

Older People and Action on Climate Change: A Powerful But Underutilized Resource

Karl Pillemer, Ph.D., Marie Tillema Cope, MPH, MSW, Julia Nolte, MA, MSc

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1. Introduction

a. Climate Change as a Threat to Older Populations

The threat of global climate change is increasing the incidence of disease, extreme weather events, rising sea levels, and shortages of water and food. If atmospheric concentrations of greenhouse gases grow unabated, it is predicted that widespread ecosystem collapse will ensue. These stressors to human habitability will be borne disproportionately by more vulnerable human populations across the globe.

Older people are among those most at risk to climate change because some decreased mobility and changes in physiology, and often more limited access to resources, all of which may limit their adaptive capacity. They are more vulnerable to the effects of temperature extremes and have a significantly higher mortality risk in extreme weather events, both of which are being exacerbated by climate change. The changing climate further will increase vector-borne diseases, compromise agriculture, reduce the availability of fresh water, and decrease habitability of human population centers. Thus, older vulnerable populations will face adaptive challenges to their new environments, with far-reaching implications for strategies to cope with climate change.

The older population in the Asia Pacific region may be particularly affected by these trends. Due to their location, many countries in this region will experience more frequent and intense heatwaves, as well as sudden-onset weather events like typhoons/cyclones and flooding. Rapid urbanization in many of the region's countries also place older people at risk during urban heat island conditions.¹ Given that the Asia Pacific region is home to over half of the world's population age 60 and over, the likely effects of climate change on this population are alarming and must be addressed.

b. Older People as Part of the Solution to Climate Change Threats

Merely viewing older individuals as passive victims of environmental threats is an overly narrow and limiting perspective. **Equally critical to efforts to address climate change is expanding and promoting opportunities for older people to act on their own behalf and that of others.** There is consensus that public involvement and political engagement are essential to curb fossil fuel consumption and limit the rise in global temperature. Older adults around the world can be active participants rather than passive actors around climate change, by mobilizing in large numbers to address local environmental problems through civic environmentalism.

Despite efforts in a number of countries, it is clear that the current cohort of older people engaged in environmental issues represents the “tip of the iceberg” and that the potential for large-scale involvement is much higher. Older adults often have more time for civic engagement and volunteerism, and they may have critical lived experience and expertise to contribute to the cause. To date, however, environmental organizations have not been successful in maximizing older people’s involvement, nor have many aging-related associations become involved in promoting environmental engagement.

This is a missed opportunity that should be addressed, because promoting wide-scale involvement of older persons climate change mobilization can have substantial benefits at the individual, regional, and national levels. Important questions must be answered, including: What is the current role of older people in climate change action? What are the barriers to such engagement? How can such action be promoted?

In this working paper, we provide an overview of several key issues in the area of *older environmental action*. By the term “older environmental action,” we mean behaviors in which people engage, often as members of or in collaboration with organizations, to address issues such as climate change, sustainability, and conservation. These activities include joining local environmental groups and volunteering for projects aimed at promoting environmental quality where one lives. Increasingly, such action involves collective mobilization in support local or national environmental movements.² Research suggests that social mobilization is especially critical in countries with weaker institutions; for example, the role of organized citizen pressure for pro-environmental policies has been especially pronounced in the Global South.³

We would note several limitations to this review. First, there are few studies or other published reports specifically on climate change action by older people. For this reason, we have expanded the topic to include environmental action among older adults more generally. This decision was considered to be acceptable because environmental action is likely to include concern with the more specific issue of climate change. Second, as there is a lack of research and policy reports on this topic from low- and middle- income countries (LMICs); expanding our understanding of older environmental action beyond high-income countries (HICs) is a high priority. Third, we acknowledge that transfer of findings and concepts between countries is challenging. For example, “retirement” differs substantially between low-, middle-, and high-income nations.

We begin by examining the potential benefits of expanded older environmental action both for older persons and for communities. Next, we note a number of barriers to wider engagement of older people in climate change action. We then conclude with suggestions to better understand and promote older environmental action.

