize themselves in ways that overcame free-rider and similar problems that impede cooperative solutions.

Ostrom did not attempt to provide a general theory of cooperative behavior, but others have done so. One popular theory is reciprocal altruism. This account was developed most fully by Robert Axelrod.[59] This theory is based on his observation that people tend to reciprocate behavior with like behavior, such as cooperation with cooperation, defection with defection. The implication is that individuals will not cooperate in situations in which there is no possibility of future interaction with each other, so no possibility of future reciprocity. Their interactions are strictly on a one-shot basis. Evidence from laboratory experiments conducted by economists Robyn Dawes and Richard Thaler (who won the Nobel Prize for Economics in 2017), however, suggests that cooperation is not so limited.[60] Dawes and Thaler observed 50% cooperation rates even in single trial experiments, leading them to conclude that reciprocal altruism cannot directly explain the experimental results they found.[61] From this and similar findings, they suggest that a "norm of cooperation" exists.[62] They conclude that "people have a tendency to cooperate until experience shows that those with whom they are interacting are taking advantage of them."[63] To explain this conclusion, they draw on Robert Frank's work. Frank proposes that people who adopt a norm of cooperation are successful in eliciting cooperation from others and in attracting other cooperators.[64] As Dawes and Thaler explain, "The key to Frank's argument is that one cannot successfully fake being cooperative for an extended period of time-just as one cannot be successful getting people to believe too many lies."[65]

Capabilities require nurturing, and cooperation is no different from any other capability in this respect. Results of empirical work have indicated that one means of nurturing cooperation is by group discussion. In several laboratory experiments involving groups that were allowed to discuss with each other individual contributions to the provision of some public good, contribution rates were high and the

58. *See id.*

59. *See* ROBERT AXELROD, THE EVOLUTION OF COOPERATION (1984).

60. *See* Dawes and Thaler, *supra* note 53.

61. *See id.* at 191.

62. *See id.* at 191-92. *See also* James Andreoni, *Why Free Ride? Strategies and Learning in Public Goods Experiments*, 37 J. OF PUB. ECON. 291 (1987); Andreoni, *Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving*, 100 THE ECON. J. 464 (1990), cited in Dawes & Thaler, *supra* note 53, at 191.

63. *Id.*

64. *See* Robert Frank, *If Homo Economicus Could Choose His Own Utility Function, Would He Want One with a Conscience?*, 77 AM. ECON. REV. 593 (1987).

65. Dawes & Thaler, *supra* note 53, at 192.

public good was provided in all of the cases.[66] Jon Elster offers as one explanation of this finding that group discussions yield arguments for group-regarding behavior and that these arguments affect not only the listener, but the speaker as well.[67] Subsequent laboratory experiments have confirmed this explanation. In groups where discussions were not allowed, only about 30% of the subjects contributed to the provision of the public good, contrasted with 70% contribution rates where discussions were permitted.[68]

There certainly is a free-rider problem, but it is far from universal. Cooperation to achieve mutually advantageous goods does occur and with greater frequency than conventional economic analysis would have us believe. Moreover, cooperation can be nurtured. Several factors contribute to individual participation in efforts to achieve group goods. For one thing, "cooperation is positively related to the investment return on the public good."[69] The more the group has to gain from cooperation, the greater the degree of participation.[70] Moreover, as previously noted,[71] discussion increases the prospects of cooperation. Yet another factor is group identity. Experiments conducted by empirical researchers have shown that cooperation rates can be radically affected by group identity.[72] Even in the absence of any expectation of future reciprocity, group identity enhances cooperative behavior.[73] As a sense of "we-ness" develops and participants begin to identify with the group, cooperation increases.[74] Discussion among participants facilitates the development of group identity. In laboratory experiments, one team of analysts found that discussion among participants in an assurance game[75] significantly contributed to the creation of group identity.[76] As they reported,

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66. *Id.* at 193-194.

67. See *id.* at 194, citing Jon Elster, *The Market and the Forum: Three Varieties of Political Theory*, in JON ELSTER AND AANUND HYLLAND, eds., FOUNDATIONS OF SOCIAL CHOICE THEORY: STUDIES IN RATIONALITY AND SOCIAL CHANGE 103 (1986).

68. *See* Dawes & Thaler, *supra* note 53, at 194-195.

69. *Id.* at 196.

70. *Id.*

71. *See supra* text accompanying note 67.

72. *E.g.,* Robyn M. Dawes et al., *Not Me or Thee but We: The Importance of Group Identity in Eliciting Cooperation in Dilemma Situations: Experimental Manipulations*, 68 ACTA PSYCHOLOGICA 83 (1988).

73. *See id.* at 86.

74. *See id.*

75. Assurance is a "game-theoretic structure also known as the stag hunt." In this game, "it is best for everybody, individually and socially, if all cooperate. But each fears that the others may not play their part and is then motivated to defect. . . . [T]he cooperative solution is a Nash equilibrium," because no one would be better off by defecting from it. Despite that, "with enough suspicion of the others, one may maximize expected utility by defecting." *Assurance Game*, OXFORD REFERENCE, https://www.oxfordreference.com/display/10.1093/oi/authority.20110803095430188 (last visited March 27, 2024).

76. *See* Dawes et al., *supra* note 72.

