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Jessica Ayers and [Tim Forsyth](#)

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Community-Based Adaptation to Climate Change: Strengthening Resilience Through Development

by Jessica Ayers and Tim Forsyth

Department of International Development, London School of Economics and Political Science.

t.j.forsyth@lse.ac.uk

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International efforts to reduce and sequester carbon dioxide and other green-house gases are not yet slowing the rate of global warming. Indeed, the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) anticipates rapid changes in climate even if the greenhouse-gas emissions are reduced quickly,¹ and recent findings suggest that these projections are underestimated.² The impacts of climate change will be severe, particularly for the most vulnerable developing countries that have the least capacity to cope. As a result, the need to support adaptation in developing countries is growing in urgency.

Adaptation describes adjustments in natural or human systems in response to the impacts of climate change.³ Until recently, adaptation was a controversial topic in climate change policy debates, with many arguing that too much attention to adaptation—considered locally focused, inexpensive, and beneficial only in the short term—could detract from more expensive mitigation efforts for the global good. In his 1992 book, *Earth in the Balance*, Al Gore wrote, “Believing that we can adapt to just about anything is ultimately a kind of laziness, an arrogant faith in our ability to react in time.”⁴

However, the tide is turning. Given slow progress on mitigation coupled with evidence of greater and more rapid impacts of climate change than those previously expected by the IPCC, adaptation is firmly on the international policy agenda as a crucial supplement to mitigation. Signaling this change, Gore stated in a recent interview with the *Economist*, “I used to think adaptation subtracted from our efforts on prevention. But I’ve changed my mind. . . . Poor countries are vulnerable and need our help.”⁵

One growing proposal for an approach to adaptation is community-based adaptation. Community-based adaptation operates at the local level in communities that are vulnerable to the impacts of climate change. It identifies, assists, and implements community-based development activities that strengthen the capacity of local people to adapt to living in a riskier and less predictable climate. Moreover, community-based adaptation generates adaptation strategies through participatory processes, involving local stakeholders and development and disaster risk-reduction practitioners. It builds on existing cultural norms and addresses local development concerns that make people vulnerable to the impacts of climate change in the first place. Three international conferences on community-based adaptation have been organized by international organizations and think tanks⁶ since 2005, with policymakers, researchers, and development organizations among the attendees. Community-based adaptation projects are now in operation in vulnerable communities in developing and some developed countries.

Yet fundamental challenges and uncertainties remain about the interpretation of adaptation policy, which in turn affects the implementation of community-based adaptation. What is adaptation to climate change (versus more general climatic variability)? Who or what adapts—and how? How does community-based adaptation fit with larger-scale adaptation policies and programs? Early debates about community-based adaptation, and adaptation in general, are grappling with these questions. In addition, examples of community-based adaptation in vulnerable communities in Bangladesh help illuminate the role and value of community-based adaptation, its limitations, and its potential to help integrate concerns about vulnerability and development into wider climate change policy.

Approaches to Adaptation

Adaptation was not a major part of the debate when climate change came onto the international policy agenda at the UN General Assembly in 1988. Initial approaches generally focused on mitigation through reducing greenhouse gas emissions at source or increasing the sequestration of carbon through managing reforestation and land use.⁷ The United Nations Framework Convention on Climate Change (UNFCCC) in 1992 mentioned adaptation only five times, never defining it.

Since then, adaptation has gained standing within the international climate change arena. The Third Assessment Report of the IPCC in 2001 defined adaptation as “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.”⁸ Six years later, at the 13th Conference of the Parties of the UNFCCC, adaptation formed one of four steps of the so-called Bali Roadmap,

which paves the way for a post-Kyoto policy framework to include adaptation alongside mitigation, technology cooperation, and finance.⁹

Emerging from this climate change policy context, the most common approach to adaptation considers how far processes of adaptation can reduce dangerous impacts of climate change and therefore defines the highest acceptable thresholds of greenhouse gas concentrations. This approach also supports adaptation practices that aim to lessen the impacts of increased atmospheric greenhouse gas concentrations, for example, through engineering and technological measures including new seed varieties, water management, and early warning systems based on projections of future climate conditions and an expected severity in events such as storms, droughts, or tidal surges.¹⁰

Academic observers have described this approach as the “pollutionist” view¹¹ because it focuses on informing climate change policies that are driven by controlling overall levels of greenhouse gas concentrations in the atmosphere, but a number of critics have questioned whether this approach is always appropriate.¹² First, some observers have pointed out that focusing on uncertain climate impacts has slowed down adaptation practices because potential victims of climate change and aid donors are often reluctant to commit to adaptation if they do not yet know exactly what they are adapting to.