2. Benefits of Older Environmental Action

The world is now searching for ways to address climate change and the related threats to the natural environment we have described in the previous section. **Globally, older environmental action provides an excellent opportunity to address two pressing social problems simultaneously: the need for greater social integration and participation of older persons and the mounting concern about the sustainability of the natural environment.** There is reason to argue that the match between older persons and environmental activities is an excellent one. Further, significant benefits to local communities can also result.

a. Benefits to Older Persons

The most obvious benefit to older persons of climate change and environmental action is the prospect that if successful, such efforts will slow the process and protect vulnerable populations. In addition, emerging research shows that there are personal benefits to older people who engage in environmental action such as civic engagement, political involvement, and volunteerism. These benefits include:

- **Health benefits.** Engagement in pro-environmental activities promotes both physical and mental health among older people. A major reason for the beneficial effects of environmental action is an increase in physical activity.^{4,5} Research, including studies of high-income countries (HICs) and LMICs, has found that meeting physical activity guidelines is beneficial to older people in terms of quality of life and life expectancy.⁶
- **Psychological benefits.** A major mechanism for the positive effects of taking action to resolve local environmental problems is also empowering and can enhance older people's self-efficacy and psychological well-being.
- **Promoting generativity.** Across countries and cultures, research shows that older people benefit from activities that are focused on improving the world and leaving a legacy for future generations. A prime example is stewardship of the environment. Research suggests that the desire to extend one's influence into the future and leave a lasting personal legacy motivates individuals toward climate change action.^{7,8} Thus, environmental action is a very appropriate fit for the developmental tasks of later life.
- **Promoting Resilience.** Older people can provide models for resilience in adverse situations, which can contribute to their leadership around climate change. In many parts of the world, community elders are leaders and bearers of traditional knowledge, which can expand their influence around climate change mitigation. They can serve as a particularly strong resource as agents for change in low-resource environments, where their experiential knowledge and practical wisdom can assist both individual and collective environmental action.⁹

b. Benefits to Communities

Environmental action has been identified as one of the most important solutions to environmental problems, in particular at the local level. The success, and indeed the existence, of many environmental efforts depend on activists, including environmental restoration, protection of endangered species, collection of scientific environmental data, monitoring environmental quality, and maintenance of protected natural areas.

Specifically in terms of climate change, social mobilization is critically important in shifting policies, practices, and daily habits to achieve low-carbon outcomes. Research has demonstrated the effectiveness of environmental movements in changing the policies and behavior of corporations¹⁰ and of governments,¹¹ as well as promoting local pro-environmental behavior.¹² Older people can contribute to this process globally through such activities as building public support for governmental policies and promoting citizens' capacity to carry out climate change mitigation and adaptation projects.

Studies point to concrete environmental benefits to local communities as a result of older people's engagement.¹³ Activists are key to performing activities like monitoring habitat and control of invasive species. Marine-based programs have had success in both HICs and LMICs, such as projects to protect mangroves and shoreline habitat.¹⁴ Although such programs are more limited in LMICs, there is great potential for expansion as new techniques are developed for engagement (e.g., overcoming lack of internet access).¹⁵

c. Filling the Need: Older Environmentalists

A concern for environmental organizations is attracting and retaining a sufficient supply of volunteers¹⁶ given the critical role they play in many projects. Therefore, a key solution is engaging the relatively untapped source of environmental activists is the older population.¹⁷ In some cases, older people have reduced work and family responsibilities, and thus have more time to dedicate to environmental action and civic engagement. As noted, older people may occupy positions as respected local leaders who can influence others in their communities.

Although formal retirement from occupations is more common in HICs, in LMICs as well the majority of the older population is not in the paid workforce. For example, a recent report found that approximately 60 percent of people age 60 and over are no longer in the paid workforce in Bangladesh, Nepal, the Philippines, Thailand, and Vietnam.¹⁸ It is clear, however, that there is great variability in the existence of a formal retirement period, and the form such retirement takes, both within and across countries. Among older people with higher resources, retirement involves additional leisure time that can be used for environmental action; this is less often the case when resources are low.