"Cooperation is a function of group interactions."[77] They further stated, "People immediately start discussing what 'we' should do, and spend a great deal of time and effort to persuade others in their own group to cooperate . . . ."[78] In the illuminating conclusion to their paper, Dawes and his colleagues made the following observations:

> The casual observer of modern economic theory might conclude that the major motivation of us humans is supplied by a short looped tape cycling in our heads continually asking the question 'have you improved your asset position today?'. . .We interpret our experimental results as implying that there are other primary motivations - in particular the parochial one of contributing to one's group of fellow humans. . . .What we question—or rather, what our data question—is whether all, or even a majority, of group regarding behaviors can be 'ultimately' related to such egoistic concerns.[79]

In addition to group identity, other factors have been found to be important in promoting cooperation. Observability is one factor that contributes to cooperation; when participation decisions are observable by others in the group, participation levels increase.[80] Another contributing factor is descriptive norms; information about how others have acted influences decisions whether to participate. When people are told that others have cooperated, they are more apt to cooperate, as this implies that cooperation is the social norm.[81]

IV. CLIMATE CHANGE ADAPTATION AND BOTTOMS-UP INITIATIVES

This Part discusses climate change adaptation. Specifically, it discusses a local, bottoms-up approach to climate change adaptation, illustrated by three initiatives that have successfully created neighborhood programs aimed at coping with the effects of climate change. Before doing so, however, I will begin with a brief explanation of climate change adaptation, what it means, and how it differs from climate change mitigation as a strategy for dealing with the effects of climate change.

A. Climate Change Adaptation

In a nutshell, climate change adaptation is the process of adjusting to the current and future effects of climate change. It differs from climate change mitigation, which is aimed at the causes of climate change. Mitigation means preventing or reducing the emission of

77. *Id.* at 94.

78. *Id.* at 94-95.

79. *Id.* at 96.

80. *See* Gordon Kraft-Todd, Erez Yoeli, Syon Bhanot & David Rand, *Promoting Cooperation in the Field*, CURRENT OP. IN BEHAVIORAL SCIENCES 96 (2015) https://sbhanot1.swarthmore.edu/wp-content/uploads/2015/07/2015-Kraft-Todd-et-al-COBS.pdf.

81. *Id.* at 98.

greenhouse gases into the atmosphere.[82] Adaptation, on the other hand, is a matter of moderating or avoiding harms to people caused by climate change.

Adaptation actions are usually classified into four types: infrastructural, including engineering, built environment, and high-tech solutions; institutional, that is, economic organizations, laws and regulations, and government policies and programs; behavioral, which includes individual and household strategies as well as social and community approaches; and nature-based options, including ecosystem-based adaptation options.[83] Some examples include mangrove planting and habitat conservation, building seawalls to protect against sea level rise, selective breeding for drought-resistant crops, and building green roofs to reduce urban heat island effects.

Adaptation measures may be incremental, or they may be transformative. Incremental measures work within a given system and seek to maintain its integrity. Transformative actions, on the other hand, alter the fundamental characteristics of a system.[84] Both types of measures take a wide variety of forms, depending on the unique context of a community, business, organization, country, or region. People may incrementally adapt to climate change-driven floods, for example, by building higher dams or elevating their houses.[85] Or they may restore previously degraded wetlands upstream.[86] Transformative actions would include, for example, "development of new land-use plans that restricted the use of areas with high risks and mitigation potential."[87] Most adaptation projects are incremental, as there are more barriers for the implementation of transformative adaptation than incremental measures. Transformative adaptation projects require high investments, and the time horizon for their benefits to be realized is longer.

Community disaster preparedness groups are important modes of implementing incremental adaptation measures. Community groups take advantage of local knowledge and utilize local resources, including social capital. They add flexibility to general, more systematized strategies for responding to the risks of climate change

82. *What is the Difference Between Adaptation and Mitigation?*, EUR. ENV'T AGENCY, https://www.eea.europa.eu/en/about/contact-us/faqs/what-is-the-difference-between-adaptation-and-mitigation (last visited Nov. 11, 2024).

83. *See generally* Brian O'Neill, et al., *Key Risks Across Sectors and Regions*, CLIMATE CHANGE 2022: IMPACTS, ADAPTATION AND VULNERABILITY, IPCC Sixth Assessment Report 2411 (Hans-Otto Pörtner et al., eds., 2022).

84. *See generally* Ian R. Noble et al., *Adaptation Needs and Options*, in CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY. PART A: GLOBAL AND SECTORAL ASPECTS, IPCC Fifth Assessment Report 833 (2014).

85. *See* Giacomo Fedele et al., *Transformative Adaptation to Climate Change for Sustainable Social-Ecological Systems*, 101 ENV'T SCI. & POL'Y 116 (2019).

86. *See id.*

87. *Id.* at 117.

disasters. Moreover, their relative cost-effectiveness makes them appealing to donors who wish to fund non-governmental climate-change preparedness projects. Although community preparedness organizations are by no means a panacea to the problems of disaster management and climate change, they play an important role as one piece of an overall, more complex strategy for coping with climate change risks.

The primary weakness of local, bottoms-up approaches to climate change adaptation is a relative lack of resources and authority. For that reason, neighborhood initiatives commonly need to work in coordination with local agencies that have greater resources and can exercise greater authority to back up the efforts of neighborhood groups. The examples discussed in the next section illustrate how these public-private partnerships can work to realize the goals of localized climate change adaptation.

B. Bottoms-Up Initiatives at Adaptation

The effects and risks of climate change are location-specific.[88] Because of this, adaptation measures are necessarily local.[89] Moreover, the response to climate change is a shared responsibility that cannot be addressed by local governments alone. Local-level adaptation includes local government efforts, but it also includes private community organizations and local groups. Analysts have argued that third parties, including local and neighborhood groups, are the ones mostly responsible for taking action and best able to do so.[90] An important finding is that taking adaptive action is usually something that private actors initiate.[91] The success of these local organizations and groups at adapting to the risk of climate-change disasters depends in considerable measure on the extent of cooperation among group members in realizing preferred adaptation measures.