Second, large-scale engineering or technological investments may not be the most cost-effective way to reduce vulnerability to climate change.¹³ A longstanding literature within development studies¹⁴ has argued that risks posed by disasters and natural hazards are often linked more to social, economic, and even political factors in different contexts rather than simply the size of physical events such as storms and floods. In this sense, social vulnerability to climate change is inseparable from the development context.¹⁵ Accordingly, technology-based measures can only be partially effective if they do not also address nonclimatic factors that are the underlying drivers of vulnerability, which may vary between local conditions. For example, the implementation and effectiveness of new drought-resistant crop varieties is limited by their acceptance in a community, which in turn depends on costs and availability of the seeds, access to fertilizer and other inputs, storage constraints, ease of preparation, and even cultural preferences for flavor.¹⁶

As a result of these concerns, a newly forming, more development-oriented perspective to adaptation considers development and adaptation risks as strongly complementary. Under this approach, adaptation is not only focused on anticipating enhanced physical risks associated with increased greenhouse gas concentrations. Rather, it also addresses developmental needs such as improving access to livelihoods and productive assets to increase the adaptive capacity of poorer, more vulnerable people. Some observers have said any adaptation

intervention can- not stand alone but must go hand-in-hand with development, either through mainstreaming adaptation into development (adaptation plus development), or even by being synonymous with development (adaptation as development).¹⁷ Adaptation as development in effect implies seeing overall development as an effective contribution to withstanding future climate change. This form of development would include acts such as achieving the Millennium Development Goals of reducing poverty, enhancing education and health, improving living conditions, and providing access to financial markets and technologies for poorer countries, communities within countries, and even individuals.¹⁸

Community-based adaptation takes the approach of adaptation as development. Responding to the concept that adaptation is local and place-based, it addresses the locally and contextually specified nature of climate change vulnerability because it takes place at local levels where people encounter impacts, build adaptive capacity, and respond. A community-based approach considers that adaptation strategies must be generated through participatory processes, involving local stakeholders and development and disaster risk-reduction practitioners, rather than being restricted to impacts-based scientific inputs alone. As such, expertise in vulnerability reduction must come from local community-based case studies and indigenous knowledge of locally appropriate solutions to climatic variability and extremes.

Community-Based Adaptation in Bangladesh

Bangladesh is frequently cited as one of the most vulnerable countries to climate change¹⁹ because of its flat and low-lying topography and location on the coast at the top of the Bay of Bengal, which make it vulnerable to cyclones and tidal surges. Moreover, Bangladesh also suffers from a history of impoverishment, high population density, weak political governance, and a reliance of many livelihoods on climate-sensitive sectors, particularly agriculture and fisheries.²⁰ Many of the anticipated adverse effects of climate change, such as sea-level rise, higher temperatures, enhanced monsoon precipitation, and increased cyclone intensity, will aggravate the existing stresses that already impede development in Bangladesh.²¹

The international community has recognized Bangladesh as a particularly vulnerable country for some time, and the country has received disaster management and adaptation support in several sectors. Bangladesh has developed some capacity for dealing with the impacts of climate change at the national level and

has mobilized policy response options that deal with vulnerability reduction to environmental variability in general and, more recently, to climate change in

particular. For example, Bangladesh was one of the first countries to submit its National Adaptation Programme of Action (NAPA) to the UNFCCC and more recently has developed a national climate change strategy to deal with mitigation and adaptation. At the same time, community-based adaptation responses are emerging both autonomously and supported by NGOs and local partners.