Further, due to their increasing numbers the impact of older people's collective behaviors is profound. Over the coming three decades, the number of people age 65 and over will double from 703 million to 1.5 billion. This dynamic is erroneously seen as affecting only high-income countries. In fact, the aging population has grown most quickly in Eastern and South-Eastern Asia, Latin America, and the Caribbean.¹⁹ As life expectancies increase, people in these regions are experiencing the same "longevity bonus" that Western countries achieved earlier.

With the aging of global populations, in some countries there is a vast reservoir of older persons no longer in the labor force who could take advantage of opportunities for civic environmental engagement, but most countries provide few organized pathways into such activities. A key effort to fill this gap is to develop new models for creating environmental roles for older persons that are inclusive, rewarding, and maximize their strengths and abilities.

3. Barriers to Environmental Action among Older People

Despite the potential benefits, older people appear to be less likely to engage in environmental action than younger individuals. Data from the United States show that rates of environmental volunteerism are much lower among people age 65 and over than for almost all other types of volunteering.^{20,21} This pattern holds true in many high-income countries across the world.²² Thus, there is considerable room for the development of environmental action opportunities for older adults and the recruitment of older persons to environmental organizations. Our review did not uncover any comparative data regarding levels of environmental engagement in LMICs; this is an important topic for future investigation.

Existing research suggests several major barriers that may depress the interest of older persons in environmental action and limit their opportunities to engage in it.

1. **Age differences in environmental attitudes.** Older adults' lack of involvement in environmental action may, in part, stem from age differences in attitudes toward climate change and related environmental issues. Studies involving participants from Indonesia, Japan, Australia, the United States, and Sweden show that older adults are less inclined to sacrifice part of their income on behalf of a clean environment than younger adults.^{23, 24,25} Overall, support across countries for pro-environmental policies such as pledging divestment from fossil fuels or curtailing the emission of greenhouse gases is lower among older adults than younger adults.²⁵ Although the relationship between age and climate change denial is not fully clear, there is fairly consistent evidence that younger adults are more concerned about climate change than are older individuals.^{26, 27, 28, 29}
2. **Perceived lack of knowledge and expertise.** Older people often feel that they lack sufficient expertise or knowledge about environmental issues and science in general to contribute effectively. This lack of self-confidence in their own expertise can depress participation.³⁰ The age gap that still persists in using information technology also inhibits older participation in some environmental activities, which may rely on the internet for recruitment and engagement.
3. **Lack of awareness of opportunities for environmental action.** The need has been identified for easily accessible resources that describe the range of environmental engagement opportunities,³¹ which would assist older adults in finding the opportunity that best meets their interests, skills, and abilities. This gap includes opportunities for those with limited knowledge or expertise, and even limited mobility.
4. **Lack of resources.** A structural barrier prevalent in low-resource settings is lack of resources. Research shows that occupying privileged status is associated with larger amounts of money and time, as well as relevant skills, that lead to greater political participation in general.³² Another unfortunate barrier in LMICs should not be ignored: increasing violence toward environmental activists, including older individuals. Studies show that such crimes are typically targeted at the efforts of indigenous groups who are opposing deforestation, pollution, and similar environmental threats.³³

4. Promoting Older Environmental Action

We have noted both the need for widespread mobilization of older people in environmental action, as well as barriers to such engagement. Programs are needed that facilitate involvement, making it easier for diverse groups of older people to take action on climate change. Research and limited existing program models suggest potential options for fostering engagement and action around climate change, sustainability, and conservation. We propose several recommendations based on research and best practices to increase older people's participation.