To illustrate how members of local groups learn to cooperate with each other to undertake adaptive measures in response to the threat of climate change disasters, I shall discuss three examples of local groups who have acted cooperatively in response to the effects of climate change. These examples are case studies of bottoms-up initiatives at climate change adaptation that demonstrate both the

88. *See* Julie Brugger & Michael Crimmins, *Designing Institutions to Support Local-Level Climate Change Adaptation: Insights from a Case Study of the U.S. Cooperative Extension System*, 7 WEATHER, CLIMATE, & SOC'Y 18 (2014).

89. *See id.*

90. *See* Alex Aylett, *Networked Urban Climate Governance: Neighborhood-Scale Residential Solar Energy Systems and the Example of Solarize Portland*, 31 ENV'T & PLAN. C: POL. & SPACE 858 (2013); Geneviève Cloutier et al., *Do-It-Yourself (DIY) Adaptation: Civic Initiatives as Drivers to Address Climate Change at the Urban Scale*, 74 CITIES: THE INT'L J. OF URB. POL'Y & PLAN. 284 (2018).

91. *See* Cloutier et al., *supra* note 90, at 284.

capability of local groups to work cooperatively and the success of such ventures.

1. COPE

The first case study concerns a local community organization aimed at fire prevention and response in Sonoma County, California. The organization's acronym is COPE – Communities Organized to Prepare for Emergencies. COPE is a self-described "grassroots effort built upon the concept of 'neighbor helping neighbor' engaging communities in emergency preparedness education, advocacy and planning. COPE fosters community preparedness in coordination with public safety agencies, non-profits, and non-governmental agencies."[92]

COPE groups consist of ten to twenty homes located within a neighborhood.[93] Each group chooses one to two members who serve as neighborhood co-chairs.[94] Co-chairs survey their neighbors, soliciting contact information as well as information about the home itself, such as the location of utility shutoffs and fire dangers.[95] Group members identify and share information about escape routes and safe gathering places both within a neighborhood as well as outside of it.[96]

COPE groups work collaboratively with local fire departments and public safety agencies both to receive information about the occurrence, location, and spread of wildfires and to develop plans to prevent or minimize the likelihood of destructive wildfires in their areas.[97]

Technology plays an essential role in COPE's operation. COPE members rely on several mobile applications not only to stay in touch with each other but to stay informed about fire conditions in the area; such apps as Watch Duty have been extraordinarily helpful in tracking fires and determining escape routes.[98]

COPE is not only about escaping fires; it is also about preventing them. The information-sharing and cooperation among COPE members has led to widespread changes in how residents use their land. Combustible trees and vegetation have been either removed entirely or set back away from homes and other structures by safe distances. Because of various cooperative practices by COPE members,

92. *Welcome to C.O.P.E.!*, CITIZENS ORGANIZED TO PREPARE FOR EMERGENCIES, N. SONOMA CNTY., https://copenorthernsonomacounty.com/ [https://perma.cc/5ZZU-D24A] (last visited Dec. 6, 2023).

93. *See Get Started*, CITIZENS ORGANIZED TO PREPARE FOR EMERGENCIES, N. SONOMA CNTY., https://copenorthernsonomacounty.org/getting-started/ (last visited Mar. 16, 2025).

94. *Id.*

95. *Id.*

96. *Id.*.

97. *See Welcome to C.O.P.E.!*, *supra* note 92.

98. *Resources*, CITIZENS ORGANIZED TO PREPARE FOR EMERGENCIES, N. SONOMA CNTY., https://copenorthernsonomacounty.org/links-documents/ (last visited Mar. 16, 2025).

homes and other structures throughout the county are significantly more fire-resistant.

2. Urban Greening Initiatives

The second example looks at civic action in the field of urban greening. Globally, cities account for up to 70% of total manmade greenhouse gas emissions.[99] Hence, cities are key players in efforts both to mitigate and adapt to the effects of climate change. There are multiple aspects of urban strategies aimed at mitigation and adaptation, but one of them is increasing the green spaces within urban areas. Cities are warming at a 29% faster rate than rural areas.[100] Researchers have found that urban greening, including everything from tree-planting to rooftop gardens, assists in cooling cities.[101] Discussions of greening efforts often privilege the role of local municipalities and businesses, but community-based actors have potentially unique roles to play in urban greening projects.[102] The efforts of two local Canadian groups illustrate how citizen-led groups can get ahead of city managers.

The local groups are two citizen groups in Quebec City, Canada: Bien Vivre à Saint-Roch (BVSR) (or "Living Well in St. Roch"), and Verdir et Divertir (VD) (or "Greening and Animating"). The groups' activities address climate change indirectly. Their objectives are enhancing the quality of the environment and the aesthetic value of their areas, rather than directly adapting the neighborhood to climate change.[103]

What triggered the two groups' formation was a notice from the city announcing plans to renovate a street.[104] The city's plan was a standard do-over, a refurbishment that really changed nothing. The neighbors recognized that this was an opportunity to do something different. The two groups came up with "proposals for shared streets, with a number of parking spots."[105] They further proposed to the city that planters should be installed, arranged in such a way as to force cars to slow down.[106] Interviews with the leaders of BVSR and VD

99. Aylett, *supra* note 90.

100. Stefan Ellerbeck, *Cities Are Warming 29% Faster than Rural Areas. Could Urban Greening Fix This?*, WORLD ECON. F. (Oct. 31, 2022), https://www.weforum.org/agenda/2022/10/cities-heat-urban-greening/ (last visited April 2, 2024).

101. Diana E. Bowler et. al., *Urban Greening to Cool Towns and Cities: A Systematic Review of the Evidence*, 97 LANDSCAPE AND URBAN PLANNING 147 (2010).

102. Victoria Campbell-Arvai & Mark Lindquist, *From the Ground Up: Using Structured Community Engagement to Identify Objectives for Urban Green Infrastructure Planning*, 59 URBAN FORESTRY AND URBAN GREENING (2021).