One example can be drawn from the Gaibandha district in northern Bangladesh, which is covered by water during the monsoon season, making it impossible to grow crops using traditional methods. The IPCC Fourth Assessment Report notes that climate change will bring greater precipitation extremes, including more intense monsoonal rainfall, which will exacerbate flooding in Gaibandha.²² The international NGO Practical Action is working with local communities in this district to develop ways of allowing farmers to grow food on flooded land, using a process of community-led identification and prioritization of natural resource management options and technologies. Detailed consultation meetings, in addition to assessments of the needs, skills, assets, and capacities of the community through household surveys led to the development of participatory action plans of development, which identified a number of options for tailoring existing and new technologies to meet the needs of the community.²³

For example, the innovative technology of floating gardens, or hydroponics, that villagers have taken up in many other waterlogged and flooded areas of Bangladesh²⁴ has been introduced to Gaibandha. A floating garden is built from a raft of water hyacinth typically about 8 meters long and 1 meter wide. The raft is covered with soil, compost, and manure, in which vegetable seeds are planted. The raft will last just one year but can be used as fertilizer during the dry season. To ensure sustainability of the program, training and input support was tailored to the particular profile of household members, and technologies were accompanied by a widespread climate change awareness program.²⁵ The work in Gaibandha was partly inspired by bad flooding in 2007, which prompted organizations such as Practical Action to look into long-term methods of reducing vulnerability to inundation, as well short-term disaster relief.

Villagers in Gaibandha use floating gardens to grow vegetables such as bitter gourds, green okra, and leafy greens, which provide subsistence for people even during the annual *monga* (period of food shortage). Indeed, in some cases, these vegetables also provide an alternative source of income when surplus is sold in the market. Because the rafts can be moved from place to place, they are also suitable for those who have temporarily or permanently lost their homes and land during increasingly severe flooding conditions.

Measuring the success of any community-based adaptation project is inherently problematic, mainly because the impacts are in the form of outcomes that have *not* happened—in this case, the crops not lost due to inundation and the economic

impacts that did not result.²⁶ It is too early to tell whether the project has resulted in long-term resilience building, given that the project is only four years old, and the project implementers suggest that the real test for the project will depend on whether it can be scaled up.²⁷

In the coastal areas of southern Bangladesh, one further threat of climate change is increasing salinity—the encroachment of saltwater onto and beneath agricultural land. Saltwater makes it difficult to grow crops historically irrigated by freshwater, and it can accelerate the deterioration of buildings. In Mongla district, near the mangrove forests of the Sunderbans, villagers are responding to the threats of salinity by building houses on raised platforms and installing sealed containers of freshwater. Small containers—called *mokti*—are often made of pottery and partly buried into the clay soil surrounding houses to provide reservoirs of freshwater for every house. Larger water tanks of plastic or even concrete are also installed near schools or in village centers to provide a more communal and robust reservoir. The freshwater usually comes from rain that is channeled off roofs into containers. Some wealthier farmers are also converting old rice fields to fishponds and using these to fatten crabs for local restaurants or for consumption in Dhaka, Bangladesh's capital city.

In the coastal district of Noakhali, South Bangladesh, the International Union for Conservation of Nature (IUCN) has been implementing the Promotion of Adaptation to Climate Change and Climate Variability Project, which aims in part to increase adaptive capacity at the community level. One community-based adaptation project under this program involves raising and reinforcing homesteads to make them more resilient against flooding and cyclonic activity, reducing the need for people to flee their homes during extreme weather events and reducing losses. The project brings together a design team of local individuals engaged as village-level house-building specialists, architects, planners, an engineer, a geographer, architecture students from local universities, user groups, and local builders and carpenters to develop preliminary design options. The team selects one family in the community for whom to build the first demonstration house. Once built, a new local design and construction team is formed from the now-experienced local members of the first team, who move the project forward in their community, building other houses in the locality along with the house owners.

House design is based on traditional cultural preferences but incorporate modest technological innovations that help strengthen or otherwise improve parts of the house that are particularly weak and vulnerable in the local climate. These include raising foundations, reinforcing house structures, and creating raised platforms within homes where people can take shelter during floods. Planting extensively along edges of homesteads is a local way of reducing wind impacts.

Community-based adaptation is not restricted to developing countries such as Bangladesh but can also be used among vulnerable communities in more developed regions (see the box on page TK).