a. Recommendations for mobilizing older people

- **Provide a basic core of knowledge to facilitate older people's involvement in environment action.** As noted, some older people avoid environmental volunteering because they feel they do not understand the issues or have specialized expertise needed for some activities (e.g., water quality testing, reef protection). Programs can provide basic science-based educational sessions adapted for older audiences and those with lower resources. Citizen science initiatives to address climate change can help fill this knowledge gap.³⁴
- **Provide training to older citizens to be effective environmental activists.** Training is needed to develop leadership skills for environmental action. Participants can benefit from understanding how their values affect their environmental activities, how to maximize the effectiveness of their actions, and learning what types of opportunities exist in their areas. Such training must be adapted to different countries, local environments, and audiences, and to settings ranging from high-income to low-income countries.
- **Adapt activities for the differing levels of ability among older people.** Few environmental agencies and organizations are capitalizing on the "age wave" by targeting older people as participants and working to meet their specific interests and abilities. An important step is to adapt activities specifically for older people. Older activists require a range of roles, including activities that are specially designed for older persons with diminished physical capacity. In addition, organizational locations should be fully accessible. Transportation issues for older people with limited mobility or access to vehicles must also be addressed.
- **Include alternatives to internet-based strategies.** Many environmental programs, especially those that emphasize citizen science, rely on the internet for engagement. It is no coincidence that many such programs are conducted in HICs (e.g., bird counts). Face-to-face strategies have been used effectively in low-resource communities for environmental engagement programs.³⁵ Such options are particularly important for older participants, who may be less likely to have access or proficiency using the internet.
- **Link climate change organizations to Older People's Associations (OPA).** OPAs are community-based groups of older people who work together to benefit both older individuals and the communities in which they live. They aim to promote dignity and quality of life, increase older peoples' skills, and reduce isolation. OPAs are playing an increasingly prominent role in many LMICs. They have been found to provide meaningful activities, social contact, and opportunities for community participation (including expanding opportunities for persons with disabilities).³⁶ These effective, grassroots organizations are a promising option to promote older environmental action. Collaboration between

OPAs and environmental organizations also can bridge the needs for scientific expertise and recruitment of older participants.

b. Models for Program Development

To date, there is very limited information about the extent and nature of environmental action among older people. Case study reports exist from a number of countries, but little is known about effective methods of promoting environmental action in later life. Particularly lacking is information from LMICs. Therefore, a major task is to better understand and evaluate the involvement of older people in climate change action and to document “best practices” for such engagement. Equally important, it is clear that environmental action by older people is taking place in many LMICs, but such engagement has not been publicized. Therefore, creating a clearinghouse for local older environmentalism that documents local initiatives would be extremely beneficial.

Despite the relative lack of information, some efforts have been documented. Although older people make up part of the membership, donor base, and participants of many local and national environmental organizations, our focus here is on programs, projects, and activities that specifically target older adults. These programs fall into six general categories: (1) government programs; (2) national advocacy organizations and associations; (3) international programs; (4) intergenerational programs and initiatives; (5) local sustainability and conservation programs; and (6) citizen science initiatives. We briefly profile these program areas and provide examples in Annex 1. As the table (Annex 1) demonstrates, we need much greater understanding and documentation of program models that promote and sustain older environmental action outside of HICs.

5. Conclusion: Issues to Be Addressed to Understand and Promote Older Environmental Action

Environmental action in the older population can be life-enhancing to the individuals and beneficial to their communities. It can help to mitigate the effects of climate change and more broadly improve environmental quality. However, this resource is vastly underutilized, with only a small percentage of older persons engaging in environmental organizations and activities. Further, the benefits specific to environmental action for older adults and for their communities have received limited research attention, especially in LMICs.

A high priority is therefore to understand the causes and dynamics of later-life environmental action and barriers to such involvement. Specific questions for consideration by policymakers, organizational leaders, and researchers include:

- **Barriers.** What are the barriers to environmental action among older people? What is the degree to which physical limitations more prevalent in the older population limit participation in environmental activities? Does offering a range of possibilities increase participation? How can barriers to environmental action or civic engagement be diminished in marginalized and low-resource populations, who have been less likely to engage in such activities?

- **Strategies.** How can programs transform environmental action into lasting pro-environmental behaviors? How can organizations structure environmental engagement experiences to accommodate older persons with different levels of physical function and ability? What strategies can be used to encourage ethnic, cultural, and socioeconomic diversity in environmental volunteering? How can environmental organizations create the organizational capacity to recruit, train, and develop appropriate jobs for elders interested in engaging? How relevant are programs developed in HICs to LMICs? How can such programs be adapted across countries and cultures?
- **Benefits.** What are the measurable benefits to individuals, communities, and society from later-life environmental engagement? Are there specific types of environmental action that confer more health or well-being benefits to participants and communities than others? How can science help make the case for the benefits of older environmental action?