103. Cloutier et al., *supra* note 90, at 286.

104. *Id.*

105. *Id.* at 287.

106. *Id.*

indicated that what motivated them was their sense that they could initiate change. One leader stated:

> I think we share a common interest in the quality of the living environment. We do not articulate our thinking and actions exactly the same way, but globally, greening reaches everyone. We all have the feeling that there is a need to adapt the municipal regulation in order to reinforce greening interventions.[107]

The VD group in particular has significant organizational strengths that not all citizen groups possess. For example, it has a Facebook page that lists about 800 members, and that serves as a platform for publicizing information sessions and work bees.[108] The group posts photos and videos online that provide a visual record of its greening work. The steps necessary to carry projects forward are clearly explained to volunteers, and put within a broader, well-justified context. Membership is open to those who live or work in a part of the Saint-Roch neighborhood known as "Tanners" piece of land.[109]

Although VD and BVSR are private citizen groups, they know how to work with and within the public municipal system to their advantage. They also know the right person to contact within the city administration to get information and with whom to speak about alternatives to the city's plans and procedures.[110] One VD leader stated, "If we hear about a street being repaired around here, we send an email about it to the borough director or the urban planning advisor and ask about their way of doing things, something like: 'have you planned on greening the street?'"[111]

The groups have found that an effective way of working with the local city administration is by demonstrating their own efforts. Using a doing-it-ourselves technique, the groups have succeeded both in greening their neighborhoods and showing the local administration that the street landscape can be reshaped.[112] As one observer put it, "I think these initiatives happen without the city administration really realising and this is precisely what is good about them. If they had asked authorization to plant, it would have been complicated and maybe it would not have happened."[113] The success of the technique of demonstrating-first is indicated by the following statement of a city official: "it is through such micro-projects that we will demonstrate our

107. *Id.* (quoting VD leader).
108. *Id.*
109. *Id.*
110. *Id.*
111. *Id.* (quoting VD leader).
112. *Id.*
113. *Id.*

ability to do things, without having to commit to elaborate large plans."[114]

Key to their success is cooperation. BVSR has established collaborative relationships with businesspeople and shopkeepers. The group's leaders present their projects to businesses as opportunities to establish ties with neighborhood residents.[115] They have been able to convince the businesses to support sponsorships to help fund the greening projects.

Admittedly, the impact of the two groups' projects is limited. As the authors of a study of the groups' work stated, "The objective of adapting urban spaces to climate change has not yet been attained."[116] The same authors further state, however, "by their collaborative approach, these greening DIY initiatives can be seen as a first step in transforming the governance of climate change at the local level."[117] They further conclude that "[t]he cases of Bien Vivre à Saint-Roch, and Verdir et Divertir demonstrate how small-scale citizen experiments can bring about climate change adaptation in a concrete way."[118] These citizen experiments succeed because the participants, recognizing their common interests, learn how to cooperate and work together.

3. Solarizing Portland

The public sector of cities has direct control of very little of their emissions—roughly 1%.[119] The remainder is controlled by private sector emitters—business, industrial, and residential. Any effective response to urban greenhouse gas emission, then, must involve these actors. Local community groups can and do participate in urban adoption of green technologies. A community-led program known as Solarize Portland (Solarize), based in Portland, Oregon, illustrates one such contribution.

Solarize was formed in 2009, at a time when solar panels were not nearly as widely used as they are today. At that time, solar power generation in the U.S. was only 1.8% of what it became by 2019.[120] The city of Portland itself is well-known for its climate change response plans, but Solarize, a private grassroots initiative, has transformed the market for solar power for residential use. As a result of this and

114. *Id.*

115. *Id.*

116. *Id.* at 288.

117. *Id.*

118. *Id.* at 289.

119. Aylett, *supra* note 90, at 858.

120. Jerold Brito, *Solarize: The Grassroots Initiative that Cut Solar Costs up to 35%*, ECOBLOCK (Aug. 20, 2021), https://ecoblock.berkeley.edu/blog/solarize-the-grassroots-initiative-that-cut-solar-costs-up-to-35/ (last visited Apr. 3, 2024).

other initiatives, Portland has managed to reduce its emissions to below 1990 levels.[121]

The genesis of Solarize Portland was a collaboration between Stephanie Stewart, a resident of Portland who was active in her neighborhood association (NA) and Tim O'Neill, a sustainability coordinator for SE Uplift, a Neighborhood Coalition facilitating the work of Neighborhood Associations (NAs) in Southeast Portland.[122] Stewart was interested in putting solar energy on her home but was dissuaded by the cost.[123] The sustainability coordinator mentioned to her a San Francisco nonprofit solar contractor that used neighborhood-scale bulk purchasing to reduce the cost of residential solar electricity.[124] That example inspired them to use the NA network the resources provided by the NA system to set up their own program in Portland.[125]

Portland's NA system dates back to the mid-1970s.[126] NAs receive funding from the municipality and are authorized to select and invest in community projects in their areas as they see fit.[127] Although the NAs were essential to Solarize's success, additional support was needed.[128] O'Neill contacted Energy Trust of Oregon (ETO), a state-wide nonprofit established in 2002 to help Oregonians take advantage of energy efficiency and renewable energy options at a household scale.[129] Price and complexity of installation had been the major barriers to commitment to solar energy.[130] Previously, Energy Trust had targeted individual homeowner, but in collaboration with SE Uplift, it developed a program of bulk purchasing discounts. The success of that program depended on adequate demand, and that was the responsibility of SE Uplift.[131] "Volunteers used a mixture of word of mouth, posters put up at local businesses, articles written for community papers and newsletters, announcements at community meetings, the distribution of fliers to homes and events, and a volunteer-maintained website (www.Solarizeportland.org)."[132] SE Uplift solicited participation from the twenty neighborhoods it serves, seeking volunteers to spread the word about the project in their

121. Aylett, *supra* note 90, at 863.
122. *Id.* at 864.
123. *Id.*
124. *Id.*
125. *Id.*
126. *Id.*
127. *Id.*
128. *Id.*
129. *Id.*
130. *Id.* at 865.
131. *Id.*
132. *Id.*

community.[133] Several neighborhoods responded with strong interest and generated a troupe of passionate volunteer representatives.[134] These efforts brought media attention and with it, widespread interest.