Challenges to Community- Based Adaptation

The approaches described above indicate how adaptation to climate change can be integrated with local development needs and economic trends rather than simply being used to slow down physical changes such as rising sea levels or increasing salinity. Proponents of community-based adaptation say it has made excellent progress in achieving place-based resilience building and addressing local social vulnerability rather than assessing climate risk only in terms of physical events. Moreover, donor agencies have shown an interest in investing in community-based adaptation, recognizing that it is a valid approach to building adaptive capacity in vulnerable communities. For example, at the Third International Community-Based Adaptation Workshop in Dhaka in February 2009, the Food and Agricultural Organization of the United Nations announced the possibility of providing funding for small-scale community-based adaptation projects, while other donors—including the World Bank, the United Nations Development Programme, the UK Department for International Development, and the Swedish International Development Cooperation Agency—were actively engaged in conference discussions on the best way to achieve donor support for community-based adaptation.²⁸

However, while community-based adaptation is a vital approach to addressing the vulnerability of communities,²⁹ it also presents many challenges. First, for some analysts, it is unclear how much community-based adaptation differs from community-based “development” in general. This lack of distinction has presented problems for practitioners and funding bodies who require firmer signposts of successful community-based adaptation projects to distinguish good practice.³⁰ Second, does community-based adaptation consist simply of local responses to existing climate variability, rather than a proactive anticipation of future climate *change*? Many community-based adaptation projects do not currently use projections of climate change from research organizations or the IPCC. At the 2009 workshop, IPCC scientists in attendance stressed the importance of consulting climate modelers in community-based adaptation design.³¹ Yet, how useful such information can be at the community level remains an open question. Tools are being developed to improve the accessibility and relevance of downscaled modeled data to community-based adaptation; for example, the weADAPT collaborative³² has created the Climate Change Explorer tool, which displays output from multiple climate models downscaled to a station level and also guides users to help apply these data outputs in meaningful ways. An important element of this tool is its emphasis on the historical context of changes in climate to better

understand future changes; long-term trends occurring in the present may in fact be more important for adaptation in many cases than projected change for 2050.³³

Tools such as the Climate Change Explorer are in the early stages of development, and data is not yet available for all vulnerable regions. Further, as is emphasized by the tool itself, users must be cautious when drawing on the outputs of downscaled climate change models in designing appropriate community-based adaptation projects. From a community-based adaptation standpoint, climatic changes are acknowledged by trying to understand locally observed, historic patterns of change in ways that are meaningful to local people. For some, this represents a strength of the approach, with proponents arguing that a focus on the underlying “drivers” of vulnerability so dependent on the development context represents a much-needed move away from an “impacts-based” approach. Yet if climate change projections are not brought into community-based adaptation projects, then can they really be said to be addressing climate change, and hence be seen as legitimate approaches to climate change adaptation? As noted by one donor representative at the workshop, “good development is not sufficient for adaptation.”³⁴

In turn, these questions also influence how community-based adaptation should be funded. Some donors, such as the World Bank,³⁵ have called for a greater involvement of official scientific assessments of climate change before using climate change funds for community-based adaptation.³⁶ Another option is to fund it through official development assistance. This option raises further challenges, however, since it may then be competing with other local development priorities. Moreover, funding adaptation to climate change through official development assistance faces strong criticisms from developing countries, who argue that climate change is another stressor on top of (albeit exacerbating) underdevelopment, and it should therefore be the responsibility of industrialized countries who have caused this problem to bear the brunt of the additional costs. For example, at the June 2008 meeting of the subsidiary bodies to the UNFCCC, developing countries called for the measurable, reportable, and verifiable use of new and additional funding for climate change-specific activities (as opposed to more general resilience building).³⁷ This principle is recognized by article 4.4 of the UNFCCC, which specifies that developed countries have committed to helping “particularly vulnerable” countries meet the costs of adaptation.³⁸

Another common concern is how to make local lessons of community-based adaptation apply to wider spatial scales (a concept often called “upscaling”). NGOs and academic studies are currently identifying several examples of successful projects at the scale of a household, a village, or a collection of villages.³⁹ But do these local, community-based initiatives offer lessons for how to adapt to climate change at the national scale, or in other countries? The

contextual nature of community-based adaptation makes developing indicators or models problematic, risking the proliferation of a piecemeal approach that lacks clarity and fails to attract wider climate change and development investment.