Particularly important is the development and evaluation of programs to promote older environmental action. Our earlier discussion of potential benefits suggests that this activity is highly appropriate across countries for the “third age” and can lead to positive outcomes for older people and their communities. Such action can also build a global “gray and green” movement to address climate change. Given current low rates of participation in such activities, flexible and culturally-relevant program models, organizational structures, and recruitment methods are needed to promote environmental action more successfully in later life.

Endnotes

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- ¹ Akhtar, R. (2016). *Climate change and human health scenario in south and Southeast Asia*. Springer.
 - ² Dono, J., Webb, J., & Richardson, B. (2010). The relationship between environmental activism, pro-environmental behaviour and social identity. *Journal of Environmental Psychology, 30*(2), 178–186. <https://doi.org/10.1016/j.jenvp.2009.11.006>
 - ³ Herrera, V. (2010). The case for studying urban environmental politics in the developing world. *APSA Comparative Politics, XXX*(1), 43–49.
 - ⁴ Librett, J., Yore, M. M., Buchner, D. M., & Schmid, T. L. (2005). Take pride in America’s health: Volunteering as a gateway to physical activity. *American Journal of Health Education, 36*, 8–13. <https://doi.org/10.1080/19325037.2005.10608149>
 - ⁵ Pillemer, K., Fuller-Rowell, T. E., Reid, M. C., & Wells, N. M. (2010). Environmental volunteering and health outcomes over a 20-year period. *The Gerontologist, 50*, 594–602. <https://doi.org/10.1093/geront/gnq007>
 - ⁶ Felez-Nobrega, M., Haro, J. M., Stubbs, B., Smith, L., & Koyanagi, A. (2020). Moving more, ageing happy: Findings from six low- and middle-income countries, *Age and Ageing, afaa137*. <https://doi.org/10.1093/ageing/afaa137>
 - ⁷ Zaval, L., Markowitz, E. M., & Wever, E. U. (2015). How will I be remembered? Conserving the environment for the sake of one’s legacy. *Psychological Science, 26*(2), 231–236. <https://doi.org/10.1177/0956797614561266>
 - ⁸ Warburton, J., & Gooch, M. (2007). Stewardship volunteering by older Australians: The generative response. *Local Environment, 12*, 43–55. <https://doi.org/10.1080/13549830601098230>