Following competitive bidding, a contractor, Imagine Energy, was selected.[135] Imagine's pricing tier was the lowest of those submitting bids, but enrollment in the program was so great that the eventual price was set at the lowest within that tier.[136] A series of introductory workshops was held, where home solar programs as well as the Solarize project were explained.[137] Weekly Q&A sessions followed for people wanting more in-depth information.[138] Participation was higher than expected, with sign-ups tripling the number of residential solar electric systems installed the year before.[139] Beyond the price advantage to individual buyers, there was another benefit to the program: its overall impact on the community. As the sustainability coordinator for SE Uplift reported, "[t]his project has truly brought our community together, all moving toward one goal. From attending workshops to watching as neighbors went solar street by street—it's been great to see what we've been able to accomplish as a group."[140]

Media attention to Solarize's success brought enquiries from households across the city.[141] Neighborhood coalitions from other areas in Portland expressed interest in similar programs of their own.[142] Recognizing that it did not have the capacity to support a citywide initiative, Solarize tried to enlist support from the city's Bureau of Planning and Sustainability (BPS) in helping other neighborhoods start their own programs.[143] BPS had created a program called SolarNow!, which was based on a strategy of spreading information about local solar contracts to the public.[144] That strategy, however, proved to have little effect upon the number of solar installations within the city.[145] The contrast between that approach and that of Solarize was clear. Whereas SolarNow! had followed a program of providing more and better information, Solarize had tapped into

133. Lizzie Rubado, *Solarize Portland: Community Empowerment Through Collective Purchasing*, ENERGYTRUST, https://www.energytrust.org/wp-content/uploads/2016/12/101110_Rubado_SolarizePortland.pdf (last visited April 4, 2024).

134. *Id.*

135. *Id.*

136. *Id.*

137. *Id.*

138. *Id.*

139. *See* Aylett, *supra* note 90, at 865.

140. Rubado, *supra* note 133, at 11.

141. Aylett, *supra* note 90, at 866.

142. *Id.*

143. *Id.*

144. *Id.*

145. *See id* .

broader community bonds of trust, shared enterprise, and neighborhood identity.[146] Still lacking, however, was the institutional support to expand citywide.

Representatives from the city's BPS department stepped up and offered background technical support.[147] Its support allowed Solarize's operation in other parts of the city to handle a much larger volume of community members who were interested in the project.[148] Nevertheless, the project remained mainly the work of the neighborhood associations members and local volunteers.[149]

The case study of Solarize demonstrates how neighborhood groups have the capacity to cooperate with each other to run programs that speed up the adoption of green technologies in urban areas. While other solar energy programs used informational strategies to limited effect, Solarize adopted a grassroots strategy of relying primarily on the work of small neighborhood groups, creating clusters of high-volume, low-margin installations. It changed the scale of action from the individual to the community, using social ties to build demand for technological change. Neighborhood association members had the networks and relationships of trust necessary to find key partners, mobilize volunteers, and initiate programs.[150]

Climate change adaptation in urban areas all too often is equated with public climate policies. The success of programs like Solarize demonstrates the ability of small community-based groups to do what large public agencies are unable to accomplish. They acted quickly, transforming the market for residential solar energy throughout Portland in a manner that was responsive to the community and without bureaucratic red tape. One analyst has identified three characteristics that are the keys to the success of community groups such as Solarize: (1) "their ability to operate at a smaller scale, which enables innovation and experimentation"; (2) "their higher risk tolerance, which lowers the barriers to implementation"; and (3) "their locally embedded understanding of sociotechnical transitions, which allows them to tailor programs to the needs, understandings, and values of their target communities."[151] The limits of this small non-governmental approach to climate change adaptation are revealed by the fact that Solarize's effort to expand its program citywide required the assistance of the municipal Bureau of Planning and Sustainability. Without BPS's technical assistance, Solarize's program would have been confined to just two areas in Portland. Solarize needed the city,

146. *See id.* at 867.

147. *Id.*

148. *Id.*

149. *See id.*

150. *See id.* at 869.

151. *Id.* at 869.

but perhaps more importantly, the city needed Solarize. This was an example of collaboration succeeding at multiple levels: within each neighborhood association group, then among those groups, and finally, between the groups collectively and the municipality. Collaboration was the key to Solarize's success.

V. CAPABILITIES AND COOPERATION

Adaptation to climate change requires social cooperation, and the three above case studies suggest that the capability to cooperate with others to achieve socially desired ends is feasible. The evidence of this capability in the examples leads to a more fundamental question concerning the roots of social cooperation. This is not the occasion for a complete analysis of the foundations of cooperation, but I want to offer some observations that may help explain why and when the capability of cooperation exists—not only under conditions of climate change, but more even broadly.