According to some analysts, the institutional design of community-based adaptation lies in the local deliberations that can identify development needs and cultural preferences, rather than the application of the same technologies or assumptions about livelihoods to different places.⁴⁰ Indeed, one option is to take the existing development assistance known as Sustainable Livelihoods Approaches and sensitize these to future climate risks.⁴¹ Sustainable Livelihoods Approaches make households more resilient to climate shocks either by using migration selectively or empowering households to intensify agriculture outputs and diversify economic activities. For example, in Mongla district of southern Bangladesh, some households are reducing their vulnerability to climate by gaining remittances from family members working in Dhaka and growing freshwater crops in the dry season and crabs in saltwater in the wet season. Addressing climate risk sometimes can mean reducing the dependency of income from agricultural or fishing-based activities.

Finally, perhaps the ultimate criticism of community-based adaptation is that it may not suffice in preventing some impacts of climate change. If current climate change policies fail to prolong atmospheric warming at just 2 degrees Celsius, and if warming approaches 4 degrees or more, then it is likely that large areas of land will, in time, be inundated with seawater. Relocation of villages would therefore be a reality. Community-based adaptation that does not incorporate detailed climate change information or communicate likely scenarios at the community level may discourage the kind of technological or engineering-based approaches to adaptation that a community-based approach seeks to supplement. Perversely, this could lead to a situation in which larger-scale strategic adaptation options that respond directly to future climate change scenarios are alienated even more from the communities they affect because a lack of awareness of the need for such programs will make participation with local people problematic.

Some analysts call this mismatching of expectations a form of maladaptation.

In Bangladesh, such issues are particularly poignant because many communities undertaking community-based adaptation are located in areas threatened by inundation (see the box on page TK).

Conclusions

“Good” adaptation requires consideration of immediate and long-term vulnerability in climatic and developmental terms. There is little point in seeking to adapt to likely climate risks without knowing how social and economic trends

make people vulnerable, or what their needs are. Yet development objectives also need to incorporate projections about how climate will change. In effect, these requirements imply that climate change impacts can be relevant to community-based adaptation, as long as it remains first and foremost a community-driven process. It is important that interventions are consistent with climate change implications and can form part of a wider climate change adaptation strategy in which specific and longer-term climate change impacts can be addressed at a variety of scales.

At the same time, scientific assessments of likely changes in climate need to be open to community-based adaptation as a means of integrating concerns about social vulnerability and development with climate change policy. Especially as we approach the 2009 climate change negotiations in Copenhagen, where a post-2012 deal on managing climate change will be reached, it is important that observers acknowledge the potential of community-based adaptation as an important means of reducing the vulnerability of the poorest communities. Policy dialogue under the UNFCCC needs to be open to a new range of expertise informed by insights from vulnerable communities, generated by local stakeholders and development and disaster risk-reduction practitioners, rather than restricted to impacts-based scientific inputs arising from global or national models alone. One sign of progress can be seen in discussions over UNFCCC's Adaptation Fund, to support adaptation in developing countries that are Party to the Protocol under the UNFCCC. *The Report of the Fifth Adaptation Fund Board Meeting* in March 2009 noted there was broad consensus among members that small-scale and community-based projects should be included in funding cycles and that community-based projects could also be submitted by governments as part of a more strategic adaptation funding package.⁴³

As the community-based adaptation community grows in size and significance, it is likely that the lessons learned from the increasing number of case studies will begin to permeate the negotiations⁴⁴ and help create a better understanding of how to build the resilience of the most vulnerable.

NOTES

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COMMUNITY-BASED ADAPTATION IN THE ARCTIC

It is not only developing countries that are vulnerable to climate change. The small communities along the Arctic coastlines in countries such as Canada, Russia, the United States, and Norway are located in supposedly developed zones yet include some of those countries' poorest people. Moreover, Arctic people are reliant on environmental services threatened by climate change. Indeed, the Arctic rim of North America is often referred

to as climate change's canary in the coal mine, ~~first to experience its effects.~~¹ One major problem associated with climate change is declining ice cover. The Inuit populations of the Arctic rely on ice for transportation to hunt, gather food, generate income, and maintain social connections, so the changing behavior of ice poses a significant threat to the Inuit way of life.