- ⁹ HelpAge International. (2014). Disaster resilience in an ageing world: How to make policies and programmes inclusive of older people. <https://www.unisdr.org/2014/iddr/documents/DisasterResilienceAgeingWorld.pdf>
- ¹⁰ Carberry, E. J., Bharati, P., Levy, D. L., & Chaudhury, A. (2017). Social movements as catalysts for corporate social innovation: environmental activism and the adoption of green information systems. *Business & Society*, 58(5), 1083–1127. <https://doi.org/10.1177/0007650317701674>
- ¹¹ Shandas, V., & Messer, W. B. (2008). Fostering green communities through civic engagement: Community-based environmental stewardship in the Portland area. *Journal of the American Planning Association*, 74(4), 408–418. <https://doi.org/10.1080/01944360802291265>
- ¹² Prasetyo, W. H., Kamarudin, K. R., & Dewantara, J. A. (2019). Surabaya green and clean: Protecting urban environment through civic engagement community. *Journal of Human Behavior in the Social Environment*, 29(8), 997–1014. <https://doi.org/10.1080/10911359.2019.1642821>
- ¹³ Ewing, C. P., Catterall, C. P., & Tomerini, D. M. (2013). Outcomes from engaging urban community groups in publicly funded vegetation restoration. *Ecological Management & Restoration*, 14, 194–201. <https://doi.org/10.1111/emr.12054>
- ¹⁴ Great Barrier Reef Citizen Science Alliance (n. d.). *Mangrovetwatch. Partnering scientists with the community to monitor and protect shoreline habitat*. <https://www.reefscitizenscience.org/organisations/mangrovetwatch>
- ¹⁵ Requier, F., Andersson, G. K., Oddi, F. J., & Garibaldi, L. A. (2020). Citizen science in developing countries: how to improve volunteer participation. *Frontiers in Ecology and the Environment*, 18(2), 101–108. <https://doi.org/10.1002/fee.2150>
- ¹⁶ McDougale, L. M., Greenspan, I., & Handy, F. (2011). Generation green: Understanding the motivations and mechanisms influencing young adults' environmental volunteering. *International Journal of Nonprofit and Voluntary Sector Marketing*, 16, 325–341. <https://doi.org/10.1002/nvsm.431>
- ¹⁷ Pillemer, K., & Wagenet, L.P. (2008). Taking action: Environmental volunteerism and civic engagement by older people. *Public Policy and Aging Report*, 18(2), 23–27. <https://doi.org/10.1093/ppar/18.2.1>
- ¹⁸ Knox-Vydmanov, C. (2017). *Work, family, and social protection: Old age income security in Bangladesh, Nepal, the Philippines, Thailand and Vietnam*. Eldis. <https://www.eldis.org/document/A101523>
- ¹⁹ United Nations, Department of Economic and Social Affairs, Population Division (2020). *World Population Ageing 2019: Highlights (ST/ESA/SER.A/430)*. <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewi2kOaz7bLuAhUjFVvKfHUYkAfsQFjABegQIBhAC&url=https%3A%2F%2Fwww.un.org%2Fen%2Fdevelopment%2Fdesa%2Fpopulation%2Fpublications%2Fpdf%2Fageing%2FWorldPopulationAgeing2019-Report.pdf&usg=AOvVaw2zwQL9S1VNq8liaQFWYjIY>
- ²⁰ U. S. Bureau of Labor Statistics (2016). Table 4. *Volunteers by type of main organization for which volunteer activities were performed and selected characteristics, September 2015*. <https://www.bls.gov/news.release/volun.t04.htm>
- ²¹ Pillemer, K., Wagenet, L. P., Goldman, D., Bushway, L., & Meador, R. (2010). Environmental volunteerism in later life: Benefits and barriers. *Generations*, 33(4), 58–63. <https://www.jstor.org/stable/26555700>
- ²² Kafková, M. P. (2019). Environmental attitudes in an intergenerational perspective. *Slovensky Národopis*, 2(67), 201–215. <https://doi.org/10.2478/se-2019-0011>
- ²³ Running, K. (2015). Towards climate justice: How do the most vulnerable weigh environment-economy trade-offs? *Social Science Research*, 50, 217–228. <https://doi.org/10.1016/j.ssresearch.2014.11.018>
- ²⁴ Winden, M., Jamelske, E., & Tvinnereim, E. (2018). A contingent valuation study comparing citizen's willingness-to-pay for climate change mitigation in China and the United States. *Environmental Economics and Policy Studies*, 20(2), 451–475. <https://doi.org/10.1007/s10018-017-0202-9>
- ²⁵ Stokes, B., Wike, R., & Carle, J. (2015). *Global concern about climate change, broad support for limiting emissions*. Pew Research Center. <https://www.pewresearch.org/global/wp-content/uploads/sites/2/2015/11/Pew-Research-Center-Climate-Change-Report-FINAL-November-5-2015.pdf>
- ²⁶ Gifford, R., & Sussman, R. (2012). Environmental attitudes. In S. D. Clayton (Ed.), *The Oxford handbook of environmental and conservation psychology* (pp. 65–80). <https://doi.org/10.1093/oxfordhb/9780199733026.013.0004>