Behavioralists and others define cooperation as occurring "when an individual incurs a cost in order to provide a benefit for another person or people."[152] The obvious question is, if cooperation is personally costly, why do people do it? As my earlier discussion indicated,[153] most accounts of cooperation analyze it in terms of reciprocity. They suppose that parties are motivated to act cooperatively out of mutual advantage. Martha Nussbaum points out that this mutual advantage account is not based on the belief that humans are selfish but as a matter of parsimony.[154] As Nussbaum puts it,

> [I]f a just society can be generated out of weak assumptions (in other words, not assuming altruism or virtue but much less than that), that is itself interesting, and one should always choose the weakest premises from which one's conclusion follows, rather than saddling the theory with thicker or more controversial premises.[155]

One astringent definition of cooperation provides that it is "costly behaviour performed by one individual that increases the payoff of others."[156] Evolutionary analysts typically explain human cooperation in terms of the so-called "three Rs": reputation, reciprocation and retribution.[157] The problem is, as Boyd and Richerson point out, the three Rs can stabilize any behavior. As Boyd and Richerson state, "[i]f

152. Joseph Henrich & Natalie Henrich, *Culture, Evolution and the Puzzle of Human Cooperation*, 7 COGNITIVE SYS. RSCH 220, 221 (2006).

153. *See supra* text accompanying notes 59-81.

154. *See* Nussbaum, *supra* note 44, at 150.

155. *Id.*

156. Robert Boyd & Peter J. Richerson, *Culture and the Evolution of Human Cooperation*, 364 PHIL. TRANSACTIONS OF THE ROYAL SOC'Y: BIOLOGICAL SCIENCES 3281, 3283 (2009).

157. *See id.*

everybody agrees that individuals must do *X*, and punish those who do not do *X*, then *X* will be evolutionarily stable as long as the costs of being punished exceed the costs of doing *X*. It is irrelevant whether *X* benefits the group or is socially destructive. It will pay to do *X*."[158]

Why, then, is *X* cooperative rather than selfish behavior? How is it that cooperation can appear and exist in a world of self-interest? One explanation is the influential theory of cultural evolution that has been developed in recent years by several different evolutionary theorists.[159] These analysts apply a culture-gene coevolutionary approach to human behavior and psychology, including the evolution of human cooperation. What has emerged from this work is a Dual Inheritance Theory, as Joseph and Natalie Henrich call it.[160] Basically, genes and culture continually interact with each other in a feedback loop. Changes in genes can lead to changes in culture,[161] and those changes may in turn affect genetic selection. The theory argues that humans are heavily reliant on cultural learning and culturally evolved adaptations.[162] These cultural adaptations develop very rapidly, more so than genetic adaptation.

Such adaptations best account for larger scale cooperative behavior, i.e. extending beyond kin groups to large social communities. "Cultural evolution created cooperative groups," Boyd and Nickerson contend.[163] In culturally evolved social environments, the process of natural selection occurring within groups favored new genes that favored more socially agreeable behavior such as cooperation. Individuals and their genes increasingly became members of groups that were governed by social norms that included cooperation.[164] These social norms are maintained by mechanisms such as reputation and signaling.[165] In light of this, as evolutionary analysts Joseph Henrich and Michael Muthukrishna state, "researchers have argued that these cultural products—social norms and institutions—over time have generated

158. *Id.*

159. *See, e.g.*, *id.* at 3181; Joseph Henrich & Michael Muthukrishna, *The Origins and Psychology of Human Cooperation*, 72 ANN. REV. OF PSYCH. 208, 210 (2020). *See generally* ROBERT BOYD & PETER J. RICHERSON, THE ORIGIN AND EVOLUTION OF CULTURES (2005).

160. *See* Henrich & Henrich, *supra* note 152, at 225.

161. "Culture" here is defined as "socially learned behavior," which itself is defined as "copying behaviors observed in others or acquiring behaviors through being taught by others." *Dual Inheritance Theory*, WIKIPEDIA, https://en.wikipedia.org/wiki/Dual_inheritance_theory (last visited on April 18, 2024).

162. *See* Joseph Henrich & Richard McElreath, *Dual-Inheritance Theory: The Evolution of Human Cultural Capacities and Cultural Evolution*, OXFORD HANDBOOK OF EVOLUTIONARY PSYCH. 555, 556 (R. Dunbar & L. Barrett, eds., 2007).

163. Boyd & Richerson, *supra* note 135, at 3286.

164. *See* Henrich & Muthukrishna, *supra* note 159, at 226.

165. *See id.*

powerful social selection on our genes and thereby shaped our evolved psychology."[166]

Arguing from a very different direction, Martha Nussbaum also rejects an account of cooperation that is premised exclusively on reciprocity. She worries that such a contractarian approach to cooperation creates dilemmas concerning the capabilities of certain groups of individuals.[167] If cooperation is strictly a matter of reciprocity, then what are we to do about the capabilities of people with disabilities? The reciprocity approach to cooperation will have difficulty justifying the development of capabilities for those persons. Supporting their capabilities, Nussbaum suggests, requires a new account of social cooperation, one that is focused on benevolence and altruism rather than mutual advantage exclusively.[168] She views humans as "held together by many altruistic ties as well as by ties of mutual advantage," and she invokes Aristotle's conception of the person as a social being for whom "[t]he good of others is not just a constraint on this person's pursuit of her own good; it is part of her good."[169]

People do in fact cooperate with others to empower those differently abled to develop essential capabilities, despite the lack of any personal advantage in doing so. How can we explain this cooperative behavior? To some extent, of course, enablement for persons with disabilities is a matter that is compelled by law. The Americans with Disabilities Act, for example, requires certain groups of individuals to take affirmative steps to facilitate access for disabled persons.[170] In many other circumstances, however, people are more than happy to help differently abled individuals in activities important to the development of capabilities ranging from recreation to education. A parent on a playground may notice a neurodiverse child being ignored by other children in their game and ask their own child to include that child in the game. In some cases, the neurotypical child may invite the neurodiverse child to join the game without any prompting from a parent. This kind of cooperative behavior does not square with the contractarian assumption that people act purely from self-interested motives, nor does reciprocity really explain such cooperative behavior. It is hard to see where the payoff is for such actions. The better explanation lies in Nussbaum's view of humans as "held together by many altruistic ties as well as by ties of mutual advantage." That view squares with the evolutionary account of Boyd and Nickerson, described earlier.