Arctic communities have always lived in conditions of environmental fragility and high variability, and as a result, they have a wealth of traditional knowledge and cultural practices that are helping them to cope with and adapt to new challenges. For example, the Inuit community of the island of Igloo-lik in Nunavut, 320 kilometers north of the Arctic Circle, has developed many behavioral responses to climatic exposures. Indigenous knowledge passed from generation to generation has resulted in flexible hunting and harvesting techniques about what to hunt, when, and where; and how to tell when dog teams indicate thin and unsafe ice is in certain areas. People have also developed risk-averse practices, such as taking extra supplies of food and gas on expeditions and never traveling alone or on land or water where the ice seems thin. Critical to adaptive capacity are social networks such as extended family units, a strong sense of collective community responsibility, and mutual aid, all of which facilitate the sharing of food and equipment and ensure rapid responses to crisis.² A study on developing appropriate adaptation policy in Nunavut, Canada undertaken in 2006³ recommended that interventions to reduce vulnerability

in the Arctic region should be developed in partnership with the local community and draw on this important indigenous knowledge and existing local coping strategies.

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LIMITS TO COMMUNITY-BASED ADAPTATION? THE IMPLICATIONS OF SEA-LEVEL RISE FOR THE COASTAL BELT OF BANGLADESH

The coastal belt of Bangladesh is the site of many community-based adaptation programs that are responding at the community scale to problems such as waterlogging, salinity intrusion, and increasing storm and cyclone severity. But what are the implications of sea-level rise on this region for the sustainability of these projects in the long term? Sea-level rise will result in more coastal flooding under ambient conditions and even more so in the event of storm surges. One prominent 2003 study suggests that a 1 meter rise in sea level would inundate 18 percent of Bangladesh's total land, directly threatening 11 percent of the country's population,¹ while a 2000 World Bank report suggests such a rise would flood 15–20 percent of the land mass and displace 20 million people, mainly from the southern coastal areas.² These projections are very possible by the end of this century, with recent studies that factor in glacial melt suggesting rises of

0.8 to 2 meters by 2100.

In addition, sea-level rise in conjunction with increased frequency and intensity of storms and cyclones has severe implications for coastal inundation in the region. A researcher at the Bangladesh Space Research and Remote Sensing Organization calculated the effect of 2 degrees Celsius warming on a repeat of the devastating 1991 cyclone in Bangladesh, which forced a 6 meter storm surge inland over a wide area, killing at least 138,000 people and leaving as many as 10 million homeless.⁴ The researcher found that the rise in temperature was associated with a 10 percent increase in wind speed and a 0.3 meter rise in sea level. He estimated that this scenario would result in higher storm surges that would inundate 20 percent more land than that of the 1991 cyclone. This prediction

is particularly alarming given that climate scientists are now questioning whether the world can make the rapid reduction of emissions needed to halt warming at 2 degrees Celsius in the face of major economic, technical, and political obstacles. Some are even suggesting that warming of more than 4 degrees is much more plausible.

In the face of such dire implications for the region, there is a sense that community-based adaptation initiatives such as floating gardens and reinforced housing, while undeniably contributing to the short-term adaptive capacity of a small number of people to current climate variability, can only prove a palliative solution for a small proportion of the threatened population. Community-based adaptation in the region is helping people cope with current climatic risks, which will in turn assist in building (or limit the loss of) assets and entitlements that can contribute to adaptive capacity over a longer time scale. However, if they are not integrated into wider and more strategic policymaking processes that addresses the longer-term and wider-scale implications of climate change, such interventions can only be short term, assist a very small number of people in relation to the threatened population, and may result in only coping against risks that perhaps should be recognized as unmanageable without much larger interventions. Coping with added shocks and stresses implies that people are able to deal with these while maintaining their original (vulnerable) state but are not able to address the myriad challenges that constrain lives and livelihoods and make people vulnerable in the first place. Adaptation, on the other hand, suggests a process that reduces vulnerability and builds resilience to climatic stresses, facilitating more general improvements to the quality of human lives.⁶

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