- ²⁷ Zaval, L., Weber, E. U., & Spada, E. (2013). *Green and graying: Environmental decision making across the lifespan*. Talk presented at the annual meeting of the Society for Judgment and Decision Making, Toronto, Canada.
- ²⁸ Moser, S. C. (2016). Never too old to care: Reaching an untapped cohort of climate action champions. *Public Policy & Aging Report*, 00(00), 1–4. <https://doi.org/10.1093/ppar/prw029>
- ²⁹ Winden, M., Jamelske, E., & Tvinnereim, E. (2018). A contingent valuation study comparing citizen's willingness-to-pay for climate change mitigation in China and the United States. *Environmental Economics and Policy Studies*, 20(2), 451–475. <https://doi.org/10.1007/s10018-017-0202-9>
- ³⁰ Bushway, L. J., Dickinson, J. L., Stedman, R. C., Wagenet, L. P., & Weinstein, D. A. (2011). Benefits, motivations, and barriers related to environmental volunteerism for older adults: Developing a research agenda. *International Journal of Aging and Human Development*, 72(3), 189–206. <https://doi.org/10.2190/AG.72.3.b>
- ³¹ Howgate, D. (2008). *Increasing volunteerism among older adults: Benefits and strategies for states*. National Governors Association, Center for Best Practices.
- ³² Marquart-Pyatt, S. T. (2012). Explaining environmental activism across countries. *Society & Natural Resources*, 25(7), 683–699. <https://doi.org/10.1080/08941920.2011.625073>
- ³³ Jeffords, C., & Thompson, A. (2016). An empirical analysis of fatal crimes against environmental and land activists. *Economics Bulletin*, 36(2), 827–842. <https://EconPapers.repec.org/RePEc:ecbull:eb-15-00335>
- ³⁴ Park, N. E., Choe, S. U., & Kim, C. J. (2020). Analysis of Climate Change Education (CCE) programs: Focusing on cultivating citizen activists to respond to climate change. *Asia-Pacific Science Education*, 6(1), 1–26. <https://doi.org/10.1163/23641177-BJA00004>
- ³⁵ Requier, F., Andersson, G. K., Oddi, F. J., & Garibaldi, L. A. (2020). Citizen science in developing countries: How to improve volunteer participation. *Frontiers in Ecology and the Environment*, 18(2), 101–108. <https://doi.org/10.1002/fee.2150>
- ³⁶ Helpage International, Asia Pacific Regional Office. (2020). *Older people's associations: A briefing on their impact, sustainability and replicability*. <https://www.helpage.org/download/58c140ef79978>

Annex 1. Example Initiatives for Older Adult Environmental Engagement

Type	Description	Examples	Location	Website
Government Initiatives	Developed and funded by the government	Senior Environmental Employment Program is a federal governmental program that provides an opportunity for older adults to assist the U.S. Environmental Protection Agency on various federal, state, and local environmental projects.	United States	https://www.epa.gov/careers/senior-environmental-employment-see-program
		TAMAR Sea Turtle Conservation Program is a federal government initiative to preserve Brazil's sea turtles in partnership with community members, including older adult fishermen employed to carry out turtle monitoring.	Brazil	http://www.tamar.org
		Green Climate Fund is an intergovernmental fund created by the UN Framework Convention on Climate Change to help developing countries fight climate change, with 150 projects in vulnerable societies and populations, including older adults.	International (Developing countries)	https://www.greenclimate.fund/
National Initiatives	Focused on national advocacy	Elders Climate Action is a nonprofit organization dedicated to mobilizing elders to address climate change.	United States	https://www.eldersclimateaction.org
		Sanctuary Nature Foundation's Mud on Boots Project is a program to support on-ground conservationists in India with the goal of documenting traditional environmental knowledge held by indigenous communities and their elders.	India	https://www.sanctuarynaturefoundation.org/projects/mud-on-boots
		Klima Action Malaysia is a nonprofit organization that calls for representative climate action in Malaysia by empowering vulnerable and marginalized groups, including older adults.	Malaysia	https://en.klimactionmalaysia.org/
International Initiatives	Focused on international advocacy	Climate and Development Knowledge Network is an international alliance that supports climate compatible development for those most vulnerable to climate change, including by combining traditional knowledge from elders with research and technology.	International (Africa, Asia, Latin America, Caribbean)	https://cdkn.org
		Senior Environmental Corps is a program of the Environmental Alliance for Senior Involvement, a nonprofit with organizations in 20 countries supporting senior volunteers to enhance their communities and the global environment.	International (20 countries)	https://www.easi.org
		The Elders is an independent group of global leaders with a Climate Change program focused on ensuring a just transition to a low carbon economy and encouraging innovative	International (Worldwide)	https://theelders.org/programmes/climate-change