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166. *Id.*

167. *See* Nussbaum, *supra* note 44, at 149-152.

168. *See id*, at 150.

169. MARTHA C. NUSSBAUM, FRONTIERS OF JUSTICE: DISABILITY, NATIONALITY, AND SPECIES MEMBERSHIP 158 (2006).

170. *See* 28 C.F.R. §§ 36.101-36.608 (2024); 42 U.S.C. § 12183.

VI. CLIMATE CHANGE AND HUMAN FLOURISHING

How can we flourish in a world where climate change poses existential threats? Any adequate answer to that question has to begin with the recognition of our inherent sociability and interconnectedness. In coping with climate change, let alone flourishing in the presence of climate change, we cannot act individually or in isolation. The only strategies that will succeed are cooperative ones. Cooperation is possible because we are social creatures who depend upon each other for our survival, let alone our flourishing.

Elsewhere, I have described what I called a "social thesis" that follows from our dependency on others:

> In order for me to be a certain kind of person—a free person with the basic capabilities necessary for human flourishing—I must be in, belong to, and support a certain kind of society—a society that supports a certain kind of political, social, and moral culture and that maintains a decent background material structure.[171]

What I mean to say here is that each of us has an obligation to belong. More concretely, we are obligated to support the institutions, associations, and infrastructures that in turn support the society and culture in which we live. This obligation is really self-regarding. If my society and its values are important to me, then I must maintain the conditions that make their existence possible. It is in my own interest to do what I can to enable these institutions to endure. This is why our obligation to belong is really not a matter of sacrifice at all. It is a matter of self-interest, so that we, each of us, can flourish.

We fulfill the obligation to belong in many ways. We vote; we pay taxes; we join civic groups, churches, synagogues, and mosques; we join unions; and the list continues. In all these activities, we cooperate. As the previous discussion indicated, we are a cooperative species, resulting from a complex process of cultural-genetic inheritance. By joining in various activities and cooperating with each other, we enable the development of the capabilities that are essential to leading flourishing lives. Recall that these include food and shelter, education, good health, having attachments with others, and so on.[172] Each of these capabilities involves cooperation with others in some way. We simply cannot develop these capabilities on our own. Alasdair MacIntyre has described humans as "dependent rational animals."[173] As he states, "we cannot have a practically adequate understanding of our own good, of our own flourishing, apart from and independently of the flourishing of that whole set of social relationships in which we

171. GREGORY S. ALEXANDER, PROPERTY AND HUMAN FLOURISHING 55 (2018).

172. *See* NUSSBAUM, *supra* note 169, at 76.

173. *See* ALASDAIR MACINTYRE, DEPENDENT RATIONAL ANIMALS: WHY HUMAN BEINGS NEED THE VIRTUES 5 (1999).

have found our place."[174] It is only within this set of relationships that we are able to develop the capabilities that enable us to live flourishing lives.

This is the basis of the bottoms-up strategy of climate change adaptation. Adapting to climate change successfully must take into account the social thesis I stated earlier. That is, it requires that each of us actually belong to the communities and the society that enables us to flourish, and that we actually support those communities and that broader society. What constitutes flourishing is an individual matter, but realizing it is not. However each of us defines a well-lived life, we can achieve such a life only in a social context. This is why cooperation is an indispensable capability for surviving, let alone flourishing in the environment of climate change.

Human flourishing may seem like an impossible aspiration under the best of circumstances to those who are under life's thumb. For them, just getting by is quite enough. Add the disastrous conditions wrought by climate change to the mix, and you get a scenario that leaves hardly enough room for survival, let alone flourishing—no matter how one defines that term. In fact, climate change disasters seem to make human flourishing beyond the reach of everyone these days.

And yet this dismal picture is not a foregone conclusion. There exist prospects that may make it possible for all persons to flourish in the future. A wide variety of adaptive measures have been developed to mitigate the effects of climate change. Some of these require government action, but many do not. COPE was just one example of such an initiative that did not need government intervention.

Perhaps the greatest impediment to human flourishing in the presence of climate change is world poverty and inequality of resources devoted to climate change adaptation, especially in Third World countries but also within the U.S.[175] Wealth permits owners to make investments to protect themselves against climate-related risks. In more extreme cases, the investments are not feasible, but wealth enables protection by moving to areas less exposed to the risks associated with climate change disasters.[176]

The problem is especially acute in the Third World. As two authors crisply put it, "[c]limate change will injure vulnerable communities."[177] Frustratingly, those same communities may be at risk of serious injury

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174. *Id.* at 107-08.

175. For an excellent discussion of the topic of climate change adaptation and inequality in the U.S., see David A. Dana, *Climate Change Adaptation as a Problem of Inequality and Possible Legal Reforms*, 117 NW. U. L. REV. 71 (2022).

176. *Id.* at 75.

177. Elizabeth Marino & Jesse Ribot, *Adding Insult to Injury: Climate Change and the Inequities of Climate Intervention*, 22 GLOB. ENV'T CHANGE 323 (2012) (quote is from the article's abstract).

following policies and plans aimed at mitigating or adapting to climate change. Although climate change mitigation and adaptation measures may create opportunities for vulnerable communities to reduce risk, they also have their own stratifying consequences for vulnerable communities.[178] In Shishmaref, Alaska, for example, relocation as an adaptation strategy to changing ecological conditions is the only sustainable option.[179] However, historically constructed vulnerability of the indigenous Iñupiat community together with mis- and under-representation of their voices in adaptation planning exacerbate their susceptibility.[180] Several case studies in other countries reveal that as part of climate change mitigation and adaptation policies, resource control and management tends to be shifting away from participatory programs to those that rely on technical expertise or state and global actors.[181] Technical expertise is needed, of course, but unless local voices are heard, already existing social stratification will be intensified.