		solutions to tackling climate change.		
Inter-generational Initiatives	Comprised of intergenerational activities with elders and youth	Green Belt Movement is a women-led indigenous nonprofit organization focused on environmental conservation with education and advocacy programs that link children and elders through community reforestation activities.	Kenya	http://www.greenbeltmovement.org/
		Indigenous Climate Action is an Indigenous-led nonprofit organization that relies on the knowledge of elders to help guide its activities and mentor younger activists fighting for climate justice.	Canada	https://www.indigenousclimateaction.com
		INTERSECTION a cross-national intergenerational project of the University of Sheffield in the United Kingdom, China, and Uganda that examines consumption and awareness of environmental problems across different generations.	International (United Kingdom, China, Uganda)	https://www.sheffield.ac.uk/intersection
Local Initiatives	Focused on local advocacy	Retirees in Service to the Environment is an environmental education and leadership training program for older adults that can run by any local environmental education organization or aging services organization worldwide.	United States, Italy	http://citra-rise.human.cornell.edu
		Local Biochar Initiatives. Many local organizations involve older people as participants in efforts to support safe, economically viable biochar systems.	International	https://biochar-international.org/regional/
		Wasini Island Marine Conservation Project is a project of the non-profit Wasini Beach Management Unit that brings together all those involved with the fisheries, with the support of community elders, to manage and conserve the island's coral reef ecosystems.	Kenya (Wasini Island)	https://wasini.net/general-info-on-wasini/community-conservation-projects/conservation-projects/
		Montana Conservation Elders is a nonprofit organization comprised of older adult members committed to protecting Montana's landscape through education and outreach efforts.	United States (Montana)	https://www.mtconservationelders.org
	Community Action - Planting trees	National Campaign to plant trees. By the end of 2016, VAE and their members had planted more than 50 million trees.	Vietnam	http://hoinguoicaotui.vn/c/nguoi-cao-tuoi-va-chuong-trinh-phoi-hop-bao-ve-moi-truong-4240.htm
		A 67-year-old woman and her group planted more than 2 million trees in the desert in North China.	China	https://www.globaltimes.cn/content/974175.shtml
		Ms. Saalumarada Thimmakka, who was 105-years old and her foundation works to protect the environment by planting trees and	India	https://inhabitat.com/meet-the-105-year-old-

		promoting awareness and actions to protect the environment.		woman-from-india-planted-300-trees-because-she-couldnt-have-children/
		Five examples of older people in Thailand – sharing their knowledge and experience planting trees and protecting forest	Thailand	https://www.youtube.com/watch?v=WkMUNNh3Ud8 https://www.youtube.com/watch?v=zIpUzBkPur0 https://www.youtube.com/watch?v=lg9ddfGPOKk https://www.youtube.com/watch?v=QEkkffo54I0 https://www.youtube.com/watch?v=Mc4dL0-pkFI
	Community and individual action - Biochar	Five examples of older people in Thailand – sharing their knowledge and experience in making and using biochar	Thailand	https://www.youtube.com/watch?v=SHJ6CZ6R3k4 https://www.youtube.com/watch?v=TVCilyq7I64 https://www.youtube.com/watch?v=U_QPcG6VmiM https://www.youtube.com/watch?v=hcAn_eqoHTg https://www.youtube.com/watch?v=ov3sHOHQ8Eo
Citizen Science Initiatives	Engagement of citizens in generating scientific data	Earth Challenge 2020 is the world’s largest ever coordinated citizen science campaign to enable people around the world – including older adults – to collaboratively address the world’s most pressing environmental challenges through technology.	International (Worldwide)	https://www.earthday.org/campaign/earth-challenge-2020
		Animal Demography Unit is a unit of the University of Cape Town that provides citizen scientists – including older adults – the opportunity to collect valuable data for science and conservation.	South Africa	http://www.adu.uct.ac.za/adu/home