CONCLUSION

In a very real and concrete way, human flourishing is dependent upon the natural world that we inhabit. As flourishing lives require certain capabilities, environmental conditions may affect development of those capabilities. Climate change threatens those conditions, and in doing so creates increasingly greater difficulties for meeting our capability needs, ranging from first-order capabilities such as food and shelter, to second-order ones like play and social affiliations or relationships. "Climate change will also affect the ability of many to move freely,"[182] while for others the effect of rapid climate change is to force them to relocate, disrupting stable relationships with their families and other communities.

Breena Holland has argued that a sustainable environment is what she calls a "meta-capability."[183] She reasons that "certain environmental conditions [are] instrumental to human capabilities in the same way that Nussbaum treats material things such as shelter, nourishment, and property as instrumental to human capabilities."[184]

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178. *Id.*

179. *See* Elizabeth Marino, *The Long History of Environmental Migration: Assessing Vulnerability Construction and Obstacles to Successful Relocation in Shishmaref, Alaska*, 22 GLOB. ENV'T CHANGE 374, 374 (2012).

180. *See id.*

181. *See, e.g.*, Betsy A. Beymer-Farris & Thomas J. Bassett, *The REDD Menace: Resurgent Protectionism in Tanzania's Mangrove Forests*, 22 GLOB. ENV'T CHANGE 332, 332 (2012).

182. *See* David Schlosberg, *Climate Justice and Capabilities: A Framework for Adaptation Policy*, 26 ETHICS & INT'L AFF. 445, 454 (2012).

183. *See* Breena Holland, *Justice and the Environment in Nussbaum's "Capabilities Approach": Why Sustainable Capacity is a Meta-Capability*, 61 POL. RSCH. Q. 319 (2008).

184. *Id.* at 320.

She further concludes: "[B]ecause certain environmental conditions are necessary for producing and sustaining these material things, and indeed for making all human capabilities possible, I seek to establish these environmental conditions as an independent 'meta-capability.'"[185] For example, she points to the effect of storm surges and tidal flooding forcing people, especially poor people, to move away from the coast. Such disruption of one's homes involves more than just direct relocation costs. It means severing attachments to one's friends and the community that makes a place a home; it may even involve detaching from parts of one's family. Such relocation can be a traumatic event, as suggested by the experiences of the low-income families in New Orleans who were forced to move out of the Lower Ninth Ward during Hurricane Katrina.[186] The same is true for the victims who survived the Camp Fire of 2018, in Paradise, California.[187]

Various methods of adapting to climate change must be pursued if the capabilities that are essential to flourishing lives are sustained. At the center of these methods are local groups. Particularly within cities, neighborhoods are increasingly taking the initiative in addressing local effects of climate change through adaptation efforts.

Local groups such as the ones mentioned above illustrate that at the core of these initiatives is cooperation. The capability to cooperate with others is indispensable to the success of adaptation programs. Development of the capacity to cooperate with others does not depend on owning property, but our ability to protect property may depend on cooperativeness. Humans have a capacity to cooperate, especially under conditions of shared existential threat.[188] Under such circumstances they share information, strategize together, and may even put themselves in harm's way to help others avoid imminent dangers to themselves or their property. Capability theorists have argued that the state must provide or at least enable individuals with the necessary capabilities, but while this is the case with respect to

185. *Id.*

186. *See* Breena Holland, *Environment as Meta-Capability: Why a Dignified Human Life Requires a Stable Climate System*, in ETHICAL ADAPTATIONS TO CLIMATE CHANGE: HUMAN VIRTUES OF THE FUTURE 145, 153-55 (Allen Thompson & Jeremy Bendik-Keymer eds., 2012).

187. Dani Anguiano, *Trauma, Fear, Homelessness: Life After California's Deadliest Fire Shows the Future of Climate Crisis*, THE GUARDIAN (Sept. 9, 2020), https://www.theguardian.com/us-news/2020/sep/09/trauma-fear-homelessness-paradise-camp-fire-migrants-climate-change. ("The Camp Fire started on Thursday, November 8, 2018, in Northern California's Butte County. The fire caused at least 85 civilian fatalities, and injured 12 civilians and five firefighters. . . . It . . . destroyed more than 18,000 structures" and "almost completely destroyed" the town of Paradise. *Remembering the Camp Fire*, CALFIRE, https://www.fire.ca.gov/our-impact/remembering-the-camp-fire (last visited Mar. 16, 2025).)

188. *See, e.g.*, Henrike Moll & Michael Tomasello, *Cooperation and Human Cognition: The Vygotskian Intelligence Hypothesis*, 362 PHIL. TRANSACTIONS OF THE ROYAL SOC'Y: BIOLOGICAL SCIENCES (2007); MICHAEL TOMASELLO, THE CULTURAL ORIGINS OF HUMAN COGNITION (1999); Harvey Whitehouse et al., *The Evolution of Extreme Cooperation via Shared Dysphoric Experiences*, 7 SCI. REPORTS 6-7 (2017).

certain capabilities like health, it is not true of cooperativeness. Aristotle was right when he famously characterized humans as social animals. Humans learn how to cooperate without any help from the state.

The voluminous literature on capabilities makes clear that capabilities are ends, and that it is the ends rather than the means on which our attention should be focused. Although it is certainly the case that ends are what ultimately matter when thinking about well-being, it hardly follows that means are thus irrelevant. When we examine actual social practices that promote well-being, we may find that what we had assumed were ends, valued for themselves, were in some cases actually means. This appears to be the case in my example with COPE, where the capabilities of cooperativeness and practical reasoning have functioned as indispensable means to the desired end of human flourishing or, more specifically, protecting life and property. Nevertheless, the general point of capabilities theory still holds true—capabilities, rather than resources, are the key to living a fulfilling and free life.